Early Implementation of a Standards-Based Mathematics Curriculum: Understanding Teacher Perspectives and Concerns

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Early Implementation of a Standards-Based Mathematics Curriculum:

Understanding Teacher Perspectives and Concerns

by

Karen Ann Prigodich

A dissertation submitted in partial fulfillment of the requirements for the degree of

Doctor of Education

in

Educational Leadership: Curriculum and Instruction

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Abstract

Standards-based mathematics curricula are intended to shape teachers’ classroom instruction in alignment with the content and practices of the Common Core State Standards for Mathematics. Instructional leaders facilitating teachers’ implementation of these curricula frequently offer a variety of resources and structures to support effective curriculum use, but teachers themselves do not always find these supports to be helpful. Because teachers’ concerns vary, understanding teachers’ own perspectives is an important starting place for aligning support with teachers’ needs. This case study explored the concerns of teachers from three U.S. school districts during their first year of implementing Bridges in Mathematics, a standards-based elementary school mathematics curriculum. Using the Concerns-Based Adoption Model’s Stages of Concern as a theoretical framework, this study identified what teachers perceived as barriers to their classroom implementation of this standards-based curriculum, and the supports they believed would help them overcome these barriers. Data from teacher surveys and interviews showed that these perspectives differ for teachers from different Stages of Concern. The findings of the study were used to develop composite descriptions that provide portraits of teachers whose primary concerns are Self-related, Task-related, or Impact-related. Recommendations are offered for curriculum leaders to align differentiated support for teachers of each concern type.
Dedication

For my parents, Hans and Lois Blom,

and my children, Anneka and Adric Prigodich

with gratitude for your unwavering confidence and unconditional love.
Acknowledgements

In the preface to his 1910 book, How We Think, John Dewey wrote, “It is hardly necessary to enumerate the authors to whom I am indebted. My fundamental indebtedness is to my wife” (p. iii). While I did, in fact, decide that a reference list was a necessary element of this dissertation, I also acknowledge that my work rests not only on the ideas of those whom I have cited here, but also on the fundamental support of many who have invested in me throughout my life.

When I was six years old, I came home from school and said, “Mommy, when I grow up, I’m going to be a 2nd grade teacher, just like Mrs. Polinsky.” I remember little of her lessons or pedagogy, but I remember how her class made me feel. It was a welcoming space of ideas and community where I was valued and loved. Fifteen years later, after completing my elementary teaching credential, I returned to Mrs. Polinsky’s class to volunteer for a week out of gratitude for her impact on my life. She was one of the first of many inspirational teachers who shaped me as a learner and a writer.

Mr. Basaraba was my English and Latin teacher in high school, a kind and professorial Jesuit with a quick wit and gracious regard for his students. He taught me to dig just a little bit deeper to turn a good sentence into a great one. I still cannot begin a sentence with the word “there”; it’s not wrong, but pausing to think harder always leads me to a more elegant and expressive turn of phrase.

In my undergraduate studies at Wheaton College, Dr. Terry Perciante first lifted the veil of procedural thinking to reveal the beauty of mathematics, leaving me marveling that 15 years of success in math class had left me oblivious to its existence, and inspiring me to ensure that the students I taught at least caught a glimpse of it much earlier in their
lives than I did. Dr. Jillian Lederhouse not only first helped me learn the instructional methods for effective mathematics teaching, but modeled for me what it looked like to complete her doctorate well into her teaching career while working and parenting her children. I was honored to be a case-study subject in her own dissertation research.

I am indebted to each professor in my doctoral program, including Dr. Swapna Mukhopadhyay, who taught me to think critically about who benefits from unjust systems; Dr. Danelle Stevens, who taught me the power of writing just 15 minutes a day; Dr. Moti Hara, who allowed me to taste the intricacies of statistical analysis; and Dr. Dot McElhone, who made esoteric research paradigms both accessible and practical. I am equally indebted to my classmates and peers, particularly Dr. Rurik Nackerud, Dr. Mary Duden, and Dr. James Gambrell, who struggled alongside me, finished before me, and continued to cheer me across the finish line.

Few doctoral students are so fortunate as to have a dissertation committee made up of not only wise and exceptional scholars but also kind and gracious mentors. Dr. Pat Burk, Dr. Anita Bright, and Dr. Paul Latiolais exemplify all of these traits, and I am deeply grateful for their insights and support. Dr. Nicole Rigelman, my advisor and chair, has been my mentor for nearly 20 years. Nicole, not only have you profoundly shaped my scholarship and instruction, but more times than I can count, you’ve provided the listening ear and calm voice that has kept me from giving up on myself. Thank you for always keeping a path open for me to move forward.

I could not have fathomed when I began this program how difficult the road would become, or how drastically my life would be changed by the end of the journey. I would not have survived had it not been for the love, prayers, and practical support of so
many friends, including Sarah, Amy, Joan, Beth, Jill, Alicia, Rita, Mary, Thuy, Shelley, Tracie, Gina, Heather, Debbie, Gail, DaVinda, Kathy, Michelle F., Sanna, Luann, Sherry, Sue, Cindy, Michelle D., Cheryl, Mary J., the Band Moms, Pastor Robin, and the women of Lake Grove Presbyterian Church. To paraphrase the angel Clarence, no one is a failure who has friends, and how could I fail with so many women such as you at my side?

During the many hours of study and writing, no presence was so constant, so patient, or so undemanding as my Lakeland Terrier, Josie, who was literally by my side every day and every night of this journey. I promise, we’ll do more walkies again soon.

Throughout my life, my mom has been my most impactful teacher, exuberant cheerleader, wisest counselor, and dearest friend. It was near the start of my doctoral program that she was diagnosed with normal pressure hydrocephalus, and she declined as I progressed. Watching the inexorable decay of her capable body and brilliant mind was excruciatingly painful, yet she remained a sanctuary of faith, hope, and love for me right up until her death two years ago. Since then, my dad has carried on with unwavering encouragement and support, urging me forward through grief and despair. I love you, Daddy. I could not have done this without you.

And, finally, to my kids—Anneka and Adric: you were 10 and 7 when I embarked on this journey, and are now 19 and 16. When I look back and consider the toll the past nine years have taken on you, I sometimes wonder if the sacrifice was too great. Perhaps it was. And yet, you still look at me with unconditional pride and love. Know that I see you through those same eyes; the greatest joy of my life is watching you becoming ever more fully the people you are created to be. Pursue your dreams. I’m right beside you, cheering you on. I love you bunches and bunches, googolplexian times infinity plus one.
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Chapter 1: Problem Statement

Years of efforts to reform mathematics instruction in U.S. schools have had limited impact at the classroom level. Examinations of classroom teaching practices indicate that mathematics instruction in U.S. classrooms is more likely to reflect traditional procedural pedagogy of the last century than the standards-based practices advocated by reformers (Jacobs et al. 2006; Stigler & Hiebert, 2004; Weiss et al., 2003; Weiss & Pasley, 2004). While one intention of standards-based mathematics reform has been to equalize the content of what students have the opportunity to learn (NCTM, 2000), the reality of how standards have been implemented has not been equitable. Classroom instruction for low-SES students, particularly in poor, urban districts, tends to focus on more basic and procedural aspects of mathematics at the expense of more advanced content (Schmidt & McKnight, 2012). Gaps in student achievement reflect continued inequities in opportunities to learn, especially for economically disadvantaged students, marginalized racial and ethnic groups, and English language learners (Flores, 2007). Without identifying and addressing ways to support effective classroom implementation of reform, the current iteration—the Common Core State Standards in Mathematics—will be just another postscript in the history of U.S. mathematics reform (Larson, 2012).

One such support that has received significant attention is the use of standards-based curriculum materials, designed to support teachers in instruction that aligns to the Common Core State Standards. While some research has found that students in classrooms that use these curricula have a greater opportunity to learn mathematics at
deeper levels, other studies show little difference in the instruction in classes using these curricula versus those using more traditional materials (Arbaugh et al. 2006; Charalambous & Hill, 2012). It is only when the implementation of these curricula reflects instructional practices such as making conjectures and explaining strategies, sharing multiple perspectives, and building conceptual understanding from discussion of students’ ideas about math, that a significant positive impact on student learning is seen (Stein et al. 2008; Tarr et al., 2008; Wenglinsky, 2002). Classroom instructional practices such as these are more likely to be present in classrooms using standards-based curricula, but the degree to which this is the case depends upon the ongoing professional development and support received by teachers (Loucks-Horsley et al., 2010; Thompson & Zeuli, 1999). When teachers do not feel that the support they receive when implementing curriculum addresses their primary needs and concerns, this can lead to uneven and ineffective use of curriculum in the classroom (Guskey, 2002).

Recognizing that student learning of mathematics “depends fundamentally on what happens inside the classroom as teachers and learners interact over the curriculum” (Ball & Forzani, 2011, p. 17), it is important to identify the specific concerns teachers have about implementing a standards-based curriculum, what they perceive as barriers to implementation, and the supports they feel would be most helpful in the implementation process. Without identifying these concerns and needed supports, it will be difficult to ensure that the curriculum is implemented effectively and sustainably (Roach et al. 2009).
Background of the Problem

In this section, I describe research on teachers’ response to mathematics reform in general and the factors that affect how they implement it in their classrooms. I also examine research that specifically focuses on teachers’ use of standards-based curricula. Finally, I describe this research study, designed to understand teachers’ concerns about their use of a standard-based mathematics curriculum and the supports different teachers identify as being helpful to overcoming barriers to effective implementation.

Factors Affecting Teachers’ Implementation of Reform

Research explores many factors that impact teachers’ implementation of mathematics reform. For example, teacher beliefs about mathematics and pedagogy have a strong impact on how they implement standards-based reform (Handal & Herrington, 2003; Wilkins, 2008). Likewise, teachers’ implementation is shaped by their beliefs about their own efficacy in using standards-based instructional practices (Charalambous & Philippou, 2010; Ross & Bruce, 2007). Teachers’ math content knowledge (Ball et al. 2001) and their own experiences with learning mathematics as K-12 students (Drake & Sherin, 2006) and in preservice teacher preparation programs (Manouchehri, 1997) also affect how they use and adapt reforms in their classrooms. Finally, teachers’ implementation is affected by the ongoing support they receive through professional development (Loucks-Horsley et al., 2010; Thompson & Zeuli, 1999; Walker, 2007), peer collaboration (Bruce & Ross, 2008; Eaker & Keating, 2012; Tam, 2015) and coaching (Anstey & Clarke, 2010; Obara, 2010).
Implementing a Standards-Based Math Curriculum

Prior research on teachers’ implementation of standards-based curriculum sheds some light on how teachers use these materials. In contrast with more traditional mathematics textbooks which have historically emphasized mathematical knowledge and skills through procedural practice, standards-based curricula tend to emphasize conceptual understanding as well as procedural fluency, and encourage students to engage in reasoning and communication skills through solving complex problems and discussing their thinking with others (Charalambous & Hill, 2012; Trafton et al., 2001). Teachers differ in the extent to which they implement the shifts required by standards-based curricula (Stickles, 2011). Some appear to implement these materials relatively easily. Others struggle to make sense of changes but ultimately find the challenge to be rewarding. Still others never fully embrace these new curricula and resist implementation (Lambdin & Preston, 1995). While the characteristics of these different types of teachers have been described, more research needs to be done on understanding the perspectives of different teachers, the ways in which they respond to standards-based curricula, and the barriers or supports that hinder or facilitate their ability to navigate change (Manouchehri, 2003).

Context of the Problem

Bridges in Mathematics is a curriculum that emphasizes standards-based mathematics content and practices. According to the publisher, Bridges is a comprehensive PK–5 curriculum that equips teachers to fully implement the Common Core State Standards for Mathematics in a manner that is rigorous,
coherent, engaging, and accessible to all learners. The curriculum focuses on developing students’ deep understandings of mathematical concepts, proficiency with key skills, and ability to solve complex and novel problems. (The Math Learning Center, n.d.)

Teachers implementing the curriculum are expected to teach math for 80 minutes a day, utilizing a wide range of instructional strategies and materials. The lesson materials are designed to encourage student exploration of math concepts through concrete and visual models and communication of their thinking through classroom sharing and discussions. These types of activities may represent a significant shift for many teachers, particularly in their first year of implementation (Jacobs et al., 2006; Stigler & Hiebert, 2004; Weiss et al., 2003; Weiss & Pasley, 2004).

For this study, I identified three school districts in their first year of using Bridges. Two districts, one with a student population of about 3,800 and the other around 20,000, were located in suburbs of cities in the northwestern United States. The third district, with a student population of about 3,200, was located in a suburb of a large midwestern U.S. city. State report card data from the school year prior to these districts’ adoption of Bridges showed between 33% and 43% of elementary students in the northwest school districts and approximately 75% of the midwestern district’s students were meeting achievement benchmarks on national assessments in mathematics prior to the implementation of Bridges. While all three districts were in states that had adopted the Common Core State Standards for Mathematics (CCSSM), the two northwestern states used the standardized assessment of the Smarter Balanced Assessment Consortium
(SBAC) to measure students’ mastery of the CCSSM, and the midwestern district used the assessment from the Partnership for the Assessment of Readiness for College and Careers (PARCC). The midwestern district had a comparatively low rate of economically disadvantaged students and those from historically underserved races (approximately 10% by both measures), whereas these rates were much higher in the northwestern districts (approximately 45% by both measures in each northwestern district). One of the northwest school districts identified 30% of their students as English language learners, while the rate in each of the other two districts was approximately 13%. Each of the three districts had selected Bridges during a curriculum adoption process the previous year, and was in the first year of implementation.

I work as a workshop leader for users of the Bridges curriculum, providing initial training for teachers upon adoption of the materials, and providing follow-up support in the early months and years of implementation. In my experience, I have found that virtually all teachers struggle at least to some degree during their first year of implementation. However, I hear many different expressions of what this struggle looks and feels like for individual teachers. As others have found (Lambdin & Preston, 1995; Stickles, 2011), I have seen some teachers embrace the struggle, while others find it overwhelming. It has not been clear, however, what differences may exist between these teachers with regard to their particular concerns, or the supports they need to overcome these implementation challenges.
Statement of the Research Problem

Therefore, the purpose of this study was threefold: (a) to understand the concerns of teachers and what they perceive as barriers to the classroom implementation of *Bridges in Mathematics*; (b) to identify teachers’ perceptions of the supports and bridges they believe will help them overcome barriers to implementation; and (c) to develop a framework describing the needs of teachers at various stages of concern and aligning these with teacher perceptions of barriers and bridges to implementing a standards-based curriculum. In this study, standards-based curricula are defined as those that reflect reform-oriented pedagogies as well as content that is aligned with state and national standards. While the findings of this study are applicable for a variety of leaders, such as curriculum developers or school district administrators, my primary goal is to equip instructional leaders such as instructional coaches, teacher leaders, professional learning specialists, or building principals to provide effective support for teachers in their first year of implementing a standards-based curriculum such as *Bridges*.

Significance of the Research Problem

In this section, I delineate the reasons why teachers need to be equipped and supported in the effective implementation of standards-based math curricula. These reasons include changes to national standards in support of mathematics reform; the limited progress and ongoing challenges in implementing this reform, including concerns about equity; and the role of curriculum in addressing these challenges.
Standards-Based Mathematics Reform

Released in 2010, the Common Core State Standards for Mathematics (CCSSM) set expectations for both mathematical content and mathematical practice (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). These standards are designed to provide a foundation for rigorous, focused, and coherent instruction. They stress both procedural skill and conceptual understanding so that students construct the knowledge they need for success at higher levels. In addition to defining the mathematical content that students should learn, the CCSSM also place a strong emphasis on mathematics processes, listing eight Standards for Mathematical Practice in which students should engage while learning and doing mathematics. These practices provide specific descriptions of learner behavior, describing them “both as a goal and as a means of learning mathematics” (NCTM, 2010, p. 13).

Progress and Challenges. In Principles to Actions (2014), NCTM looks back on 25 years of standards-based mathematics reform and identifies many positive changes in student learning. Since the publication of the NCTM Standards in 1989, there has been a steady rise in the number of students scoring “proficient” or above on the National Assessment of Educational Progress (NAEP) in mathematics (13 percent in 1990 to 42 percent in 2013 for fourth graders; 15 percent in 1990 to 35 percent in 2013 for eighth graders) (National Center for Education Statistics, 2013). This increase in achievement has been true for all students, regardless of gender, ethnicity, or socioeconomic status. Likewise, the average mathematics scores on the Trends in International Mathematics
and Science Study (TIMMS) assessment for U.S. fourth and eighth grade students rose 23 and 17 points, respectively, between 1995 and 2011 (NCES, 2013). These data indicate that the mathematics achievement of U.S. students is at historically high levels.

Despite these gains, however, significant challenges remain. Examinations of classroom teaching practices indicate that mathematics instruction in U.S. classrooms does not currently reflect the emphasis on mathematical processes or the focus, coherence, or rigor called for by the CCSSM (Schmidt & McKnight, 2014). Nor does it reflect the vision of effective teaching practice promoted by NCTM (Jacobs et al., 2006; Stigler & Hiebert, 2004; Weiss et al., 2003; Weiss & Pasley, 2004). Analysis of video from U.S. eighth-grade mathematics classrooms from the 1999 Third International Math and Science Study (TIMSS) revealed that instruction placed strong emphasis on practicing skills through repetitive procedures and little on mathematical reasoning and conceptual development (Jacobs et al., 2006). Even more striking was the finding that even when problems offered the potential to make connections to mathematical concepts, virtually every U.S. teacher studied instead transformed these problems into procedural exercises (Stigler & Hiebert, 2004). In another study of more than 350 elementary, middle, and high school lessons from across the United States, instruction was rated for quality based on indicators such as student engagement with significant mathematics, respectful and rigorous classroom culture, effective questioning, and an emphasis on making sense of the content (Weiss et al., 2003). Fewer than one in five of U.S. mathematics lessons were found to “be strong in intellectual rigor; include teacher questioning that is likely to enhance student conceptual understanding; and provide
sense-making appropriate for the needs of the students and the purposes of the lesson” (p. 119). Overall, researchers in this study judged 59% of U.S. mathematics lessons to be low quality and only 15% to be high quality. Based upon this examination of progress and challenges, NCTM summarizes the current need by saying, “we must move from ‘pockets of excellence’ to ‘systemic excellence’ by providing mathematics education that supports the learning of all students at the highest possible level” (NCTM, 2014, p. 3).

**Equity concerns.** Compounding these issues are the effects of race and poverty on students’ opportunities to learn mathematics. In the book *Inequality for All: The Challenge of Unequal Opportunity in American Schools*, Schmidt and McKnight (2014) consider the effects of geography and economic status on classroom mathematics instruction. They found that, when compared to their peers in wealthier districts, low SES students in urban classrooms tended to focus on more basic and procedural aspects of mathematics at the expense of more advanced content, limiting their opportunities to learn and leading to lifelong consequences.

These findings are confirmed in *The Opportunity Myth*, a research report by education non-profit TNTP (2018), which found that only 16% of nearly 1,000 core-subject lessons observed across five diverse school districts offered strong instruction, defined as lessons taught with instructional practices that engaged students with grade-appropriate content in robust ways. Moreover, the opportunity to learn from strong instruction was not distributed equitably across all students. Students of color and those from low-income backgrounds had far fewer opportunities to engage in deep thinking in classrooms. Strong instructional practice was 3.5 times as likely to happen in classrooms
with mostly white students, and over five times as likely in classrooms from higher-income backgrounds.

According to Flores (2007), disparities in student achievement between different economic, racial, and ethnic groups reflect not an *achievement gap* but rather an *opportunity gap*. Ladson-Billings goes a step further, refocusing the issue as an *education debt* (2006). In such a system, write Schmidt and McKnight, “the result may be the poor getting poorer and the wealthy getting wealthier, both educationally and, in the long term, economically as well” (p. 90).

**Standards-Based Mathematics Curricula.** The use of a standards-based mathematics curriculum can have a significant impact on improving teachers’ classroom practice, but this is not always the case (Charalambous & Hill, 2012). Teachers’ implementation of the same curriculum varies widely both in quality and in terms of integrity to the intention of the curriculum (Arbaugh et al., 2006; Lambdin & Preston, 1995; Stein et al., 2007). The impact of a standards-based curriculum on student learning depends greatly on the extent to which the implementation of that curriculum aligns with high-quality instructional practices (Stein et al., 2007; Tarr et al., 2008). While the intention of a curriculum such as *Bridges* is for teachers to utilize instructional practices that engage students with content in rigorous ways, (Math Learning Center, n.d.), it is important to understand the factors that limit the effective implementation of the intended curriculum.
Presentation of Methods and Research Questions

In the last section of this chapter, I state the questions guiding my research and will briefly describe the methods I used to answer these questions. I also define the key terms and concepts that are central to my work.

Methods

In an effort to understand the barriers to the implementation of reform, many researchers have identified factors that influence instructional change at the classroom level. Some have explored the influence of teachers’ own experiences with mathematics (Drake & Sherin, 2006; Manouchehri, 1997) or their mathematical content knowledge (Ball et al., 2001). Others have identified teachers’ beliefs about mathematics and pedagogy (Handal & Herrington, 2003; NCTM 2014, Wilkins, 2008) or their beliefs in their own efficacy (Charalambous & Philippou, 2010; Ross & Bruce, 2007) as potential barriers to change. And many have considered the importance of the support teachers receive in facilitating change in their instructional practice (Anstey & Clarke, 2010; Bruce & Ross, 2008; Eaker & Keating, 2012; Walker, 2007). While studies such as these go a long way in helping make sense of the intricacies of mathematics reform and the barriers that need to be overcome in classroom implementation, I believe it is profoundly significant that teachers’ own voices play a limited role in the discussion of how best to support them in this process. Research studies that reflect teachers’ concerns and perspectives on the barriers and bridges to the classroom implementation of mathematics reform are rare (Manouchehri, 2003).
For this reason, this study used a questionnaire from the Concerns-Based Adoption Model (George et al., 2006) to identify the Stages of Concern (SoC) of teachers in their first year of implementing the *Bridges in Mathematics* curriculum and explored teacher perceptions of their needs and the supports they felt would be beneficial to them. I used a mixed methods approach to identify and explore teacher concerns. First, a SoC survey was given to district teachers and was scored to identify a stratified sample of teachers at various SoC. Next, I conducted individual interviews with teachers at various SoC to deepen my understanding of their concerns and to identify the supports they felt would help them overcome barriers to change in their classroom practice. Finally, I coded and analyzed these data to develop a model of teachers’ needs and SoC that can be used as a framework for understanding the needs of teachers at different stages of concern when implementing standards-based mathematics curricula.

**Research Questions**

Understanding teachers’ concerns about standards-based curricula and what different teachers perceive as barriers and supports toward implementing these curricula in their classrooms has benefits for several different stakeholders. Results from this study may be beneficial to instructional leaders who support teachers in the implementation of standards-based curricula, or even to curriculum publishers building these supports into the curricula themselves. This framework of teacher concerns and supports for change could allow instructional leaders to target their support, differentiating the allocation of resources according to the varying needs and concerns of teachers. This support for instructional leaders will, in turn, provide indirect benefits for teachers themselves.
IMPLEMENTING A STANDARDS-BASED MATH CURRICULUM

through more effective support in navigating standards-based curricula and the removal of challenging obstacles to their implementation efforts. Ultimately, through this support of teachers, it is students themselves who will receive the greatest benefit through classroom instruction that more closely aligns to the intentions of standards-based curricula.

The following research questions guided this study:

1. What are the concerns of different teachers with regard to the classroom implementation of the Bridges in Mathematics curriculum?

2. What do teachers at different Stages of Concern perceive as barriers or bridges to their classroom implementation of this curriculum?

From this research, I have developed a framework describing the needs of teachers at various stages of concern and aligning these with teacher perceptions of barriers and supports for curriculum implementation.

Definitions of Terms

The following is a list of definitions for key terms relevant to my problem of practice and my research study.

Standards-Based Mathematics Reform

Standards-based reform is a movement in educational practice that seeks to improve instruction by utilizing curriculum materials and instructional practices that are aligned to and rooted in standards established by educational authorities. In mathematics, the primary professional organization responsible for establishing and promoting standards over the past two decades has been the National Council of Teachers of
Mathematics (NCTM). Building on its vision for school mathematics in the 1980
document Agenda for Action, NCTM published the original Curriculum and Evaluation
Standards for School Mathematics in 1989, followed by professional standards for
School Mathematics (NCTM, 2000) refined and built upon previous work to develop new
standards for mathematical content and processes. The pursuit of coherence in the
standards across the grade levels led to the publication of Curriculum Focal Points for
Prekindergarten through Grade 8 Mathematics in 2006. Together, these documents have
laid the foundation for standards-based mathematics reform. The Common Core State
Standards in Mathematics (CCSSM), while developed independently, built upon the
vision articulated by NCTM (2010) and the National Research Council’s report Adding it
Up (Kilpatrick et al., 2001). In this study, the CCSSM provides the context of standards-
based mathematics reform.

Standards-Based Mathematics Curriculum

While the term curriculum has been defined and used in many ways (c.f. Stein et
al., 2007), for the sake of this study, curriculum is defined as a collection of teacher
guides, student books, and other related materials that are used by teachers in classroom
mathematics instruction. These instructional materials are often developed by a publisher
as a coherent program and adopted by schools for classroom use. These materials are
designated as standards-based when they are aligned to the mathematical content and the
student learning practices and dispositions defined by the standards themselves (Trafton
et al., 2001). Trafton et al. describe standards-based mathematics curricula as
comprehensive, coherent materials that engage students in mathematical sense-making through an in-depth exploration of concepts and ideas. Contrasting them with more traditional or conventional materials, Charalambous and Hill (2012) note that these standards-based mathematics curricula:

- included more problems set in realistic contexts and fewer exercises requiring only arithmetic or algebraic computation; they placed more emphasis on problem-solving, alternative solution methods, and discussions of multiple methods and answers; and they incorporated lessons designed to engage students in mathematical reasoning and communication and increase their problem-solving capacity and confidence in doing mathematics. (p. 448)

The standards-based mathematics curriculum used in the context of this study is *Bridges in Mathematics*, described by the publisher as a “comprehensive and standards-based” curriculum, “built from the ground up to fully address Common Core State Standards” (Math Learning Center, n. d.).

*Effective Mathematics Teaching Practices*

In Principles to Actions (2014), NCTM synthesizes a wide body of research to define *effective mathematics teaching practice* as teaching that “engages students in meaningful learning through individual and collaborative experiences that promote their ability to make sense of mathematical ideas and reason mathematically” (p. 7). The book goes on to present, describe, and illustrate a set of eight research-informed teaching practices that support the mathematics learning of all students. These include

1. Establish mathematics goals to focus learning
2. Implement tasks that promote reasoning and problem solving
3. Use and connect mathematical representations
4. Facilitate meaningful mathematical discourse
5. Pose purposeful questions
6. Build procedural fluency from conceptual understanding
7. Support productive struggle in learning mathematics
8. Elicit and use evidence of student thinking (NCTM, 2014, p.10)

For the purpose of this study, these eight practices define effective mathematics teaching.

Concerns

According to an early manual for the Stages of Concern Questionnaire, a concern is defined as “the composite representation of the feelings, preoccupation, thought, and consideration given to a particular issue or task” (Hall et al., 1979, p. 5). In a later version of the manual, the authors add that these concerns arise when, due to external forces (the influence of others) or internal forces (our personal history, personality dynamics, motivations, needs, feelings, education, roles, and status) our thoughts and feelings about something are heightened (George et al., 2006, p. 7). They note that these concerns are created and shaped by our perceptions. Different individuals may have very different levels and types of concerns about the same set of facts, depending on their point of view. Therefore, in this study, I was interested in exploring teachers’ concerns based upon their individual perceptions of the use of the Bridges curriculum for classroom instruction.
For the purposes of this study, the terms *needs* and *supports* are largely overlapping. *Supports* are defined as tools, resources, or opportunities provided to teachers with the intention of equipping them for successful classroom implementation of mathematics reform. Resource examples might be tools embedded in curriculum materials or those provided by a school in support of that curriculum, such as guidance documents, instructional materials, assessment tools, or technology. Examples of support opportunities, or *bridges* to implementation, might be planning time, coaching, or various types of professional development. Teacher *needs* can be thought of as supports which are missing or which teachers would find helpful in addressing their concerns. Another related term would be *barriers* which are defined as obstacles that make it difficult for teachers to successfully implement a standards-based mathematics curriculum. These barriers may be internal, such as limited content knowledge or pedagogical skill, or external, such as a lack of instructional materials, inadequate planning and/or instructional time, or large class sizes with great and diverse student needs.

In this chapter, I have described the need for understanding teacher concerns about implementing standards-based mathematics curriculum and provided a rationale for why this problem is worthy of study. I have stated the purpose for the study and identified the research questions that have defined the scope of my inquiry, and I have introduced key concepts and terms. In Chapter 2, I present a synthesis and critique of literature relevant to my problem of practice and this study. This includes research establishing the Concerns-Based Adoption Model as a theoretical framework, literature
on teachers’ interactions with standards-based mathematics curriculum, and research on the methodologies and instruments used in my study.
Chapter 2: Literature Review

A teacher is the fulcrum in a system that seeks to transfer the change forces of reformers and policy makers into the classroom experience of students, and curriculum is frequently used as a lever to facilitate this process (Luttenberg et al., 2013; Stein & Kim, 2011). Valverde et al. (2002) write that textbooks “are intended as mediators between the intentions of the designers of curriculum policy and the teachers that provide instruction in classrooms” (p. 2). The enormity of these forces places pressure on teachers that can be overwhelming. While curriculum is intended as a tool to equip teachers in this work, implementing curriculum well can be another tremendous challenge for teachers, particularly when that curriculum calls for instructional roles and skills that are a departure from teachers’ historical practice. Instructional leaders seek to mitigate some of this burden on teachers by offering various scaffolds such as professional development, coaching, and implementation resources, but teachers themselves do not always find these supports to be helpful or are unsure about how to incorporate the learning into their day-to-day practice. The needs of teachers vary, and the one-size-fits-all approach to curriculum implementation used in many educational settings fails to address this range of needs.

In the previous chapter, I described the threefold purpose of this study: (a) to understand the concerns of teachers and what they perceive as barriers to the classroom implementation of Bridges in Mathematics; (b) to identify teachers’ perceptions of the supports they believe will help them overcome barriers to implementation; and (c) to develop a framework describing the needs of teachers at various stages of concern and
IMPLEMENTING A STANDARDS-BASED MATH CURRICULUM

aligning these with teacher perceptions of barriers and bridges to the implementation of a standards-based curriculum. The research questions that guided the study are:

1. What are the concerns of different teachers with regard to the classroom implementation of the *Bridges in Mathematics* curriculum?

2. What do teachers at different Stages of Concern perceive as barriers or bridges to their classroom implementation of this curriculum?

In this chapter, I situate my study conceptually by describing and analyzing the Concerns-Based Adoption Model as a theoretical framework relevant to my research problem. I then describe, analyze, and critique research literature in areas relevant to my study, laying a foundation for my work and constructing an argument for how my study will contribute to what is known about the problem. Finally, I review the methodologies I have chosen to support my inquiry into my research questions.

**Theoretical Framework**

The theoretical framework for my study is informed by my own background as a teacher, instructional coach, teacher educator, and *Bridges in Mathematics* workshop leader. In addition, I utilize the Concerns-Based Adoption Model (CBAM), which provides both a theoretical and methodological framework for understanding and measuring the implementation of change in educational contexts.

**My Experience**

In my own 28 years of experience in public schools, I have observed many teachers in many different settings navigating the changes schools attempt to implement in response to larger mathematics reform efforts. Typically, these initiatives have had
limited impact on teachers’ work in the classroom. Reforming mathematics teaching and learning requires teachers to engage in significant shifts. These shifts are internal—their identities as mathematicians and as teachers, and external—their instructional practice and work with students. Because I believe that these shifts are important, are difficult, and are individual, my goal is to be able to equip and support teachers as they navigate these changes. I want to understand what this process looks like for different teachers and what helps and hinders them in the change process.

**Concerns-Based Adoption Model**

The Concerns-Based Adoption Model (CBAM) provides the theoretical framework for my study. A significant body of literature has been written about CBAM, a model with three diagnostic dimensions that examines practitioners’ beliefs and feelings about an innovation, describes what the innovation looks like in practice, and gauges the degree to which they are utilizing the innovation (Anderson, 1997; Hall & Hord, 2020; Hall, Wallace Jr., & Dossett, 1973; Hord & Roussin, 2013).

**Assumptions About Change.** This model is undergirded by a set of assumptions about change: (1) change is a process; (2) change is individual; (3) the perceptions and feelings of individuals are crucial to successful implementation; (4) individuals proceed through stages in their feelings about, perceptions of, and level of skill in use of an innovation; and (5) change facilitators must proceed systematically, assess regularly, and provide support continually (Hall & Hord, 2020; Hall & Loucks, 1978; Loucks, 1983; Tunks & Weller, 2009).
These assumptions lead to several principles for implementing change (Hall & Hord, 2020; Loucks, 1983). If change is a process, time must be allowed both to prepare individuals for change and to allow them to grow in its implementation. If change is individual and feelings are crucial, then individuals must be allowed and expected to proceed at their own pace and with their own degrees of trauma. If individuals progress through developmental stages in the implementation of change, then leaders can use knowledge of these patterns to design and sequence support activities to address questions and concerns as they arise.

**Beliefs About Change.** In addition to these six underlying assumptions about change, Hord and Roussin (2013) describe six fundamental beliefs about change that shape their approach to supporting its implementation. First, they believe that “all change is based on learning, and improvement is based on change” (p. 2). This belief centers on change as an opportunity for adults to come together to learn, rather than being driven by external forces. Second, they believe that “implementing a change has greater success when it is guided through social interaction” (p. 3). This leads to an invitational approach to change that has greater sustainability due to networks of social support. A third belief is that “individuals have to change before the school can change” (p. 3). Each individual comes to a change with his or her own concerns and levels of readiness. These must be addressed at an individual level in order to influence change at a systemic level. Fourth, Hord and Roussin believe that “change has an effect on the emotional and behavioral dimensions of humans” (p. 3). Because change can be stressful, it often leaves people feeling disoriented and confused. A failure to attend to the emotional aspects of change is
IMPLEMENTING A STANDARDS-BASED MATH CURRICULUM

a significant factor in the failure of reform efforts (Saunders, 2013). In addition, as individuals implement change, their behavior tends to move across a spectrum that ranges from non-use of the innovation to full implementation. Acknowledging these behavioral stages allows leaders to lessen stress by offering appropriate support as teachers grow. A fifth belief undergirding CBAM’s approach to change is that “people will more readily choose to change when they foresee how an innovation will enhance their work” (Hord & Roussin, p. 3). This belief is consistent with Knowles’ (2012) principles of adult learning theory which state that adults want to know why they are learning something before undertaking learning, that they become ready to learn when they see an immediate need for new knowledge, and that they are most motivated to learn when new learning will help them perform tasks or deal with problems they confront in everyday situations. A sixth and final belief articulated by Hord and Roussin (2013) is that “a change leader’s role is to facilitate the conversations that invite others to own the desired change” (p. 3). Hord and Roussin call for leaders to transfer ownership of learning to the learners, using discourse to facilitate this process. They write, “Conversations are not the end, but rather the means to gain action and envision new behaviors of the innovation” (p. 3).

**CBAM As an Implementation Bridge.** The authors of CBAM view the implementation of change as a journey across a chasm between the adoption of an innovation and its full implementation resulting in improved student outcomes. They describe the CBAM model as the implementation bridge across that chasm (Hord & Roussin, 2013). This implementation bridge (see Figure 2.1) includes three diagnostic dimensions: Stages of Concern (SoC), Levels of Use (LoU), and Innovation.
Configurations (IC). The Stages of Concern dimension addresses the feelings and perceptions of people as they are engaged with the change process. These concerns progress from Self concerns (How will this affect me?) to Task concerns (How will I organize all the pieces of this?) to Impact concerns (How can this change have the greatest positive impact?). The Levels of Use dimension focuses on the behaviors of individuals as they proceed from non-use to full use of the innovation. Innovation Configurations describe the ways that individuals adapt the innovation, often mutating it drastically from its intended use. By mapping these configurations, leaders can provide interventions and support toward using an innovation in its intended way (Hall et al., 1999).

**Figure 2.1**

*Concerns-Based Adoption Model as an Implementation Bridge*

*Note.* Reprinted from *Implementing Change: Patterns, Principles, and Potholes* (Figure 2.6, p. 60), by G. E. Hall & S. M. Hord, 2020, Hoboken, NJ: Pearson. Copyright 2020 by Pearson Education. Reprinted with permission.
Stages of Concern. The primary use of the CBAM framework in my study focuses on the SoC dimension. CBAM defines a continuum of concerns teachers express when adopting an innovation (Hall et al., 1973). These stages include:

- Stage 0: Unconcerned (or Unrelated)
- Stage 1: Informational
- Stage 2: Personal
- Stage 3: Management
- Stage 4: Consequence
- Stage 5: Collaboration
- Stage 6: Refocusing

These seven stages are a refinement of earlier work by Fuller (1969). Fuller identified three broad types of concern teachers have about an innovation: Self, Task, and Impact. Self concerns typically revolve around the impact of an innovation on an individual teacher themself.¹ In the CBAM model, this has been expanded into Stages 1 and 2 (Informational and Personal). Task concerns include questions about organization and the management of time and resources for the implementation of the innovation. This is a broad category that is represented by Stage 3 (Management) in the CBAM model. Fuller’s Impact stage centers on the effectiveness of the innovation and is expanded into Stages 4, 5, and 6 in the CBAM model. The seventh stage in CBAM, Stage 0 (Unconcerned/Unrelated), is outside of Fuller’s model. Stage 0 indicates the degree to

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¹ In this paper, unless using the preferred pronouns of a particular individual, I intentionally avoid gender-binary language.
which teachers are unconcerned with the innovation (higher scores = lower levels of concern), either because they have no interest in an innovation and no expectation that they will be involved in or affected by its implementation (Unconcerned), or because they have concerns about other issues or innovations that are more pressing (Unrelated). Both terms are used in the CBAM literature to describe Stage 0. Table 2.1 shows how Fuller’s and CBAM’s Stages are related and how these concerns are typically expressed.

Table 2.1

Typical Expressions of Concerns

<table>
<thead>
<tr>
<th>Fuller’s Types of Concern</th>
<th>CBAM’s Stages of Concern</th>
<th>Typical Expressions of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact</td>
<td>Stage 6: Refocusing</td>
<td>“I have some ideas about something that would work even better.”</td>
</tr>
<tr>
<td></td>
<td>Stage 5: Collaboration</td>
<td>“I am concerned about relating what I am doing with what my coworkers are doing.”</td>
</tr>
<tr>
<td></td>
<td>Stage 4: Consequence</td>
<td>“How is what I am doing affecting students?”</td>
</tr>
<tr>
<td>Task</td>
<td>Stage 3: Management</td>
<td>“I seem to be spending all of my time getting materials ready.”</td>
</tr>
<tr>
<td></td>
<td>Stage 2: Personal</td>
<td>“How will doing this affect me?”</td>
</tr>
<tr>
<td></td>
<td>Stage 1: Informational</td>
<td>“I would like to know more about it.”</td>
</tr>
<tr>
<td>Unrelated</td>
<td>Stage 0: Unconcerned</td>
<td>“I am not concerned about it.”</td>
</tr>
</tbody>
</table>

Note: This same table is shown in Chapter 4 as Table 4.1. Adapted from *Measuring implementation in schools: The stages of concern questionnaire*, (Figure 1.2, p. 4), by A. A. George, G. E. Hall, & S. M. Stiegelbauer, 2006, Austin: TX: Southwest Educational Development Laboratory. Copyright 2006 by SEDL, [https://sedl.org/cbam/socq_manual_201410.pdf](https://sedl.org/cbam/socq_manual_201410.pdf) Adapted with permission.
In this study, the particular innovation being studied was the first year of implementing the *Bridges in Mathematics* curriculum. The Concerns-Based Adoption Model provides a framework for understanding underlying principles about change and how these affect individuals’ change processes. It also provides insight into the types of supports and structures that may be most helpful in facilitating the implementation of change. In particular, the SoC framework provides a way to assess teachers’ concerns about the innovation as a starting point in addressing and resolving them in order to facilitate change.

**Critique of Theoretical Framework**

The Concerns-Based Adoption Model presents a progression across the Stages of Concern as developmental, with later stages emerging as the concerns of earlier stages are resolved (lowered in intensity). While this is a compelling ideal, in actuality, not every teacher progresses across all of these stages of development. Resistance to change, and even outright refusal, are common, particularly in circumstances of complex, longitudinal change (Duffy & Roebler, 1986). Likewise, as Task concerns become routinized, some researchers have found that teachers’ concerns profiles flatten out without progressing into later *Impact* stages of concern (Anderson, 1997; Kwok, 2014; Min, 2017). This may be because teachers’ engagement with the innovation diminishes as they turn their attention to more pressing concerns.

Researchers using the SoC dimension of CBAM frequently struggle with how to interpret concerns in Stage 0 (Unconcerned/Unrelated) and Stage 6 (Refocusing). Early versions of the CBAM framework combined two different categories of concerns into
Level 0 of the Stages of Concern—lack of awareness of an innovation and lack of interest. Later revisions of Stage 0 items on the SoC Questionnaire have attempted to remedy this through greater recognition of the concerns of non-users of an innovation (George et al., 2006). However, Stage 0 can also include teachers who are aware of and interested in the innovation, and may well be using it, but their attention and concern is divided by a focus on other competing initiatives or issues. For this reason, CBAM theorists have added the descriptor *Unrelated* to Stage 0 to indicate that it also measures teachers’ concern with unrelated issues. Rather than automatically including teachers with high Stage 0 (Unconcerned/Unrelated) concerns in the *Self* concerns stage, it is important to understand the reasons behind them and interpret these scores in the context of the full concerns profile.

Likewise, Stage 6 (Refocusing) is another aspect of the model that can be problematic. The user manual for the SoCQ includes Stage 6 (Refocusing) as part of the *Impact* stage of concerns (George et al., 2006). In an idealized progression of concerns, ideas for refining an innovation to maximize its impact would emerge at the end of a developmental process of implementation and represent higher level *Impact* concerns. In practice, however, teachers at all stages of concern can have ideas for changing an innovation. George et al. have acknowledged that Stage 6 (Refocusing) concerns need to be interpreted in light of peak scores in other stages, but still classify it as an *Impact* stage. Other researchers have separated Stage 6 (Refocusing), describing it as independent of the *Self, Task, and Impact* stages (van den Berg et al., 2000).
Application of Theoretical Framework

Despite these cautions, the theory and constructs of the Concerns-Based Adoption Model still form a meaningful conceptual framework for my study. CBAM provides a model for understanding teachers’ feelings, needs, and concerns and how these may change through ongoing support. My theory is that understanding teachers’ concerns, needs, feelings, and motivations provides insight into the ways they make sense of a new standards-based curriculum and the degree to which they are able to successfully implement it in their classrooms. Specifically, the Stages of Concern dimension of the Concerns-Based Adoption Model provides a lens for analyzing teacher data and translating it into a framework for describing the needs of teachers at various stages and aligning these with teacher perceptions of barriers and bridges to the implementation of change.

In Chapter 3, I elaborate on how this framework influenced my methodology, specifically how I used the SoCQ to identify teachers’ stages of concern and use them as a lens for sorting and interpreting the data. In Chapter 4, I elaborate on how I addressed challenges with regard to Stage 0 (Unconcerned/Unrelated) and Stage 6 (Refocusing) in analyzing and interpreting my data. In my discussion of the findings of the study, I also address the fact that development across the stages is not inevitable, and that even regression is possible.

Review of the Research Literature

In the next section of this chapter, I review research literature relevant to my problem of practice. Curriculum is a principal driving factor of the mathematics teaching
and learning that happens in schools (Remillard, 2005). However, a written curriculum such as *Bridges* goes through several stages of interpretation and transformation before emerging in the form of actual student learning. The research literature on curriculum can be categorized in three broad areas: the *intended* curriculum (system-level expectations for mathematics learning), the *enacted* curriculum (what is taught in classrooms), and the *attained* curriculum (what is learned by students) (Lloyd et al. 2017; Stein et al., 2007). In my study, *Bridges in Mathematics* can be considered to be the *intended* curriculum, and my focus is on teachers’ concerns as they translate this curriculum into practice. Therefore, my study is situated in the space between the *intended* curriculum, which Lloyd et al. (2017) define as “textbook authors’ intentions about what and how mathematics should be taught,” and the *enacted* curriculum, which they describe as “the processes of teaching and learning mathematics that emerge as teachers and students interact with curriculum materials and tasks in classrooms” (p. 825). Specifically, by studying the needs and concerns of teachers as they implement new curriculum materials, I am focusing on the space between the intended and the enacted curriculum where teachers’ perspectives and decisions shape their plans for implementation and how they enact it with their students. Therefore, the literature selected for review here focuses on the factors that influence the ways in which teachers interact with curriculum, particularly in the context of change.

A survey of the literature reveals several factors with a significant influence on teachers’ interactions with a new mathematics curriculum. These can be categorized as both internal--factors within the teachers themselves, and external--those related to the
organizational context or the curriculum itself. I will consider both of these categories in turn.

**Internal Factors**

In terms of the internal factors within individual teachers that affect their curriculum use, the most significant of these are teachers’ knowledge, attitudes, and beliefs. In this section, I will describe the influence of each of these factors on teachers’ use of curriculum as they translate it into practice.

**Knowledge.** It may seem self-evident that teachers cannot teach knowledge which they themselves do not possess. Yet defining what teachers must know in order to effectively implement mathematics reform is a complex undertaking. Certainly, teachers must have the ability to do the mathematics that they are assigning to their students. Ball et al. (2008) call this *common content knowledge* (CCK) and deem this knowledge to be essential to planning and carrying out instruction. But research into teachers’ knowledge of various areas of mathematics content indicates that while teachers “generally have a command of the facts and algorithms that comprise school mathematics, they lack a conceptual understanding of this mathematics” (Mewborn, 2001, p. 29). Thus, efforts to measure teachers’ knowledge based on mathematics courses taken or degrees earned may not be an effective measure of their ability to understand and use mathematics knowledge to carry out the tasks of teaching.

Shulman (1987), in describing the types of knowledge needed by teachers, identified *pedagogical content knowledge* (PCK) as one of the most critical. Shulman defined PCK as “the blending of content and pedagogy into an understanding of how
particular topics, problems, or issues are organized, represented, and adapted to the
diverse interests and abilities of learners, and presented for instruction” (p. 8). Ball et al.
(2008) applied these concepts to mathematics, defining *mathematical knowledge for
teaching* (MKT) as the mathematical knowledge needed to carry out the work of teaching
mathematics. In another study, Hill et al. (2005) found that MKT had a significant effect
on student learning, even when controlling for other variables of teacher background such
as courses taken or years of experience. Therefore, teachers’ MKT is a significant factor
in their ability to effectively implement effective mathematics teaching.

Mathematical knowledge for teaching also plays a significant role in how teachers
use curriculum (Charalambous & Hill, 2012; Hill and Charalambous, 2012). From a
practical standpoint, standards-based curricula, with their emphasis on deep conceptual
understanding of mathematics, place higher demands on teachers for deep mathematical
content knowledge and a greater ability to apply this knowledge in teaching (MKT)
(NCTM Research Committee, 2008). In a series of case studies designed to explore the
relationship between teachers’ MKT and their use of curriculum, Hill and Charalambous
found a complex relationship that depended both on the MKT of the teacher and the
degrees of both demand and support in the curriculum. For teachers with low MKT, the
demands of a lesson in the curriculum may extend beyond their ability to implement it
effectively. High quality lesson enactments were only evident in cases where the low-
MKT teachers followed the curriculum closely, and this happened only when the
curriculum provided these teachers with adequate support. When the curriculum was not
sufficiently supportive however, low-MKT teachers either departed from the curriculum
or enacted it in low-quality ways. Either way, instruction suffered (Hill & Charalambous, 2012).

**Attitudes.** Philipp (2007) has defined attitudes as “manners of acting, thinking, or feeling that show one’s disposition or opinion…[and] may involve positive or negative feelings” (p. 259). Because my study involves teachers’ concerns about a new mathematics curriculum, I will examine the literature on both teachers’ attitudes toward teaching mathematics and teachers’ attitudes toward change.

**Teachers’ Attitudes Toward Mathematics and Mathematics Teaching.** Teachers’ attitudes toward mathematics and mathematics teaching influence their interactions with curriculum (Ernest, 1989; Philipp, 2007). Attitudes are largely shaped by teachers’ prior experiences with mathematics. Drake and Sherin (2006) studied teachers’ mathematics narratives and their models of curriculum use and found that their early experiences with mathematics, their recent experiences as adult learners of mathematics, and their mathematical interactions in their personal lives and relationships all influenced the ways in which they implemented and adapted a standards-based curriculum.

Studies of teachers’ attitudes toward mathematics often show high levels of mathematics anxiety and negative attitudes toward mathematics, particularly among elementary teachers (Kelly & Tomhave, 1985; Rech et al., 1993). In a large study of 692 elementary school teachers, Hadley and Dorward (2011) found that higher anxiety about teaching mathematics was related to lower student achievement. They also found that teachers with high levels of anxiety about teaching mathematics were more likely to teach in a manner that was less consistent with standards-based reform. Similarly, Karp
(1991) found that teachers whose attitudes toward mathematics were more negative were more likely to use instructional methods that involved following rules given by the teacher rather than exploring mathematical relationships and developing conceptual understanding, which tend to be emphasized in standards-based curricula.

**Teachers’ Attitudes Toward Change.** It is important to note that not all teachers respond to change in the same way. In studies describing teachers’ attitudes when implementing new standards-based curricula, three broad types of teacher responses have been found (Lambdin & Prestin, 1995; Stickles, 2011). One common response type includes teachers who attempt to implement the curriculum but are frustrated and conflicted about the reforms. Another cluster of teachers are those who find success with standards-based curriculum and who serve as leaders and role models for other teachers. Both Lambdin and Prestin (1995) and Stickles (2011) found that the majority of teachers form a third cluster somewhere between these two groups. While many of these teachers have weak mathematics backgrounds and struggle with standards-based curriculum, they nonetheless embrace the vision for reform in the curriculum and are seeking to improve their teaching practices.

In studies of teachers’ attitudes toward educational changes, teachers demonstrate differing emotional responses to externally mandated change and to self-initiated change. (Hargreaves, 2004; Jenkins, 2019). Responses to the former tend to be overwhelmingly, though not universally, negative, while responses to the latter tend to be largely positive. However, how school leadership handles external change is highly significant. Inclusive educational change that involves teachers in the change process helps them deal with the
experiences of loss and stages of concern that naturally accompany human experiences of change. These studies indicate that teachers’ responses to reform vary, but that teachers respond more positively to changes in which they have had a voice and personal investment. The degree to which educational leaders support teachers and involve them in reform efforts may impact how teachers respond.

**Beliefs.** Beliefs are understandings or premises that are held to be true. Philipp (2007) wrote that, “beliefs might be thought of as lenses that affect one’s view of some aspect of the world or as dispositions toward action” (p. 259). Teachers’ beliefs about mathematics and pedagogy, as well as their beliefs about their own efficacy, can affect the ways they interact with standards-based mathematics curricula.

**Beliefs About Mathematics and Pedagogy.** Teacher beliefs about mathematics and pedagogy can have a significant influence on their use of curriculum. In *Principles to Actions* (2014), NCTM identified dominant cultural beliefs about the teaching and learning of mathematics as a significant obstacle to the implementation of effective teaching and learning in classrooms. These dominant beliefs reflect a view that “students should learn math through memorizing facts, formulas, and procedures and then practicing skills over and over again” (p. 9). Classroom practice that reflects these beliefs is pervasive in classrooms across the United States (Weiss et al., 2003). The authors of *Principles to Actions* contrasted these beliefs about mathematics teaching and learning with a standards-based belief that mathematics is about reasoning and problem solving and is most effectively taught through engaging students in solving and discussing cognitively demanding tasks in order to make sense of mathematical concepts and
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procedures (NCTM, 2014; Philipp 2007; Weiss & Pasley, 2004). They went on to contrast productive and unproductive beliefs about teaching and learning mathematics (See Table 2.2). They identified beliefs as unproductive when they hamper teachers’ implementation of effective teaching practices or impede students’ access to important mathematical ideas and processes. When implementing a standards-based curriculum that emphasizes conceptual learning through interaction with complex tasks, teachers’ use of the curriculum will be affected by the extent to which their beliefs about mathematics aligns with this view.

Table 2.2

Productive and Unproductive Beliefs About Teaching and Learning Mathematics

<table>
<thead>
<tr>
<th>Focus of math learning</th>
<th>Unproductive beliefs</th>
<th>Productive beliefs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Focus on practicing procedures and memorization</td>
<td>Focus on understanding concepts and procedures</td>
</tr>
<tr>
<td>Approach to computation</td>
<td>Need only to learn standard algorithms and prescribed methods</td>
<td>Need for a range of strategies and approaches</td>
</tr>
<tr>
<td>Approach to learning</td>
<td>Application only after mastery of basic skills</td>
<td>Explore and solve contextual and mathematical problems</td>
</tr>
<tr>
<td>Role of the teacher</td>
<td>Tell students what they should know and how to solve problems</td>
<td>Engage students in tasks that promote reasoning and facilitate discourse</td>
</tr>
<tr>
<td>Role of the student</td>
<td>Memorize information and use it to solve routine problems</td>
<td>Make sense of math, use varied strategies and representations, justify solutions, make connections, consider reasoning of others</td>
</tr>
<tr>
<td>View of effective teacher</td>
<td>Make math easy for students by guiding them step by step</td>
<td>Provide students with appropriate challenge, support productive struggle</td>
</tr>
</tbody>
</table>

Note. Adapted from *Principles to Actions: Ensuring Mathematical Success for All*, p. 11, by NCTM, 2014, Reston, VA: Author. Adapted with Permission.
Beliefs About Efficacy. Teacher beliefs about mathematics teaching and learning also impact their sense of efficacy, or their belief in their capacity to affect student learning (Philipp, 2007; Smith, 1996). A belief that mathematics is a fixed set of facts and procedures, and that teaching is a process of communicating these facts and procedures to students, supports teachers’ sense of efficacy by restricting teaching to a manageable and achievable model of practice. The challenge to these beliefs raised by the approach of a standards-based curriculum poses a significant threat to teachers’ sense of efficacy, and is a fundamental challenge for effective implementation.

By contrast, in a study of high school mathematics teachers whose beliefs and practices were strongly supportive of standards-based teaching, Manouchehri (2003) found several common characteristics among these teachers that influenced their successful implementation of standards-based teaching practice. The first shared characteristic among these teachers was a strong sense of teacher efficacy and a clear vision for the type of teaching and learning they strove to implement in their classrooms. Even those teachers whose students faced daunting social, economic, and cognitive barriers to learning had a clear sense of the powerful influence they had over student learning, despite the many aspects of their students’ lives that they could not control. These teachers were confident in their own ability to make sense of mathematics themselves and had a clearly articulated vision for how teaching and learning standards-based mathematics looked in their classrooms. Another shared trait among these teachers was a deep philosophical commitment to education as a catalyst for social change, mathematics as a tool for student empowerment both in and out of the classroom, and
themselves as change agents with a mission and a calling to influence society through the moral act of teaching. They viewed the standards as instruments of justice that called boldly for all students to have access to high-quality teaching and learning in mathematics. Finally, all of these teachers viewed teaching as a learning process and their own implementation of the standards as an ongoing process of personal and professional growth. They acknowledged the challenges they faced in consistently implementing their vision for teaching and learning, but viewed obstacles as opportunities to learn and grow. They demonstrated flexibility in their short-term goals while maintaining commitment to their long-term vision for change. These attitudes may help mediate some of the challenges inherent in the implementation of a standards-based mathematics curriculum.

**Interaction of Internal Factors.** Wilkins (2008) developed a conceptual model relating teachers’ knowledge, attitudes, and beliefs to their instructional practices (see Figure 2.2). In a study of 481 elementary teachers, Wilkins gathered data on each of these factors and used statistical analysis to investigate and model the relationship between them. As predicted, all of these factors were confirmed to influence teachers’ instructional practice. In particular, both teachers’ attitudes toward mathematics teaching and their beliefs in the effectiveness of inquiry-based instructional practices were found to have a positive relationship with their use of these practices. Somewhat surprisingly, however, teachers’ content knowledge was negatively correlated with their use of inquiry-based teaching practices. Wilkins hypothesized that this may be because teachers with higher levels of content knowledge may attribute their success to the traditional
implementation of standards-based math curriculum. Teachers who were less successful with mathematics, on the other hand, may wish to try using alternative methods in order to spare their students from their own negative experiences. This hypothesis is related to the findings of Nathan and Koedinger (2000), who described an “expert blind spot” in teachers with high levels of content knowledge but lower levels of awareness of alternative interpretations of mathematical concepts and procedures. These authors proposed that “teachers who tend to hold such formal strategies in high regard also tend to discount students’ mathematical ideas” (p. 230).

**Figure 2.2**

*Model Relating Teachers’ Content Knowledge, Attitudes, Beliefs, and Practices*

Wilkins (2008) found that, of the factors studied, teachers’ beliefs had the greatest impact on their instructional practice. Because teachers’ attitudes were found to influence their beliefs, and their content knowledge had a negative effect on their belief in the effectiveness of inquiry-based instructional practice, this increased the overall effect of beliefs on practice. Therefore, not only were beliefs found to have the strongest direct effect on instructional practice, they were also found to be a significant mediating factor on the effects of teachers’ knowledge and attitudes. Wilkins concluded, therefore, that “increasing the level of mathematical content knowledge without also helping teachers develop positive beliefs and attitudes related to mathematics within the context of teaching and learning will in the end limit the value of learning the content. It is teachers’ beliefs and attitudes that ultimately shape their instructional practices which can then be enriched or enhanced, but not driven, by content knowledge” (pp. 157-158).

**External Factors**

These findings about the internal factors that influence teachers’ practice have significant implications for understanding their interactions with written curriculum. However, it is important to recognize that teachers’ use of curriculum is also affected by external factors such as their institutional contexts, the types of support they receive, and even the curriculum itself.

**Context.** In an analysis of the difficulties inherent in enacting lasting school mathematics reform, Engeström (1998) described a “middle level” between codified systems and structures such as laws, regulations, and budgets, and classroom level structures such as curriculum. He described this middle level as consisting of:
relatively inconspicuous, recurrent, and taken-for-granted aspects of school life. These include grading and testing practices, patterning and punctuation of time, uses (not contents) of textbooks, bounding and uses of the physical space, grouping of students, patterns of discipline and control, connections to the world outside the school, and interactions among teachers as well as between teachers and parents. (p.76)

Teachers’ use of curriculum, then, is influenced by the constraints and affordances of this context. Herbel-Eisenmann et al. (2006) described this as “curricular context” and also include within this construct the perspectives of stakeholders such as parents and students as well as the historical context of curricular reform within a particular locale. Parent expectations and student reactions to curriculum can exert a powerful influence within a local context. These expectations can become even stronger in places with a history of conflict over curricular change.

McClain et al. (2011) pointed out that it is not only the existence of these contextual features that influence teachers, it is the teachers’ own perception of them that influences them as they seek to work within them. They described this as the *instructional reality* within which teachers work. This includes teachers’ perceptions of the demands and supports placed upon their practice within their context. It is critical to note, then, that these researchers held as a guiding principle that teachers’ concerns and decisions can always be presumed to make sense within their own instructional realities. This allowed them to avoid a deficit view of teachers’ practice when understanding how their concerns and decisions operate within their perceived context.
McClain et al. also placed the construct of *agency* within a particular instructional context. They defined agency as “having authority both over the mathematics that is taught and the sequencing and presentation of that content” (2011, p. 63). If a curriculum is perceived by administrators and teachers as being authoritative, then the curriculum itself holds a great degree of agency in shaping how teachers position and use the text. If, however, teachers are perceived as the authoritative arbiters of instruction, this positions them as instructional designers who use curriculum as a resource for instruction. This, in turn, leads to another construct described by McClain, et. al. which is teachers’ *professional status*. This status is shaped by the degree to which teachers face expectations to implement curriculum with fidelity. This may be enforced explicitly as administrators monitor and ensure that teachers are following prescribed patterns of curriculum use, and it may also be influenced more implicitly by expectations for student achievement to which teachers are held accountable.

All of these contextual factors, such as expectations, agency, and professional status, and the ways in which teachers experience and perceive them, shape teachers’ use of curriculum. Likewise, these factors also influence the types of support given to teachers within these contexts.

**Support.** Recognizing the challenges teachers face in implementing a new mathematics curriculum, instructional leaders provide varying types of support to teachers. These supports align to the goals of the providers, and are shaped by the contextual values and constructs described in the previous section. For example, in contexts where teachers are perceived as instructional designers with a high degree of
professional status, the support offered to them will likely look different than contexts where the text is held as authoritative and teachers are expected to be accountable to implementing the curriculum with fidelity. In this section, I consider research about teacher support through professional development and collaborative communities of practice, as well as through supports embedded within the curriculum itself.

**Professional Development.** The conclusions of many of the studies cited above about the impact of internal factors such as teachers’ knowledge, attitudes, and beliefs on the implementation of mathematics reform herald the role of professional development in transforming teachers’ practice. Many researchers (e.g. Guskey, 2002; Loucks-Horsley et al., 2010) have studied effective models of professional development to support effective instructional practice and improve student learning outcomes. However, despite teachers’ own indications that learning opportunities that are focused on student curriculum are more likely to transform their practice in ways that are consistent with the goals of standards-based reforms (Cohen & Hill, 1998), few studies focus on professional development that is curriculum based and designed to support implementation (Hodges & Jong, 2014; Polly et al. 2014).

In one of the few published research projects on curriculum-based professional development, Polly et al. (2014) conducted a study during the first year of a three-year state-funded Math Science Partnership (MSP) grant designed to support teachers in the implementation of a standards-based curriculum. Teachers received 84 hours of curriculum based professional development over the course of a school year. In the professional development sessions, participating teachers completed mathematical tasks...
and examined how mathematical concepts were presented in the curriculum. They also focused on pedagogical issues related to implementation. While results indicated moderate growth in teachers’ content knowledge, a shift toward student-centered instructional practices, and gains on curriculum-based assessments, researchers were not able to demonstrate a measurable influence on teacher’s beliefs, particularly in the face of concerns about high-stakes testing.

In a related study in the same project, McGee et al. (2013) analyzed teacher perceptions of the professional development program to determine whether or not teachers found it to be helpful. While teachers expressed positive learning experiences in the program, they also expressed concerns. In particular, many teachers expressed a desire for in-class support as a follow up to professional development. They appreciated the opportunities for peer collaboration, but wanted to see that carry over into classroom settings, with opportunities to watch other teachers using the curriculum. While researchers conducted classroom observations as a method of data collection during the study, teachers wanted feedback on these observations in order to refine their instructional practice.

These findings are consistent with others who have found that professional development that is disconnected from classroom practice is not only perceived by teachers to be not useful in addressing their concerns, but also ineffective in transforming practice (Darling-Hammond et al. 2009; Loucks-Horsley et al. 2010). Together, these studies indicate that transformational professional learning that effectively supports
teachers’ implementation of standards-based curriculum must be curriculum-based, job-embedded, and connected to classroom practice.

**Collaboration.** A variety of studies substantiate professional collaboration as a support for teachers’ implementation of change. For example, Stein et al. (1998) examined middle school teacher development and change through their participation with communities of practice. They found that by participating as members of a collaborative community of practitioners, teachers were able to observe teaching strategies in action, be immersed in the language of reform, and hear stories about the process of teachers changing. These communities of practice not only provided support for individual change and growth, they also contributed to collective growth for the community as a whole.

As with other professional development literature, little research exists on the specific role of communities of practice in the implementation of standards-based curriculum. Choppin (2006) found that when professional communities of practice are not established and used as support for curriculum implementation, teachers’ use of the materials can be challenging and inconsistent. In a study of one school attempting to implement school-based professional development to support the implementation of a new curriculum, Obara and Sloan (2010) found that these professional development sessions typically degenerated into planning sessions. The professional development specialist said of the meetings, “All it has become is, ‘Oh my God, how are we going to get this done’” (p. 359). Nonetheless, the researchers found that these sessions had value for teachers by providing opportunities for them to share their understandings of the
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curriculum, develop collaborative activities, and provide moral support for each other in a challenging time.

In an attempt to develop communities of practice to support the implementation of a standards-based curriculum, Hodges and Jong (2014) implemented a two-year program of curriculum-based professional development specifically designed to foster ongoing, sustainable collaborative communities among teachers. They contrasted the experiences of two teachers, one of whom worked in a school with a strong site-based community of practice, and one in a school that lacked this community support. The teacher who worked within a professional community of practice experienced curriculum implementation as a joint enterprise conducted in a mutual relationship with collective ways of reasoning about the work, which Wenger (1999) identifies as the defining elements of a community of practice. Teachers in this school regularly engaged in conversations centered on the teaching and learning of mathematics, reflection on and critique of classroom practice, and exploration of student thinking. By contrast, the teacher in the school without a strong community of practice lacked these opportunities. Common planning times were typically used independently for the completion of assigned tasks, and when joint meetings occurred, conversations typically focused on specific students who were struggling and general perceived deficiencies in students’ prerequisite knowledge. These differences translated to significant contrasts in these teachers’ use of the standards-based curriculum materials, with the first teacher engaging more meaningfully with the materials, while the second teacher used the materials sparingly and only in narrow ways.
While these few studies highlight the importance of collaborative communities in the building of teachers’ knowledge of and confidence in curricular materials, it is impossible to make broad generalizations about the role they play in supporting the implementation of standards-based curricula. Nonetheless, given the strong indications of the support these communities provide to teachers in the context of curricular change, this topic is worthy of further study.

Curriculum-Embedded Supports. While providing teachers with high-quality curriculum materials that align to current standards is certainly important, a survey of the literature indicates that curriculum may have limited impact on teachers’ implementation of mathematics reform. Charalambous and Hill (2012) write, “Simply inserting Standards-based curricula into classrooms cannot on its own improve instructional quality; what matters is how these curricula are enacted” (p. 448). Teachers’ implementation of the same curriculum varies widely both in quality and in terms of integrity to the intention of the curriculum (Arbaugh et al., 2006; Lambdin & Preston, 1995; Stein et al., 2007). Tarr et al. (2008) examined achievement data of over 2,500 students and found that students from classrooms using a standards-based curriculum showed increased gains in achievement over students from classrooms using traditional curricula only if their teachers also engaged students in activities such as making conjectures and explaining strategies, sharing multiple perspectives, and building conceptual understanding from discussion of students’ ideas about math. In the absence of this type of instruction, no significant difference was found in student achievement regardless of the curriculum type. They did, however, find that a learning environment
that promoted these types of activities was more prevalent in classrooms using a standards-based curriculum, indicating that this type of instruction was more readily, though far from universally, supported by these curricula.

Emerging research indicates that embedded supports within a curriculum itself can impact teachers’ effective curriculum use. The idea that curriculum materials have a role to play in teacher learning was suggested by Ball & Cohen in 1996, and has been explored and developed by other researchers since (Davis & Krajcik, 2005; Hill & Charalambous 2012; Remillard, 2005, 2012). More recently, research has focused on the specific design heuristics through which this educative process happens, and how curriculum designers can provide this support most effectively. Remillard (2012) theorizes that teachers have a transactional, two-way relationship with curriculum materials. Moreover, she argues that teachers are positioned by curriculum materials in particular ways as well as positioning themselves as particular types of users. Because current mathematics standards emphasize ways of doing and understanding mathematics that promote new methods of teaching, the authors of standards-based curriculum materials are more likely to use particular forms of address that are intended to provide pedagogical guidance for teachers. Through these forms of address, curriculum materials can influence how teachers read and use the materials to help align teachers’ curriculum use to the intentions and goals of the curriculum designers (Davis & Krajcik, 2005; Remillard, 2012, Remillard & Kim, 2020). However, it is important to recognize that teachers read curriculum materials in different ways to meet their own perceived needs.
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(Remillard, 2005, 2012). Curriculum designers need to understand these variations in order to develop educative supports in curriculum that teachers will use and apply.

Based on these foundational understandings, and their belief that the daily role that curricular materials play in teachers’ lives makes them well suited to provide teacher support, Davis et al. (2017) engaged in a three-year program of research to extend knowledge about educative curriculum materials and their role and influence in teachers’ curriculum use. Their research, while built upon many of the above studies from the domain of mathematics education, studied these concepts in the realm of elementary science instruction. Like the CCSSM, the Next Generation Science Standards (NGSS), first released in 2013, contain both content and practice standards, and are grounded in core concepts and ideas (NGSS Lead States, 2013). Standards-based science curricula, like corresponding materials in mathematics, are designed to engage students with content, practices, and core concepts in ways that may require teachers to shift their instructional practice from more traditional approaches that tend to emphasize just content knowledge and skills. In the first year of their study, Davis et al. studied teachers’ initial use of a commercially developed, standards-based science curriculum. Based upon their study of teachers’ use of the curriculum, the researchers then developed a range of educative support elements to embed within the curriculum. In the second year of the study, they gave another group of teachers the same curriculum, but this time with the embedded educative supports. The researchers then revised the educative features based on the Year 2 outcomes. In the third year, they conducted a quasi-experimental study of two new groups of teachers, one using the original standards-based materials and the
other using the same materials enhanced with embedded educative supports. These supports included both content knowledge and pedagogical supports. The former were placed primarily in front matter at the beginning of each unit, while the latter were more situated as instructional tools in the day-do-day lessons. Participating teachers varied in their use and uptake of these features. In terms of content knowledge support, such as concept maps, content support boxes, and concept storylines, the study showed great variability in teachers’ use of these supports, and did not find a significant difference in content knowledge growth across the treatment and control groups. Teachers expressed a preference for the pedagogical supports such as rubrics that included samples of student work and narratives that described a fictional teacher’s decision making. Teachers’ use and uptake of these educative supports was greater, and had a greater impact on teacher and student learning. Based on their findings, Davis et al. suggested design principles for educative curriculum materials that include anticipating the concerns behind teachers’ adaptations and providing suggestions that are grounded in the goals of standards-based reforms, and situating the educative features in teachers’ practice in ways that can be applied directly as teaching tools in the classroom. Moreover, given the variation in teachers’ needs and concerns, they recommended developing multiple forms of support for highlighting important content and a constellation of educative features designed to meet teachers’ varying needs.

**Critique of the Research Literature**

Teachers’ concerns are shaped by and at the center of all of these factors that affect their interactions with curriculum. Understanding these concerns can provide a
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window into addressing all of the internal and external factors that influence curriculum use. While the literature has much to say on teachers’ use of curriculum and the factors that influence it, little can be found about teachers’ own concerns in this process, and how these concerns vary across teachers. Likewise, there is a dearth of literature about how support for curriculum use can be differentiated for teachers at different stages of concern. Just as students in various stages of learning have different needs, I propose that teachers also need differentiated support to facilitate their growth in their use of a new curriculum.

Understanding and modeling the relationship between teachers’ concerns about curriculum use and the supports that are helpful at each stage in the process can guide instructional leaders and curriculum developers seeking to support teachers in implementing standards-based curriculum. The patterns and convergences I have found in my analysis of data from teachers at various stages of concern assists in the development of such a model.

**Review of the Methodological Literature**

In this final section of the chapter, I conduct a brief review of the methodological literature to identify and justify the methodologies I use to answer my research questions, specifically surveys and interviews.

**Surveys.** My first research question begins with identifying teachers’ concerns and my second begins with identifying teachers’ Stages of Concern. For both of these questions, a survey is an effective and efficient place to begin. Vogt et al. (2012) have suggested that surveys are an effective research tool when the data are best obtained
directly from the subjects and can be obtained through brief answers to structured questions. Surveys also enable a researcher to gather data from a large number of participants. A broad administration of a survey across a large percentage of a population allows a researcher to reach a greater number of participants in a study than can be easily achieved through other means. The specific survey tool I used is CBAM’s Stages of Concern Questionnaire (George et al., 2006). I discuss this instrument more specifically in chapter three.

While a survey is a potent tool for identifying and classifying teachers’ concerns, my research questions contain additional complexity that cannot be satisfied by a survey alone. For this reason, I followed the survey with interviews to add qualitative depth to the data.

**Interviews.** Following the survey with teacher interviews allowed me to gather individual data in greater depth than the survey alone. Interviews are particularly useful in “determining how individuals perceive their situation” (Krathwohl, 2009, p. 296) and when seeking knowledge that is subjective or internal to the people being interviewed (Vogt et al., 2012). While surveys are helpful in answering direct, low-inference questions, interviews are more suited to pursuing complicated matters in depth.

Many CBAM studies have found that following the use of the Stages of Concern Questionnaire (SoCQ) with an individual interview adds depth and nuance to the findings of the survey alone. Reams and Twale (2008), for example, used a mixed methods case study to study the implementation of service learning at a health sciences university. They found that following the SoCQ with in depth individual interviews allowed them to
untangle apparent contradictions between the survey results and document analysis. In
the manual for use of the SoCQ, George et al. (2006) recommend that interpretations of
the data from the survey should be confirmed with the respondents. Interviews provide a
type of member checking on the quantitative data, allowing participants themselves to
interpret and elaborate on the results of the survey.

Summary of the Research Literature

In this chapter, I have reviewed and critiqued a range of literature relevant to my
problem of practice. I considered the experience of teachers in a process of change where
they must navigate the disequilibrium provoked by new experiences and expectations. In
studying this process, the Stages of Concern framework of the Concerns-Based Adoption
Model can help identify and describe teachers’ feelings and perceptions of teachers as
they engage with transformative change.

Teachers’ implementation of standards-based curriculum is impacted by a variety
of internal and external factors. While content and pedagogical knowledge and
organizational contexts and structures are significant factors, these seem to be secondary
to teachers’ attitudes and what they believe. Because teacher beliefs mediate other
internal and external factors in the implementation of reform, engaging teachers in
learning experiences that challenge them to critically reflect on their beliefs about
mathematics teaching and learning is critical. Job-embedded professional development
structures within communities of practice may be particularly helpful contexts for
support. Emerging research shows that curriculum materials themselves can provide
educative support for teachers, but more research is needed to understand how these curriculum-embedded supports can most effectively impact teachers’ instruction.

When considering how teachers make sense of a new standards-based mathematics curriculum and the attitudes, beliefs, and concerns that affect how they implement it in their classrooms, it is important to use methodologies that obtain data about these factors directly from the teachers themselves. Surveys and interviews are the methodologies I chose to inquire into teachers’ concerns and needs. In the next chapter, I describe and justify the research design of my study, including my selection of research methods, participants, procedures, and instruments. I also consider my own role in my research and the procedures I used to suspend my own biases. Finally, I discuss how I coded and analyzed the data I collected to fully answer my research questions.
Chapter 3: Methods

When a district adopts new instructional materials, teachers are the ones who must translate standards-based mathematics curriculum into classroom practice. Implementing a new curriculum requires ongoing systemic support that equips and empowers teachers to do the work. I wanted to inquire into teachers’ experience of this process and understand their perspective on what they are experiencing and why. Change is individual and it is a process. Where teachers are in the process of change may affect both their individual experience of that change and what they perceive as bridges or barriers to successful implementation. Teachers experience systemic change from particular points of view, yet these perspectives are often neglected by change leaders. Listening to teachers was a primary value in my research.

My reason for doing this research was to know how best to support teachers at various stages of change as they implement *Bridges in Mathematics* in their schools and classrooms. Therefore, the purpose of this study was threefold: (a) to understand the concerns of teachers and what they perceive as barriers to the classroom implementation of a standards-based math curriculum; (b) to identify teachers’ perceptions of the supports they believe will help them overcome barriers to implementation; and (c) to develop a framework describing the needs of teachers at various stages of concern and aligning these with teacher perceptions of barriers and bridges to the effective implementation of the curriculum. This led to my research questions:

1. What are the concerns of different teachers with regard to the classroom implementation of a standards-based math curriculum?
2. What do teachers at different Stages of Concern perceive as barriers or bridges to the classroom implementation of that curriculum?

**Research Methods**

When seeking to explore and understand a phenomenon within a particular context, case studies allow a researcher to examine the phenomenon up close and in depth (Merriam, 1988). A *collective case study* is one in which multiple cases are studied in order to shed light on a larger phenomenon (Creswell, 2013). In my study, I sought to understand the perspectives of teachers in their first year of using the *Bridges in Mathematics* curriculum. Conducting this research as a case study allowed me to interact on a personal level to gain a deep understanding of teachers’ perspectives. Selecting multiple teacher cases from across three different school districts broadened my understanding of the teachers’ perspectives collectively.

In selecting a research design for a study, “one’s choice of design should be driven by the research question, the context in which one is trying to answer it, and the objectives of the research” (Vogt et al., 2012, p. 49). My research questions are complex, with multiple parts representing several layers of inquiry, which indicated a need for a combined research design. Vogt et al. propose using a mixed methods approach when a researcher wants to use one method to corroborate, elaborate on, or inform the use of another method; when looking at a question from multiple angles to look for unexpected findings or apparent contradictions; or when developing a theory about a phenomenon of interest (p. 107). A mixed-methods approach provides several strengths. First, it allows for triangulation of data by corroborating evidence from different sources to provide a
fuller picture of an issue (Creswell, 2012). Second, the qualitative approaches allow for confirmation or clarification of the findings of the quantitative portion (Krathwohl, 2009). Finally, combining research methods allows for each method to compensate for the inherent weaknesses in the others.

For these reasons, I used a mixed methods research design with both quantitative and qualitative elements. The complex nature of my questions required multiple layers of inquiry, starting with a quantitative survey and continuing with individual interviews to confirm and clarify the initial findings. A final confirmation survey allowed for both quantitative and qualitative responses from participants to confirm the findings of my analysis through triangulation. Discussing the value of combining quantitative and qualitative approaches, Elliot Eisner writes, “With both we can achieve binocular vision. Looking through one eye never did provide much depth of field” (1981, p. 9).

Participants

In the remainder of this chapter, I discuss the participants, procedures, instruments, and methods of data collection and analysis used in this study. The population I studied in my research consisted of K-5 classroom teachers in their first year of implementing the Bridges in Mathematics, 2nd edition curriculum. I used purposeful sampling to identify a research sample within this population. Purposeful sampling is “based on the assumption that one wants to discover, understand, gain insight; therefore one needs to select a sample from which one can learn the most” (Merriam, 1988). My criteria required participants to be teaching in a district that had adopted the 2nd edition of Bridges in Mathematics, that they be K-5 classroom teachers in their first year of
implementing the curriculum, and that they have participated in a standard introductory professional development workshop provided by The Math Learning Center, the curriculum publisher, at the start of the year before using the curriculum.

I identified school districts that had recently adopted the *Bridges* curriculum and obtained consent from three to recruit teachers from their schools to participate in the study. In order to represent as broad a range as possible of teachers, I chose districts located in three different states in different regions of the country. In each case, I collaborated with a district leader to recruit as broad a range as possible from teacher participants from multiple schools within each district.

My first step was to send a recruitment video presenting the study and linking to a consent form and survey that administered the Stages of Concern Questionnaire (SoCQ) (George et al., 2006). This survey, which is discussed in greater depth later in this chapter, was scored to categorize respondents according to their SoC based on their pattern of responses. A total of 65 participants from the three districts completed the SoCQ. After eliminating teachers who did not meet my criteria, my sample included 59 participants (District 1, *n*=35; District 2, *n*=11; District 3, *n*=13). These 59 participants and the sample of 18 selected for follow up interviews represented a range of backgrounds in terms of self-described gender identity, self-described racial and ethnic identity, years of experience, and grade level taught (see Table 3.1). While numbers in each subgroup of each particular demographic were not sufficient to draw conclusions about the data with regard to these categories, the overall sample represents diverse perspectives across the population.
Table 3.1

Sociodemographic Characteristics of Participants

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<th>Interview sample</th>
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<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
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<tr>
<td>No response</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Years of experience</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-3</td>
<td>14</td>
<td>24</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>4-10</td>
<td>21</td>
<td>36</td>
<td>6</td>
<td>33</td>
</tr>
<tr>
<td>11-20</td>
<td>17</td>
<td>29</td>
<td>6</td>
<td>33</td>
</tr>
<tr>
<td>21+</td>
<td>7</td>
<td>12</td>
<td>4</td>
<td>22</td>
</tr>
</tbody>
</table>

*optional questions, responses in participants’ own words

Note. *N*=59 for full sample, *N*=18 for interview sample
Next, I used the SoCQ findings to categorize the population of teachers into three groups, according to whether their responses clustered primarily around *Self* concerns, *Task* concerns, or *Impact* concerns. From this categorized list, I invited teachers from all three groups to complete individual interviews. Of the 59 teachers in the full sample, 18 consented to being interviewed, 6 teachers from each of the three research sites, 5 from the *Self*-concerns group, 10 from the *Task*-concerns group, and 3 from the *Impact* concerns group, which aligned well to the distribution of concern types in the full sample of study participants, which will be discussed more in Chapter 4 (see Table 4.2). When comparing the concerns profiles as reported on the SoCQ, the summary profile for the 18 interviewed participants closely matched that of the 59 teachers in the entire surveyed group (see Figure 3.1). The relative intensity of concerns across the six stages is almost identical for the two groups, though the interviewed group’s concerns are slightly higher on the scale for Stages 1-6. This indicates that the pattern of concerns is the same, but those who agreed to be interviewed felt these concerns somewhat more intensely. The only stage that was different was Stage 0 (Unrelated), where the interview group’s score was slightly lower. This means that the interview group is somewhat less involved with non-*Bridges*-related concerns, and is somewhat more concerned about implementing *Bridges* than the full sample group. It is logical that those with greater involvement and greater concern would be the ones who agreed to additional follow up to the SoCQ. The interviewed subset aligned well to the sociodemographics of the larger group as well, with similar distributions of gender identity, racial and ethnic identity, grade level taught, and years of experience (see Table 3.1). Overall, the subgroup selected for individual
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interviews is a reasonably representative subset of the group as a whole, both
sociodemographically and in terms of the intensity and types of concern.

**Figure 3.1**

*SoCQ Summary Profiles of Full Sample vs. Interviewed Sample*

![Graph showing the comparison between All Participants and Interview Participants](graph)

**Procedures**

Case study research focuses on “discovery, insight, and understanding from the
perspectives of those being studied” (Merriam, 1988 p. 3). In this section, I describe the
procedures I used to engage in this inquiry through a series of methods: first through the
administration and scoring of the SoCQ, next through individual or small group
interviews, and finally through a confirmation survey.
Phase 1

In the first phase of my study, I worked with district leaders and/or building administrators to identify teachers who were willing to consider participation in the study. Through an email with an introductory video and a link to the survey, I presented the SoCQ and its purpose. Teachers who agreed to participate then took the 10- to 15-minute survey online through a secure portal developed and managed by the Southwest Educational Development Laboratory (SEDL) and the American Institutes for Research (AIR). Through a personal administrative account, I customized the SoCQ items to reflect the specifics of the innovation being studied in my research (the implementation of the Bridges in Mathematics curriculum), as well as to collect relevant sociodemographic data and obtain informed consent for the survey portion of the study (see Appendix A). Because I needed to be able to match survey responses with individuals in order to conduct the subsequent stages of the research, respondents’ email addresses were collected as a part of the demographic data. The consent form at the beginning of the questionnaire clarified that data was confidential but not anonymous. All data were housed on a password-protected account accessed through the SEDL website.

As recommended by the SoCQ authors, I included an optional open-ended statement of concern at the end of the survey (George et al., 2006). Participants were given the opportunity to respond to the question, “When you think about implementing the Bridges in Mathematics curriculum, what feelings, perceptions, or concerns do you have?” Responses to this question provided valuable context for interpreting individual scores on the SoCQ, an additional data source for understanding concerns overall, and
guidance for follow up with individuals who were selected as participants in later stages of the study.

The online software automatically analyzed and scored each teacher’s SoCQ according to the factor analysis protocol developed for the instrument. Through the administrative account, I was able to view both tabular and graphical results for individuals, subgroups, and the entire cohort. By examining the results generated by the software, I categorized the population of survey respondents into three groups according to the dominant patterns in their profiles of concern. These groups reflected Fuller’s (1969) three broad stages of concern: Self, Task, and Impact.

*Phase 2*

While the Stages of Concern Questionnaire elicited information about the types of concerns teachers had, it did not give any indication of why they had these concerns, how these concerns affected them, or how they would have liked to see these concerns addressed. As a result, individual interviews were conducted to answer the research questions of this study. From the themes of participating teachers’ open-ended statements and the research questions of the study, an individual interview protocol was developed with questions that explored the feelings, concerns, and experiences of teachers with regard to the *Bridges* curriculum, and what these teachers perceived as barriers and bridges to effective classroom implementation (see Appendix B). Responses to these questions were coded according to the Stages of Concern to aid in the connection of teachers’ concerns to their feelings about the curriculum and perceptions of barriers and bridges to its implementation. Digital audio recordings as well as notes and transcriptions
of these recordings were uploaded to a secure, password-protected Google Drive folder accessible only to the researcher.

**Phase 3**

The final stage of the research process was a confirmation survey, which functioned as a member check (see Appendix C). In this stage, interviewed teachers received composite descriptions of the three teacher concern types that emerged from the data. The confirmation survey allowed them to respond to these descriptions to determine the extent to which these research caricatures rang true with their experience, as well as an opportunity to provide open-ended comments. Feedback from these confirmation surveys was used to triangulate data from the SoCQ and interviews to validate the overall findings of the study.

**Instruments**

In this section, I will describe the instruments I used to collect data in my study. These include the Stages of Concern Questionnaire (George et al., 2006) as well as researcher-developed protocols for conducting individual interviews and confirmation surveys.

**Stages of Concern Questionnaire**

The Stages of Concern Questionnaire (SoCQ) is a 35-item survey designed by researchers at the Southwest Educational Development Laboratory to assess the perceptions and feelings of participants implementing an innovation (see Appendix A). The 35 items are designed to assess the seven Stages of Concern, with five items correlated to each stage. Participants mark each item on a 0-7 Likert scale according to
how true the statement seems to them at the present time. The questionnaire also includes a cover letter and introduction and a demographic page that can be used to sort the data into subgroups. An optional open-ended statement was also included for respondents to express a statement of their concerns. This statement provided valuable context for interpretation of the SoCQ profiles.

The Stages of Concern Questionnaire has a long history of use. Initial development in the mid-1970s lasted over three years and was tested in cross-sectional and longitudinal studies of 11 educational innovations (George et al., 2006). Since then, it has seen wide international use in a range of research contexts. For example, in a study of the state-mandated implementation of a mathematics problem solving textbook in Cyprus, Charalambous and Philippou used the SoCQ to assess teacher concerns and found that teachers’ concerns in earlier stages informed their concerns in later stages and that these concerns were impacted by their efficacy beliefs (2010). In a Dutch study of adaptive teaching, van den Berg and Ros (1999) implemented the SoCQ at several points during the innovation and found that teachers tend to express Self concerns at the beginning of a reform, that as these concerns are resolved they tend to progress to Task concerns, and that as the reform becomes well-established, that teachers express Impact concerns about ways to increase the effectiveness of the innovation. In a more recent study (2009), Tunks and Weller also used the SoCQ to corroborate this shift in teacher concerns over the course of a reform implementation, but, critically, found that this shift is facilitated when teachers receive substantial ongoing support in the use of the innovation.
Several critiques of the SoCQ have been published over the years. Kember and Mezger (1990) used the SoCQ to measure teacher concerns in the implementation of distance education, but found that the SoC framework at that time did not accommodate the concerns of teachers who rejected the innovation instead of implementing it. Several users of the SoCQ have proposed revisions to the stages in the SoC model, most proposing a reduction in stages to four or five (Bailey & Palsha, 1992; Cheung et al. 2001; Shotsberger & Crawford, 1999). Often, these proposed changes resulted from challenges with differentiating concerns in the early stages of the model. Responding to these concerns, in 2005 the developers of the SoCQ revised the survey items correlated to Stage 0 to more effectively address non-users of an innovation (George et al., 2006).

**Interview Protocol**

In qualitative research, interview protocols may reflect different levels of structure. Unstructured interviews can be more helpful for exploring issues, whereas structured interviews can be designed to target areas of interest to get meaningful responses in an efficient manner (Krathwohl, 2009). The interview protocol for this study combined multiple types of interviewing to achieve both goals. The protocol (see Appendix B) served as a starting place for preparing for the individual interviews, but consideration of an interview participant’s responses to the SoCQ and the open-ended statement of concern allowed me to use the interview as a time to probe participants’ perspectives in more detail. Open-ended questions and unstructured time in the interview also allowed for fresh insights and new information to emerge. For example, reviewing open-ended concern statements and items with particularly high scores on the SoCQ
allowed me to ask for elaboration in the interviews (e.g. “In the initial survey, you wrote.... Tell me more about this concern.” or “You responded to this statement by saying it was very true of you. Can you tell me more about why you feel that way?”). Likewise, probing for additional detail about particular responses (e.g. “You mentioned that you’re part of your building’s math leadership team. Can you tell me more about what that entails?”) gave me additional depth of understanding for each teacher’s experience with implementing the Bridges curriculum.

**Confirmation Survey**

In the final phase of the study, interviewed participants had the opportunity to respond to the findings and interpretations through a confirmation survey (see Appendix C). Composite descriptions of three teacher types that emerged from the data were shared with each interview participant, and they were asked to respond to the extent to which each description aligned with their perceptions of other teachers they knew, and the extent to which they personally identified with each description. Open-ended questions allowed them to provide any additional feedback on the proposed descriptions. This conformation survey functioned both as a member check, and as an opportunity to triangulate the findings from other data sources.

**Role of the Researcher**

This research was conducted within three school districts in their first year of implementing the Bridges in Mathematics curriculum. As a consultant for The Math Learning Center, the publisher of this curriculum, I have worked extensively with similar districts in the early stages of implementation. While I have not had any role within the
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participating districts prior to this study, my background and experience with many other similar districts gave me additional insight into the needs and concerns of the teachers who participated in my study. My role as a professional development consultant for the curriculum publisher also enables me to be responsive to the issues raised by the study, increasing the benefits to my participants. However, my role also raises concerns with regard to both ethics and validity that must be thoroughly addressed.

**Personal Biases**

I believe that my broad experience with teachers in many different settings gives me empathy and understanding for the challenges teachers face. While this experience might also lead me to make assumptions or inferences about teachers’ experiences, the design of my study ensured that teachers’ perspectives were captured in a variety of ways, enabling me to cross-check my interpretations with data from other sources. A bias I have that has proven to be an asset in this research is my committed belief that teachers’ voices about curriculum implementation should be heard. A potential negative bias might be that because I am committed to the goals of mathematics reform and value this curriculum as a tool for standards-based mathematics instruction, I may have had the tendency to be judgmental of those who were frustrated by the curriculum or who, in fact, were actively resistant to using it. Instead, this heightened my desire to understand these teachers’ positions and why they were committed to their beliefs. As a listener and a researcher in these districts, I played no role in implementation support, which allowed me to respect where each participant was in the process of implementation. Because of my role in other settings as a mathematics specialist and coach, that is, helping teachers
grow in their process of implementing standards-based curriculum, I at times experienced internal conflict in my role as a researcher, which was simply to understand how my participants experienced this process. This required me to be intentional and transparent in my exploration of these identities and the biases they brought to my research, resisting the temptation to cross the boundary between researcher and consultant when I found myself wanting to intervene with teachers by offering support.

**Ethical Concerns**

Because I worked with district leaders and principals in each participating district to identify and access teachers as participants in my study, I needed to be certain that my participants’ confidentiality was protected. I told each district leader I worked with that I would not be able to share with them individual or even school-level data, but only aggregate data for their districts. In constructing portraits of the needs and concerns of teachers at various Stages of Concern, I needed to be sure that my participants are not identifiable from my descriptions. For this reason, I used the data I gathered to create composite descriptions of teachers that cannot be traced to any one individual. It is also important to acknowledge the power differential between me as a researcher and mathematics consultant and my participants as teachers. While I had no prior relationship with any of the teachers or their districts, I do have professional relationships with colleagues who may have worked with them. This had the potential of making it difficult for teachers to share with me openly, and required clear assurances of confidentiality. I also needed to ensure that participants are protected from any negative consequences as a result of my study, for example in evaluations of their teaching which may impact their
status within a school or perhaps even their job placement. It was critical that I explained up front the potential risks and benefits to participants in my study and solicited informed consent from each participant. I ensured that teachers clearly understood and believed that their participation was optional and that they could withdraw their consent and/or participation in the study at any time.

**Validity**

Maxwell defines a validity threat as “a way you might be wrong” (2013, p. 123). He goes on to describe a variety of strategies that qualitative researchers can employ to reduce their own biases and their reactivity, or their own influence upon the individuals or setting being studied. In this section, I will describe several of the strategies I employed in order to increase the validity of my research: intensive, long-term involvement; rich data; member checks; and triangulation.

**Intensive, Long-Term Involvement.** While my involvement with participants in this study was limited to the surveys and interviews I did with them, I have worked extensively as a consultant with similar teachers in their first year of *Bridges* implementation in dozens of districts across the country for the past ten years. This gave me the benefit of familiarity with the types of feelings, concerns, and needs I could anticipate hearing from my participants. By following up with participants from the SoCQ, to the interviews, to the confirmation survey over the course of approximately one calendar year, I had several opportunities to check and confirm my inferences and theories. Maxwell writes that this long-term experience and these repeated data collection efforts “can help rule out spurious associations and premature theories. They also allow a
much greater opportunity to develop and test alternative hypotheses during the course of the research” (2013, p. 126).

**Rich Data.** The multi-phase process of the SoCQ, interviews, and confirmation surveys, allowed for the collection of “rich” data, which Maxwell defines as “data that are detailed and varied enough that they provide a full and revealing picture of what is going on” (2013, p. 126). In my research, I collected both closed-response Likert scale and open-response survey data. I collected high-quality, digital recordings of the interviews and took robust notes at the time of the interviews. I then went back and transcribed the recordings, providing multiple opportunities for me to listen to each participant’s perspective. These transcripts provided the rich data needed to develop valid descriptions that reflect participants’ own perspectives and experiences.

**Member Checks.** Another support to the validity of my study was the use of member checks to allow participants the opportunity to validate my data and the ways in which I interpreted it. According to Maxwell, “this is the single most important way of ruling out the possibility of misinterpreting the meaning of what participants say and do and the perspective they have on what is going on, as well as being an important way of identifying your biases and misunderstandings of what you observed” (2013, p. 127). After analyzing and synthesizing the data into composite descriptions of different types of teachers, I gave participants the opportunity to reflect on the extent to which these descriptions resonated with them with regard to their colleagues or themselves.

**Triangulation.** A final strategy for supporting the validity of my study and the model I developed from my data was the use of triangulation. In general, triangulation is
the use of different sources of data to determine the consistency of evidence used in a study (Krathwohl, 2009). Denzin (1978) and Patton (1999) describe different types of triangulation, two of which are relevant to my study: method triangulation and analyst triangulation. I will consider each of these in turn.

In *method triangulation*, researchers compare quantitative data with qualitative data to look for both convergence and divergence in what they reveal. In my study, the SoCQ provided quantitative data about teachers’ SoC, while the open-ended statements of concern and the individual interviews provided qualitative data. The confirmation survey comprised both quantitative and qualitative data as well. Patton notes that researchers “should not expect that the findings generated by those different methods will automatically come together to produce some nicely integrated whole” (1999, p. 1,194). Rather, it is the exploration of the conflicts between these data that can strengthen overall reliability. Patton writes that “deciding whether results have converged remains a delicate exercise, subject to both disciplined and creative interpretation. Focusing on what is learned by the degree of convergence rather than forcing a dichotomous choice--the different kinds of data do or do not converge--typically yields a more balanced overall result” (1999, p. 1, 194). As I looked for convergences that supported the development of my model, it was important for me to consider the complementary strengths of the qualitative and quantitative components of my study.

*Analyst triangulation* refers to using multiple researchers to collect or analyze data. While I was the sole researcher in my study, Patton identifies another method of analytical triangulation through having the people described in a data analysis react to
what is described. This happened in the final phase of my study through confirmation
surveys. In these surveys, participants reviewed the findings of my study and responded
to them from the insights of their perspectives and experience. Patton writes, “to the
extent that participants in the study are unable to relate to the description and analysis in a
qualitative evaluation report, it is appropriate to question the credibility of the report”
(1999, p. 1,196). By subjecting the findings of my study to the scrutiny of my participants
prior to its completion and allowing them to contribute their critical responses to my
work, I was able to increase the validity of my study.

Data Collection and Analysis

In qualitative research, data collection and analysis is a simultaneous and iterative
process. Merriam writes, “Emerging insights, hunches, and tentative hypotheses direct
the next phase of data collection, which in turn leads to refinement or reformulation of
one’s questions, and so on” (1988, p. 119). Because my study focused on teachers in a
process of change, the purpose of my data collection was to understand the views,
perspectives, and needs of teachers in this process. Aligning these data with the Stages of
Concern allowed for the development of a framework that describes how these views,
perspectives, and needs shift through the process of change. Thus, this method of analysis
in my research design supported the last of the three stated purposes of my study, which
was to develop a framework describing the needs of teachers at various stages of concern
and aligning these with teacher perceptions of barriers and bridges to the implementation
of the Bridges curriculum.
In analyzing my interview data, open coding was used to identify categories and subcategories of information from the participants. In this first stage of coding, categories emerged from the data itself. Next, axial coding was used to begin to identify logical themes across participants. At this stage, the research literature and theoretical framework played a role in developing categories and possible paradigms of how the information in the interviews was distributed across the different sample groups based upon their Stages of Concern. And finally, selective coding was used to develop a description of the data in each of the three broad types of concern (Self, Task, and Impact). For each concern type, the themes were used to construct a composite representation of teachers in that stage.

Together, these methods of data collection and analysis enabled me to answer my research questions about the concerns of different teachers with regard to the first year of classroom implementation of the Bridges in Mathematics curriculum. I was able to identify how these concerns and needs varied across teachers at different Stages of Concern and align these in a framework describing the supports these different teachers felt would assist them in the implementation of the curriculum. In the next chapter, I describe these findings and discuss their implications for policy and practice.
Chapter 4: Results/Analysis

Understanding teachers’ concerns about standards-based curricula and what different teachers perceive as barriers and supports toward implementing these curricula in their classrooms is foundational to providing the differentiated support needed for effective implementation. Therefore, the purpose of this study was threefold: (a) to understand the concerns of teachers and what they perceive as barriers to the classroom implementation of Bridges in Mathematics; (b) to identify teachers’ perceptions of the supports they believe will help them overcome barriers to implementation; and (c) to develop a framework describing the needs of teachers at various stages of concern and aligning these with teacher perceptions of barriers and bridges to the implementation of a standards-based curriculum. The following research questions guided this study:

1. What are the concerns of different teachers with regard to the classroom implementation of the Bridges in Mathematics curriculum?

2. What do teachers at different Stages of Concern perceive as barriers or bridges to their classroom implementation of this curriculum?

In this chapter, I present the results of the Stages of Concern Questionnaire and what these data reveal about teachers across the Self-, Task-, and Impact-concerns subgroups. I then describe additional insights revealed through interviews with a subset of survey participants. Based on these data, I present answers to my research questions about the concerns, perceived barriers, and desired supports these teachers described in relation to their first-year implementation of the Bridges in Mathematics curriculum, and compare and contrast these across the three groups. Finally, I close the chapter with three
research caricatures, or descriptions of hypothetical teachers who display the most prominent characteristics for each group. These are intended to provide recognizable portraits of different types of teachers in order to give insights into their concerns and needs.

**Analysis of Data**

This study identified the Stages of Concern (SoC) of 59 teachers in their first year of implementing the *Bridges* curriculum and interviewed a stratified sample of 18 of these teachers to understand their perceptions of their needs and the supports they felt would be beneficial to them. These data were analyzed to determine convergent and divergent patterns across the stages of concern to understand how these patterns of concern influenced teachers' needs and desired supports.

**Stages of Concern Profiles**

The user manual for the Stages of Concern Questionnaire (SoCQ) provides guidance for interpreting SoCQ data at several different levels of detail and abstraction (George et al., 2006). Analyzing the participants’ profile data at these different levels provides insights at both the group and individual levels. In this section, I describe the different layers of profile analysis and how these were used to categorize teachers into three groups according to their primary types of concern (*Self, Task, or Impact*). I also discuss the insights gained about the participants from these concern profiles.

**Stages of Concern.** Results from the SoCQ provide percentile scores measuring the intensity of respondents’ concerns across six stages of concern. Typical expressions of concern across these stages are described in Table 4.1. A high score in Stage 0,
(Unconcerned/Unrelated), indicates that the individual has little concern or involvement with the innovation, or that they may be more concerned about or involved with other unrelated issues or initiatives. High scores in Stages 1 (Informational) or 2 (Personal) indicate a respondent has high *Self* concerns and wants more information or reassurance about what the innovation will require, or its potential rewards, demands, or consequences for them individually. A high score in Stage 3, (Management) indicates

**Table 4.1**

**Typical Expressions of Concerns**

<table>
<thead>
<tr>
<th>Fuller’s Types of Concern</th>
<th>CBAM’s Stages of Concern</th>
<th>Typical Expressions of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stage 6: Refocusing</td>
<td>&quot;I have some ideas about something that would work even better.&quot;</td>
</tr>
<tr>
<td>Impact</td>
<td>Stage 5: Collaboration</td>
<td>&quot;I am concerned about relating what I am doing with what my coworkers are doing.&quot;</td>
</tr>
<tr>
<td></td>
<td>Stage 4: Consequence</td>
<td>&quot;How is what I am doing affecting students?&quot;</td>
</tr>
<tr>
<td>Task</td>
<td>Stage 3: Management</td>
<td>&quot;I seem to be spending all of my time getting materials ready.&quot;</td>
</tr>
<tr>
<td></td>
<td>Stage 2: Personal</td>
<td>&quot;How will doing this affect me?&quot;</td>
</tr>
<tr>
<td></td>
<td>Stage 1: Informational</td>
<td>&quot;I would like to know more about it.&quot;</td>
</tr>
<tr>
<td>Unrelated</td>
<td>Stage 0: Unconcerned</td>
<td>&quot;I am not concerned about it.&quot;</td>
</tr>
</tbody>
</table>

*Note.* This same table is also shown in Chapter 2 as Table 2.1. Adapted from *Measuring implementation in schools: The stages of concern questionnaire.* (Figure 1.2, p. 4), by A. A. George, G. E. Hall, & S. M. Stiegelbauer, 2006, Austin, TX: Southwest Educational Development Laboratory. Copyright 2006 by SEDL, [https://sedl.org/cbam/socq_manual_201410.pdf](https://sedl.org/cbam/socq_manual_201410.pdf) Adapted with permission.
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intense Task concerns about logistical aspects of implementing the innovation, such as time, management, and organization. High scores in Stages 4 (Consequence) or 5 (Collaboration) indicate a focus on Impact concerns such as student outcomes or the systemic coordination of efforts with others using the innovation. High scores in Stage 6 (Refocusing) indicate that the respondent has ideas about altering or even replacing the innovation in order to address their other areas of concern.

Profile Analysis. Initially, the peak score for each SoCQ participant was used as a starting place for identifying that teacher’s highest stage of concern. For those with peak scores in Stages 0 or 6, however, or where the second-highest stage score was within a few percentage points of the first, an additional layer of analysis provided additional insight into the dynamics of concerns. In this section, I provide examples of profiles with peak scores at Stage 0 or Stage 6, and one with multiple peak scores, and description of the further layers of analysis used to interpret these profiles.

Stage 0 Peak Score. Figure 4.1 shows the profile for one SoCQ respondent. While their highest score was in Stage 0, Unconcerned (96%), this only indicates the degree to which this teacher is unconcerned about using the Bridges curriculum. This extremely high score for this stage indicates that they are intensely unconcerned, meaning that they likely have many other competing concerns that are a higher priority for them. Note that this does not indicate anything about the degree to which the teacher is using the curriculum, simply that they have greater concerns about other things. Looking at their second-highest score, Stage 5, Collaboration (76%), indicates that in using Bridges, this teacher’s greatest concern is in coordinating their use with other teachers, which is an
Impact stage concern. While this teacher did not participate in a follow up interview, one likely scenario might be that this is a teacher leader who is invested in multiple initiatives, at least one of which is of a higher priority than implementing *Bridges*.

**Figure 4.1**

*Profile with Stage 0 Peak Score*

![Graph showing Stages of Concern with relative intensity percentages at Stage 0, 1, 2, 3, 4, 5, and 6.](image)

**Stage 6 Peak Score.** It is not uncommon for teachers of all Stages of Concern to have peak scores at Stage 6. George et al. (2006) indicate that looking at the second-highest score for Stage 6 respondents reveals the difference between those whose ideas for changing the implementation of the innovation are based on their concerns about the effects of the innovation on students (second-highest score in Stage 4); those who are very busy with the innovation or other job demands (second-highest score in Stage 3); and those who are concerned about the effect on themselves (second-highest score in
Stage 2). Figure 4.2 shows the profile for a teacher with a peak score in Stage 6, Refocusing (69%). The profile also shows that this teacher is somewhat more concerned about other things (Stage 0 score of 48%), and the likely reason for this teacher’s Refocusing concerns relates to their need for more information about what implementing Bridges entails (Stage 1 score of 48%). The higher scores in Stages 1 and 2 relative to Stages 3-5 indicate that this teacher’s primary concerns about Bridges are Self-related.

**Figure 4.2**

*Profile with Stage 6 Peak Score*

*Multiple Peak Scores.* Profiles with multiple peaks tend to show their closest scores in adjacent stages due to the developmental nature of how concerns change over time (George et al., 2006). Figure 4.3 shows the profile of a teacher with identical scores in Stages 2 and 3 (both at 39%). As discussed above, the peak score in Stage 0 (91%)
indicates that this teacher is likely highly concerned about things unrelated to using Bridges; however, the equal scores in Stages 2 and 3 show that they are dealing with both Stage 2 concerns (Personal) and Stage 3 concerns (Management). This likely captures a moment in this teacher’s development where they are beginning to use the curriculum with greater intensity as their Self concerns begin to resolve, leading to growing Task-related concerns. However, given that Stage 2 concerns remain high, for the sake of stratification, I categorized this teacher with the Self concerns group.

**Figure 4.3**

*Multiple Peak Concerns Profile*

![Graph](image)

**Self, Task, and Impact Stage Subgroups.** These layers of analysis allowed me to sort participants into three groups depending on whether their greatest concerns were Self-related (Stages 1 or 2), Task-related (Stage 3), or Impact-related (Stages 4 or 5).

Sorting the 59 SoCQ participants in this way allowed me to employ deeper analysis and
follow up interviews for a stratified sample that resembled the distribution of concerns among the larger survey group.

The frequency and percent of teachers in each group is shown in Table 4.2. In both the full SoCQ cohort and the subset who completed follow up interviews, over half of the participants identified their highest concerns in the middle Task stage, with the remaining participants distributed between the upper Impact stage and the lower Self stage, skewing slightly toward the lower end of the concerns continuum. This reflects the developmental nature of concerns and is to be expected in a study conducted with teachers in the early stages of an innovation.

**Table 4.2**

*Types of Concern for SoCQ and Interview Participants*

<table>
<thead>
<tr>
<th>Participants</th>
<th>Types of Concern</th>
<th>SoCQ</th>
<th>Self</th>
<th>Task</th>
<th>Impact</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>SoCQ</td>
<td></td>
<td>13</td>
<td>22.0%</td>
<td>34</td>
<td>12</td>
<td>59</td>
</tr>
<tr>
<td>Interviews</td>
<td></td>
<td>5</td>
<td>27.8%</td>
<td>10</td>
<td>3</td>
<td>18</td>
</tr>
</tbody>
</table>

**High Self Concerns.** Plotting the SoCQ data graphically for each participant demonstrates convergences and divergences for individual and subgroup data. Figure 4.4 shows profile data for the five participants who showed highest Self concerns, identified here as Teachers B, C, F, G, and R. These data show expected variations in the relative
types and intensities of concern across the subgroup, but all teachers in this group showed high scores in Stages 1 and 2. Scores in Stage 0 represent the degree and relative intensity of interest and engagement in using the *Bridges* curriculum relative to that teacher’s other tasks, activities, and efforts, with higher scores indicating that there are other initiatives and tasks of concern to them. High scores in Stage 0 were interpreted in relation to second-highest scores in other stages, as discussed above.

**Figure 4.4**

*Profiles of Teachers with High Self Concerns*

According to George et al., (2006) high scores in Stage 1 (Informational) indicate that the respondent is interested in knowing more about substantive issues related to the innovation. These *Bridges* users are likely concerned with understanding more about the structure and function of the curriculum. High scores in this area do not necessarily indicate how much information the respondent already knows, just that they have
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unresolved concerns in this area. They need more information about what *Bridges* will look like in their classrooms, what it will do for them and their students, and what implementing the curriculum will require.

Those respondents with high Stage 2 concerns (Personal) likely have questions and uncertainties about how implementing *Bridges* impacts them. These concerns may have to do with both their perception of their own ability to teach in ways consistent with the curriculum and what consequences or rewards may result from evaluations of their performance. While Stage 1 (Informational) and Stage 2 (Personal) concerns often occur at the same time, the relationship and relative intensity of these concerns reveals significant differences that need to be analyzed individually.

**One-Two Split Scores.** The greatest divergences in the data shown in Figure 4.4 are between those whose Stage 1 score is significantly higher than Stage 2 (Teachers C and G), and those whose Stage 2 scores exceed Stage 1 (Teachers B, F, and R). When the Stage 1 and Stage 2 scores are very different for an individual, George et al. (2006) refer to this at a *one-two split*. When the Stage 1 (Informational) score is distinctly higher than Stage 2 (Personal), this indicates that the individual is open to the innovation and is interested in learning more. This is referred to as a *positive* one-two split. These teachers likely have a positive, proactive orientation to *Bridges*, with little fear about its personal impact on them.

Those whose Stage 2 (Personal) scores are much higher than Stage 1 (Informational), however, show what is termed a *negative* one-two split. A new *Bridges* teacher with this profile may be highly concerned about potential negative impacts to
their own position, personal well-being, or job security, and these concerns may override their openness to learning more about the curriculum. Moreover, George et al. (2006) write, “when general, non-threatening attempts are made to discuss an innovation with a person with this profile, the high Stage 2 concerns are intensified and the Stage 1 concerns are further reduced. An individual with this kind of profile probably will not be able to consider a proposed innovation objectively until [their] personal Stage 2 concerns are reduced” (p. 41). This has significant implications for these teachers’ responses to professional learning and other supports that may be offered to them in these early stages of implementation, as they may be met with various degrees of doubt and resistance.

**High Task Concerns.** The data shown in Figure 4.5 represent the profiles of teachers whose highest scores were in Stage 3, indicating that their greatest concerns were *Task* concerns (Teachers A, D, E, H, I, J, K, L, M, and P). While some in this group still show evidence of the one-two splits discussed above, this has less significance due to the fact that Stage 3 scores all exceed those in Stages 1 and 2. All of these teachers show peak scores in Stage 3 (Management) and so a greater degree of overall convergence can be seen across these profiles than those in the *Self*-concerns group. As with all of the scores, the relative placement of the Stage 3 scores on the vertical axis indicates the degree of intensity, with higher scores indicating more intense concerns.

Participants with high scores in Stage 3 (Management) are intensely concerned about management, time, and logistical aspects of the innovation. For early *Bridges* users, these teachers are likely in the thick of trying to manage the nitty-gritty details. They are learning to navigate the curriculum resources, organize and manage the physical
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materials, and carry out the preparation and planning needed to teach the *Bridges* lessons each day. They are likely intensely concerned about the time *Bridges* requires, both in terms of teacher preparation time as well as instructional time within the school day.

**Figure 4.5**

*Profiles of Teachers with High Task Concerns*

Above, I discussed the issue of high Stage 6 scores (Refocusing) and how these scores need to be interpreted in relation to the respondent’s second-highest scores. High Stage 6 scores indicate that these participants have strong ideas about how the process of implementing the innovation should be different. Their reasons for this, however, differ according to the concerns indicated by their second-highest score. Many of the teachers with the highest *Task* concerns also scored very high in Stage 6. George et al. (2006)
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contend that these teachers are very engaged and busy with management tasks and are actively considering ideas for changing their use of the innovation or how it is being implemented.

While most teachers in this Task group showed Stage 6 scores that tailed up, one, Teacher I, showed a Stage 6 score that tailed down. In contrast to those teachers with many ideas about how to address their Task concerns, a low Stage 6 score in combination with a high Stage 3 score may indicate a teacher who is feeling stuck and is uncertain what to do about the challenges they are facing. For an early implementer of the Bridges curriculum, this may indicate that this teacher is overwhelmed and paralyzed by the weight of the task of implementing the curriculum and may need greater assistance in resolving these concerns.

High Impact Concerns. Finally, Figure 4.6 shows profile data for the three participants who showed highest Impact concerns, identified here as Teachers N, O, and Q. Each of these teachers showed peak scores in Stage 5, demonstrating a high degree of interest in collaborating with colleagues to coordinate use of the innovation. George et al. (2006) indicate that profiles that peak at Stage 5 are typical of team leaders or administrators. Follow up interviews with these three teachers indicated that each was, in fact, identified as a teacher leader in their grade level or building, with responsibilities for helping to coordinate use of the Bridges curriculum among other teachers in their setting. These teachers had been selected for their leadership roles based on their levels of interest and expertise in teaching mathematics. All three had participated in significant post-licensure learning opportunities to deepen their knowledge of effective mathematics
instructional practice, and had access to additional professional learning opportunities during this first year of *Bridges* implementation to support their own use of the curriculum and their leadership among their colleagues.

**Figure 4.6**

*Profiles of Teachers with High Impact Concerns*

For each of these teachers, it is likely that these experiences and opportunities may have been both a cause and an effect of their *Impact* stage concerns. Their past experiences with more advanced mathematics teaching and learning methodologies may have mitigated some of their lower-stage concerns as the instructional models and practices promoted by the *Bridges* curriculum were already somewhat familiar to them. Likewise, the additional opportunities for support and professional learning these
teachers had access to, due to their leadership roles, may have accelerated the resolution of any knowledge and management concerns they may have had at the start of the school year.

While these teachers’ SoCQ profiles and the patterns across subgroups provide important insights into their concerns, further clarification and illumination of these patterns were needed to more fully understand what these concerns looked like in practice and how they impacted teachers' feelings and needs. Engaging these 18 teachers in individual interviews allowed me to explore these profiles more deeply and identify additional patterns across the three groups.

**Insights From Teacher Interviews**

Going into the interviews with teachers, I reviewed their SoCQ results so I could probe and clarify the things they reported on the survey. I took note of particularly high areas of concern in their scores and any responses they had submitted to the open-ended question about their feelings, perceptions, or concerns, and I gave them an opportunity to elaborate in the interview protocol. In my analysis of the interviews, I found themes that aligned well with the reported SoCQ profiles.

**High Self-Concerns Interviews.** Teachers in the *Self* group had indicated on the SoCQ that their greatest concerns were in Stage 1 (Informational) or Stage 2 (Personal). These concerns were verified in the themes of the interviews. Informational concerns were expressed with statements about needing to learn the components of the curriculum and become comfortable with the layout. Some felt that they were overwhelmed by the quantity of information presented in their initial orientation workshop at the start of the
year, and one mentioned trying to email the publisher directly to seek answers to some of her questions. Personal concerns were particularly evident in a strong desire for autonomy in how, or even if, they used the curriculum to teach. As one teacher said, “I don’t want something to tell me what to do.”

Teachers in this group whose SoCQ profiles showed a positive one-two split, that is, whose Stage 1 (Informational) concerns were higher than Stage 2 (Personal) scores, were trying to use the curriculum, but expressed doubt and a need for reassurance. Some gave expressions of uncertainty and worry such as, “Hopefully we were doing it right. We still don’t know.” One teacher said, “it was so intimidating. There was so much going on...I felt like, how am I going to teach all this?” When asked about the support they needed, one teacher said she wished she had someone to give her encouragement that she was doing the right thing.

Teachers with this positive one-two split also shared some of their perceptions of themselves that impacted their concerns. Some spoke of how the program challenged their own understanding of mathematics and knowledge about how to understand and respond to students’ mathematical thinking. Others expressed concern about their personal skills like organization or the ability to take anecdotal notes. They seemed to struggle with confidence in their ability to use the curriculum. As one teacher said, “I was worried I was not going to be able to do the curriculum justice.”

Teachers whose SoCQ profiles indicated a negative one-two split, that is, where their Stage 2 (Personal) concerns outweighed their Stage 1 (Informational) concerns, tended to emphasize their strong desire to have control over what and how they taught.
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They tended to be more openly critical of the curriculum, with statements that it was “too complicated” or had “lots of fluff [the students] don’t need.” In contrast to the positive one-two split teachers who expressed a lack of confidence in themselves, these teachers were more likely to lack confidence in the curriculum itself.

A common theme across teachers in the Self-concerns group was that they tended not to use the curriculum as it was designed. External expectations or even their own desires to implement all of the components and lessons with fidelity led to high levels of stress or resistance, and they responded by returning to methods or materials that were more comfortable for them. They were much more likely than other groups to pick and choose elements from the curriculum, referring to it as a general scope and sequence, but only using components or lessons that aligned with their own existing instructional structures and practices. They frequently skipped lessons or even whole units that did not align to their understanding of student needs, and they used other instructional materials to support the skills they wanted their students to master. As one teacher said, “I felt that the majority of my students were becoming more overwhelmed and confused by those strategies instead of just using numbers.... Maybe because I was taught with the algorithm so I prefer it.” Another was more blunt: “We spent the whole first half of the year doing the addition and subtraction algorithm cause it was like, what are you gonna [inaudible] with a number line.”

Autonomy was a high value for the teachers in this group. Whether they were skeptical of the curriculum or simply uncertain of their own ability to teach it, they wanted the freedom to streamline and modify the Bridges materials, adapting it to their
own comfort levels and teaching styles. The components they liked the best were the ones they felt were fun and engaging for students, and those they perceived as leading to strong computational fluency.

Asked about supports that would help them with implementing Bridges, they typically responded with a desire for support with resources and strategies for curriculum modifications that would allow them to teach according to their own teaching styles and learning experiences. Those who worried about whether or not they were delivering the curriculum adequately wanted reassurance that partial implementation was acceptable, and even encouraged in the first year. If they received this support, it allowed them to feel less stressed and build more comfort with the program. Those who did not receive explicit permission to streamline the curriculum felt pressured, and they tended to entrench more deeply in their desire to teach in their own way. This is consistent with the contention that attempts to discuss an innovation with teachers whose profile shows a negative one-two split without adequately addressing their Stage 2 (Personal) concerns can lead to an intensification of those concerns and a lessened openness to learning more about the program (George et al., 2006).

Overall, teachers in the Self concerns stage were most concerned about having the autonomy to implement the curriculum in a way that aligned with their own teaching beliefs, models, and styles. When they lacked confidence in the curriculum or their own ability to use it as written, they alleviated that stress by moving away from the written curriculum and back into practices that felt more comfortable. The support that they most
desired was either a streamlined version of the curriculum or permission and resources to do that streamlining on their own.

**High Task-Concerns Interviews.** Teachers in the Task group had indicated on the SoCQ that their greatest concerns were in Stage 3 (Management). As expected, interviews with these teachers revealed strong concerns about preparation, planning, and instructional time, the organization and management of materials, and navigating the logistics of the program. In contrast to the Self concerns group, who responded to these challenges by stepping back from the written curriculum, teachers in the Task group were more likely to rise up to meet these challenges. While they found this overwhelming, they were also determined to persevere because they felt the curriculum was worthwhile.

Even so, many of these teachers felt overwhelmed and exhausted by this process. They described their curriculum use as a “mad panic,” saying things like, “Bridges is running our life right now,” and that they were “just trying to keep up.” Most of this had to do with time challenges. They found the materials preparation and lesson planning to be time-intensive, and worried that the time needed to prepare materials left them with insufficient time to prepare for teaching the lessons effectively. One teacher said, “Even though I prepped all of these hands-on materials...my kids still were not understanding that concept. I was like, I put so much work in and I’m not achieving what I want.” In order to feel prepared, they needed more time to understand the lessons before teaching them. Some said things like, “You can’t just pull up the lesson and teach the lesson.” and “You have to read it several times.... It’s like homework. I sit and highlight it, and then I read it again. And then I read it right before teaching the lesson.”
The greatest support these teachers wanted was dedicated time each month to understand and prepare each unit in advance. Without time to think through each unit ahead of time, they could not even utilize paraprofessionals or parent volunteers to assist with materials preparation. As one teacher said, “We’ve been in the throes of it and not being able to get organized enough to give them what they could do for us.” They felt that guidance from instructional leaders in analyzing the big ideas, lesson structures, and assessment goals before each unit, as well as identifying the materials that would need to be organized and prepared, would help them start each unit with more understanding and confidence. They emphasized that this needed to be done ahead of each unit on an ongoing basis.

The lack of this big-picture preparation for each unit may have contributed to their struggles with pacing, as they seemed to lack clarity about what they were aiming to accomplish. Many spoke of their struggles with getting through a lesson in the time allotted each day. When pressed to elaborate on this challenge, their responses uniformly confirmed that their schedules allocated the full quantity of instructional time recommended by the *Bridges* materials. However, their answers also frequently revealed that they were trying to fit in additional components that were not expected by the written curriculum such as homework review, additional skills practice, and intervention for individuals or small groups. Even those who were trying to teach the curriculum with fidelity struggled to complete a lesson each day, and often attributed this to the learning curve of implementing something new, both for themselves as teachers as well as for students, who were not necessarily familiar with the strategies, models, vocabulary, and
routines used in *Bridges*. Many of these teachers wanted support with pacing and understanding more about the curriculum components and how they fit into one day. As one teacher said, “I felt very overwhelmed because there were so many pieces to the puzzle.” Another said, “Because we don’t really know that structure, it falls by the wayside sometimes.” Developing a stronger understanding of the curriculum structure and the larger vision for the games and lessons was something they felt could help them avoid getting lost in the details.

Logistical struggles were another common theme in interviews with this group of teachers. Some of this had to do with organizing the many different materials that come with the curriculum. “I have to dig through a box, and then go over here to get the manipulatives,” said one teacher. “If the first [game] has dice, I didn’t know if I could keep the dice in there, or if I would need them again,” These teachers wanted practical tips about effective organizational strategies. As one teacher said, “I would love to have it all in one place.” But they felt it would be even better if those organizational systems were built into the curriculum itself. “If we had that already done” said one teacher, “then it wouldn’t be such a burden on me.”

Even the many resources provided by the publisher to support teachers could, themselves, be part of the problem. One teacher described the “overwhelming abundance” of resources. While they appreciated the quality of the resources, they struggled with knowing where they are located and finding the time to go through them. Navigating the teacher guides was also a challenge for many. “I would like a more linear organization,” said one teacher. “This is a lot of text. The way the manual is laid out can
be overwhelming.” Another said, “It’s great that there’s so much script, but sometimes I just need the point. The purpose of the lesson, the basic things. Not to get rid of the binders, but just in addition to.”

While teachers appreciated the initial training they received at the start of the year, they also found it hard to take everything in. “They tell you everything,” said one teacher, “but because there’s so much, it doesn’t really stick the first time.” Many suggested that smaller doses of ongoing support would be more helpful, or at least follow-up once they knew enough to know where they needed support. “If I had had someone come a couple of months in and go, how’s it going? What do you need support in? That would have helped,” said one teacher. “That one training at the beginning of the year is hard,” said another, “because you don’t know what you don’t know. You’re kind of going into it blind and trying to soak up everything you can.”

Overall, teachers in the Task concerns stage were determined to implement the curriculum well, but found the task to be overwhelming. Keeping track of all of the materials and components and fitting them into their day took all of their time and energy. They wanted professional learning and planning support on an ongoing basis and wanted to see tools and structures built into the curriculum to help them access what they needed with less time and effort. Despite the challenges, these teachers felt the effort was worth the struggle. They frequently mentioned the benefits to their students both in terms of engagement and in mathematical learning. They had seen improvements in test scores and were excited by growing enthusiasm for mathematics among both teachers and
students. As one teacher said, “I’ve enjoyed teaching it and the kids love it, which is the only thing that really matters.”

**High Impact-Concerns Interviews.** Teachers in the Impact group had indicated on the SoCQ that their greatest concerns were in Stage 5 (Collaboration). In the Stages of Concern model, peak scores in Stage 4 (Consequence) are also considered to be part of the broader stage of Impact concerns, however, none of the interview participants in my sample showed high Stage 4 concerns. Even in the larger group of 59 SoCQ participants, only one teacher’s results demonstrated Stage 4 concerns as a second-highest score, with a peak score in Stage 6. No other participants had either a first or second highest score in Stage 4. As a result, the concern profiles of the three interview participants in this group were a reasonably representative sample of the larger set of participants.

It is unclear why Stage 4 (Consequence) concerns were of such noticeably low intensity across the group, but it may be that the developmental nature of the Stages of Concern makes it more likely that Self and Task concerns are most prevalent in the first year of the innovation. George et al. (2006) say that Stage 4 (Consequence) concerns are demonstrated when the teacher is most focused on improving the outcomes for students in their own classroom. Since this was the teachers’ first year using the Bridges curriculum, most seemed to be focused on building their own familiarity with the curriculum and managing the details of using it. It is likely that Stage 4 (Consequence) concerns would surface in subsequent years of implementation as Self and Task concerns are resolved.
As described earlier, peak Stage 5 (Collaboration) scores are likely to be found in the profiles of leaders with responsibility for coordinating use of the innovation with others. Interviews with the three teachers in the Impact group confirmed that all three had roles beyond their own classrooms where they were working with other school and district leaders to coordinate use of the Bridges curriculum across building and district classrooms. These roles involved opportunities to participate in additional support activities such as professional learning sessions focused on Bridges instruction and implementation, or guided planning sessions with a mathematics instructional coach. It is possible that these supplementary opportunities may have helped accelerate the resolution of any Self and Task concerns they may have had, allowing them to focus on more Impact-related concerns.

Participation in a mathematics-related leadership role did not always have this effect, however. One teacher, whose profile placed her clearly in the Task concerns group, also had a role as a mathematics instructional leader in her building. Like those in the Impact group, this teacher also attended similar district-level meetings each month where she and other teacher leaders worked with a mathematics instructional coach to analyze building assessment data from each completed unit and delve deeply into the mathematical content, models, and strategies in the next unit. She then had the responsibility to share that information with other grade level teachers in her building. When asked about her background and how she came to take on this role, however, she gave a sheepish laugh. “This is so embarrassing,” she said. “The other lady went on maternity leave, so the principal asked, uh, ‘voluntold’ me.” She acknowledged that,
while she had enjoyed the work, she had no particular interest or expertise in teaching mathematics. This was reflected on her SoCQ profile, which showed low Impact concerns and much higher concerns in earlier stages with a clear peak at Stage 3 (Management).

The teachers in the Impact group, by contrast, not only had roles as mathematics teacher leaders, but the interviews revealed that each also had a strong background in deepening their own understanding of mathematics and effective mathematics teaching. One described herself as “kind of a math geek” and another had been a mathematics major in college. They had all taken additional courses beyond their elementary teaching credential program specifically to deepen their mathematical content knowledge. All had a history of mathematics leadership roles within their districts long before the Bridges curriculum had been adopted, and all had experience leading and facilitating mathematics professional learning experiences with their colleagues.

These teachers’ strong concern for collaboration came through clearly in their interviews. “I’m always looking for ways to connect with people and hear their ideas,” said one teacher, and all expressed a strong desire for more of this connection as well. One felt that sometimes her leadership role actually got in the way of this. She said of the other teacher in her building at her grade level, “She doesn’t collaborate unless I go in, and then it’s viewed as I’m going in there as the math coach, to support. And that’s not really what I want. What I want is a collaborative partner.” Her solution to this was to use her connections across the district to find teachers in other buildings to collaborate with. She said, “There’s just times when I’m reading through a lesson and I’d like to be able to
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talk it through with a colleague and say, what’s your understanding of this? What do you think they’re meaning?” Another teacher who also lacked collaborative partnerships with teachers in her building described herself as being “on an island.” She looked for ways to connect with other Bridges teachers online, and while she found some interactive features on the Bridges educator website, she felt that additional support with finding and facilitating these connections outside her district would have supported her greatly.

In contrast to many of the teachers at earlier stages of concern, the Impact-concerns group had a different approach to the curriculum. While they acknowledged the time it took to prepare and teach the lessons, they did not seem particularly concerned about this. One teacher said of the work she put into preparing materials, “Sometimes the tasks that require the most prep are the most engaging and enriching.” Her concern was more with the learning her students took from each lesson. They were all very positive in their descriptions of the curriculum and this confidence was reflected in how they described their use of the materials. “I’ve been really impressed with how it [addresses] the core concepts. It’s really pushing students’ thinking toward a higher level,” said one. Another said, “it aligns perfectly with the standards. There’s no holes or gaps that I have to supplement with other material.” The third teacher expressed the same thoughts. “I’ve done next to nothing in terms of supplementing anything.” They consistently expressed excitement about the things they saw their students learn and understand. They also described their own excitement about teaching the curriculum. “I think a lot of the activities are engaging for the students, but I also feel like they’re engaging to me,” said one teacher. “I can see where they’re trying to go and what they’re trying to get the kids
to understand with what they’re doing.” When asked to describe their feelings about the curriculum, these teachers used words like “empowered,” “prepared,” “confident,” and “supported.”

Like the teachers in the Task-concerns group, these teachers also expressed a desire for time to prepare and plan in advance of every unit, but were more likely to emphasize that they wanted to do this work collaboratively with others. In addition, they wanted this collaborative work to go beyond planning and into a deeper understanding of the purpose of the lessons. One wanted time weekly to meet with teammates to talk through the next week’s lessons. “I think that would be really beneficial to not just have the time to [plan] but have those conversations.” Her reasoning was, “if I don’t understand it at a deep level it might be something that...I’m doing it, but I’m not pointing out the deep learning that my kids most need from it.”

In addition to having time to delve deeply into the lessons with colleagues, these teachers also expressed a desire for ongoing professional learning. While teachers in the Self stage wanted professional learning to focus on resources to modify and supplement the curriculum, and teachers at the Task stage wanted a focus on managing the curriculum, teachers at the Impact stage wanted to learn more about ways to teach the lessons even more effectively. They felt the most important professional learning would focus on things like deepening their questioning and facilitating discourse among the students. They also suggested that this might be done most effectively through a lab classroom model, where teachers could watch a Bridges lesson in action and then discuss these effective teaching practices in the context of what they had observed.
Overall, *Impact*-stage teachers expressed high levels of confidence in the curriculum and felt it equipped them well to teach their students effectively. While they also expressed confidence in their own use of the curriculum, they wanted more opportunities to collaborate with others to enable them to engage students with even deeper levels of learning. Through their leadership roles, they had received professional development that they felt supported their ability to teach the curriculum effectively, and they wanted to support their colleagues with these opportunities as well.

**Answering Research Questions**

In this study, I sought to answer two research questions:

1. What are the concerns of different teachers with regard to the classroom implementation of the *Bridges in Mathematics* curriculum?
2. What do teachers at different Stages of Concern perceive as barriers or bridges to their classroom implementation of this curriculum?

My hypothesis was that teachers’ perceptions of the curriculum and what they felt they needed to implement it in their classrooms would differ according to their Stages of Concern. While this hypothesis was largely confirmed by the data, there were elements of the teachers’ responses that surprised me as well.

**Teacher Concerns**

In question one, I sought to understand the concerns of different teachers with regard to the classroom implementation of the *Bridges in Mathematics* curriculum. As expected, both the SoCQ and the follow up interviews confirmed that these concerns looked different for each of the three groups. All three groups expressed sincere concern
for student learning; however, each group expressed that concern in different terms. The Self-concerns group was concerned about students mastering skills, frequently mentioning the importance of computational fluency. They also wanted to see these skills acquired through fun and engaging learning experiences. The Task-concerns group was concerned that student learning be rigorous, and frequently tied this to their concerns about accountability measures such as report cards and standardized tests. The Impact-concerns group expressed their concern that students develop productive mindsets and attitudes toward learning mathematics, seen not only in deep conceptual understanding, but also in excitement about the mathematics they were learning. While the other two groups expressed this student learning in individual terms, the Impact group also expressed their concern that student learning be collective, developed collaboratively through student discourse.

The ways each group described their feelings about implementing Bridges also provided insights about their differing concerns. George et al. (2006) describe the SoCQ as being affective, in that concerns are revealed by measuring how a person is feeling about the innovation. When asked to describe their feelings, teachers in the Self-concerns group frequently described an initial sense of stress when first receiving training about using Bridges, but said that they became much more comfortable as they streamlined the curriculum. The feelings in this group did not seem to be particularly intense. When asked to give a word to describe their feelings about using Bridges, one teacher simply shrugged and said. “Fine.... It’s easy to implement, it’s easy to modify, do whatever I need. So, ‘fine.’ That’s my one word.”
Those in the Task-concerns group, on the other hand, used much more intense words to describe their feelings. “Overwhelmed” was the word most often used, along with similar descriptors such as “frazzled,” “busy,” “pressured,” “frustrated,” and “just trying to keep up.” However, the same teachers who used these words to describe their feelings also described feelings that were very positive, such as “surprised,” “encouraged,” “excited,” and “proud.” This seems to indicate that, while they found the implementation of Bridges extremely challenging, they also found that persevering through the challenge was worth the effort.

The Impact-concerns group used strong words to describe their feelings about implementing the curriculum, but they were also words of lower intensity than the Task group. They said that using the curriculum made them feel “prepared,” “supported,” “engaged,” and “confident.” This did not mean that they necessarily found the implementation to be easy—another word used by one Impact group teacher was “tired”—but they felt well equipped by the curriculum to engage in the work of implementation.

This answers my first research question by describing the concerns of different teachers with regard to the implementation of Bridges, and these answers confirm my hypothesis that significant differences in concerns would be found across the three groups.

**Implementation Barriers and Supports**

In question two, I sought to understand what teachers at different Stages of Concern perceived as barriers to their use of the Bridges curriculum, as well as the
supports they felt would help them to overcome these barriers. Just as the three groups identified significantly different concerns with regard to the implementation of *Bridges*, I expected they would also identify different barriers to implementation. However, this did not turn out to be the case. Analysis of the barriers each group of teachers identified revealed striking consistency across the three groups. The supports each group felt would be helpful in overcoming these barriers, however, differed significantly.

**Barriers.** All three groups found their own lack of familiarity with the curriculum to be a barrier to implementing it well. This seems to be a barrier inherent in the newness of the curriculum. It is difficult to teach a curriculum well while still becoming familiar with the curriculum components and materials. However, each group expressed confidence that this would improve. A typical expression of this barrier was, “I’m not familiar with anything, so everything is new. I don’t know what is coming next. So I’m really excited for year two.” This seems to be a barrier that would resolve itself in time.

Compounding this barrier of lack of familiarity, however, was the problem of inadequate time for advance preparation and planning. This also was universally expressed across all three groups. Given the newness of the curriculum, each group felt they needed extra time to make sense of the lessons before teaching them, and felt the planning time they had was not enough. This led to additional challenges with getting through the lessons in the instructional time allotted in their day. Lacking familiarity and a deep understanding of the lessons affected teachers’ pacing and ability to support students effectively. This meant that it was often difficult for teachers to complete a lesson in a day, causing them to fall behind their pacing schedule for the year. In an effort
to keep up or stay on track, many teachers dropped components of the curriculum, which then meant that students did not always have a strong background with foundational concepts or sufficient practice with skills before moving on. Therefore, challenges with instructional time were compounded by challenges with preparation time which were compounded by challenges inherent in the newness of the curriculum. All of these barriers reinforced each other, making them even more daunting for teachers to overcome.

Another barrier universally identified by teachers in all groups was the fact that students did not always have sufficient background knowledge to engage with the lessons productively. Some of this had to do with the fact that the Bridges curriculum was new for students as well as for teachers. Even when teachers at the previous grade levels had been teaching to the same Common Core standards addressed in Bridges, the instructional materials they had used the previous year did not necessarily align with the models, strategies, vocabulary, and instructional routines students encountered in this new curriculum. This created an inevitable learning curve for students as well as for teachers. In addition, many students did not have a strong grasp of skills and concepts from previous grade levels, whereas those who did often needed additional challenges. This required teachers to differentiate instruction to meet varying student needs. This barrier is not inherent to Bridges itself, but finding ways to use the Bridges materials to meet the needs of a wide range of students was a challenge that teachers from all three groups faced. Just as the teachers’ familiarity with Bridges would naturally improve over subsequent years of implementation, students’ familiarity would also improve over the
years as students progress through various grade levels of *Bridges* instruction. However, the need to differentiate instruction to meet a wide range of student needs will likely always be a challenge teachers must address.

These barriers around preparation and instructional time and diverse student abilities, knowledge, and needs were challenges faced by all teachers in the study. These barriers seem to be common to all teachers, and are not necessarily related to the curricula they may be using. However, teachers in the first year of implementing *Bridges* have to address these barriers in the context of a new and challenging curriculum.

**Supports.** While the barriers teachers faced when implementing *Bridges* were largely the same across all three groups, the supports each group felt would be most helpful in overcoming these barriers differed. As mentioned above, all three groups felt that ongoing professional development would be a helpful support, but descriptions of what they wanted this to look like diverged across the three groups. The *Self* group expressed less urgency in their desire for professional development, but did say that they would welcome guidance on modifying the curriculum and resources to help them streamline it. However, they wanted the autonomy to decide how to apply these supports in their classrooms. The *Task* group valued the initial professional development they had received from the publisher at the beginning of the year, but tended to feel overwhelmed by the quantity of information they had received in that training. They frequently mentioned a desire for “refresher training” a bit later in the year once they were more familiar with the program and knew more about their own questions. This group also frequently expressed a desire for “tips and tricks” from experienced *Bridges* classroom
teachers who could help them with ideas for managing the demands of implementing the curriculum. The Impact group wanted professional development to focus on high-leverage teaching strategies such as posing purposeful questions and facilitating student discourse while implementing Bridges lessons. They also wanted to learn more about ways to incorporate more rich problem-based tasks in their Bridges lessons. This group also sought ways to embed this professional development in classroom settings such as a lab classroom where teachers could observe a lesson being taught by a skilled mathematics teacher or instructional coach and see the strategies in action.

All three groups also wanted to work with others in implementing the curriculum, but, again, this looked different across the three groups. The Self-concerns group felt that having an assistant in the classroom to help with small groups and classroom management would be most helpful, whereas the Task-concerns group was more likely to want help outside of the classroom with preparing materials and lesson planning. Because teachers in the Self-concerns group were more likely to skip lessons that required substantial preparation, they expressed a wish that curriculum materials would come in a more ready-to-use format right off the shelf. While the Impact-concerns group agreed with the Task-concerns group that being provided with time for collaborative materials preparation would be a helpful support, they were more likely to want time to delve into deeper levels of collaborative planning to identify the important mathematical ideas in each lesson and strategize around ways to engage their students with these ideas in productive ways. Perhaps because teachers at the Impact-concerns stage were in the minority, these teachers also expressed a desire for ways to connect with teachers outside
of their own buildings who shared these same goals. They looked for ways to network within their own districts, but also wanted to use technology to connect online with like-minded Bridges teachers in other areas.

So, while all teachers indicated a need for support in the first year of implementation, the type of support they most felt they needed differed according to their stages of concern. All teachers felt professional development was important, but each group differed in what they wanted it to look like, both in terms of the content and in terms of the delivery. All teachers also expressed a need for support with sharing the load of implementation with other educators, but differed in the support they wanted from colleagues, both in terms of who they wanted support from and the type of support they wanted. This supports my contention that support for teachers in the first year of implementing a reform-based mathematics curriculum should be differentiated for teachers according to their needs and concerns.

From the patterns that emerged through my analysis of the research data, I developed composite descriptions of teachers at each of the three Stages of Concern. In the next section, I share these research caricatures and the study participants’ responses to them gathered through a confirmation survey sent to each of the 18 teachers I had interviewed.

**Research Caricatures**

While the word *caricature* often has negative connotations, in its simplest form, a caricature is a rendering of a person where certain prominent characteristics are made more visible. In research, group caricatures are a type of composite description that
emphasizes the salient characteristics of those it represents. In this study, it is not my intent to capture every characteristic of each participant in the group description, but rather to highlight the most distinctive features that members of each group had in common. The caricature descriptions, shown in Table 4.3, are written as if each is about an individual teacher, but in actuality, they represent the most salient characteristics of all teachers within a particular group. No individual teacher perfectly aligns to one particular caricature, but rather expresses a unique, individual profile of needs and concerns that aligns more closely to some caricatures than others. By analyzing the SoCQ and interview data, I was able to develop caricatures that emphasize the most prominent characteristics common to the teachers categorized in each of the three concerns groups. The goal was to create a recognizable portrait where the “family resemblance” of individual teachers can be seen.

These caricatures were sent to interview participants as part of a confirmation survey (see Appendix C). Participants were given an explanation of research caricatures and were asked two questions about them. No labels were attached to any of the three caricatures, and they were presented to each survey respondent in a random order. The questions about each description were:

1. To what extent does this description fit with certain teachers within your school or district during the first year of Bridges implementation?

2. To what extent do you personally identify with the teacher in this description?
Table 4.3

*Research Caricatures of Self-, Task-, and Impact-Concerns Teachers*

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Concerns Caricature</td>
<td>“Sarah” uses the new curriculum as a resource in mathematics instruction. She wants to ensure that her students master important skills, particularly those related to computational fluency, ideally in a fun and engaging way. Sarah strongly values having autonomy in how she chooses to use the curriculum with her own students. Initially, Sarah felt stress and pressure about the new curriculum, but once she began to streamline it, she felt more at ease. While Sarah would like supports such as ready-made curriculum materials and classroom assistance with managing students, her greatest desire is to be granted the freedom to modify and adapt the curriculum to her own tastes and teaching styles.</td>
</tr>
<tr>
<td>Task-Concerns Caricature</td>
<td>“Tom” is striving to implement the curriculum with as much fidelity as possible. He wants to give his students rigorous instruction focused on both computational fluency and conceptual understanding. He also wants them to demonstrate mastery of standards on state tests and district report cards. Tom values the curriculum’s alignment to standards and wants to be sure that he is covering what he is supposed to be covering. While Tom appreciates having a curriculum that is already laid out for him, he frequently feels overwhelmed and pressured as he tries to keep up with curriculum and district expectations. As the first year of implementation progressed, he was encouraged and proud when he saw results in student learning. Tom wants support in easing the burden of materials and lesson prep by being given time for in-depth unit planning and advance materials prep, ideally sharing the load with colleagues. He wants professional learning experiences to focus on implementation tips and tricks from experienced users and watching the lessons in action.</td>
</tr>
<tr>
<td>Impact-Concerns Caricature</td>
<td>“Ilana” strives to implement all components of the curriculum. She wants to ensure that her students and her fellow teachers develop deep conceptual understanding of mathematics content, as well as a confident mindset and attitude of excitement toward mathematics. She strongly values creating a classroom community that is characterized by student discourse. While Ilana acknowledges the work involved in implementation, she feels well equipped and supported by the curriculum and is confident in the impact it will have on her students. Ilana wants to provide support to other teachers by leading efforts in unit planning and preparation. She is looking for opportunities to collaborate and network with others, even those outside of her own school and district. She wants professional development on high leverage teaching strategies and facilitating productive discourse, ideally within a lab classroom environment.</td>
</tr>
</tbody>
</table>
Each of these questions were answered on a Likert scale ranging from 1 (Not at all) to 4 (To a great extent). Participants were also given the opportunity to share comments or feedback about each of the three caricatures. This confirmation survey was completed by 12 of the 18 teachers who had been interviewed. The surveys were completed approximately a year after the initial interviews, so teachers were in their second year of implementation, but were asked to base their responses on what they recalled from their experiences and perceptions in the first year.

In the questions where teachers were asked the extent to which each of the descriptions fit with certain teachers in their school or district, the distribution of responses resembled the actual distribution of teachers categorized in each of the three groups. Just as the majority of SoCQ and interview participants had scored highest on Task-related concerns, so also did the confirmation survey teachers rate “Tom”, the Task concerns caricature, as the most recognizable among teachers in their school or district (See Figure 4.7). The scores for the extent to which “Sarah” and “Ilana” (the Self and Impact concerns caricatures) described school or district teachers was much lower, just as the number of teachers in the sample who demonstrated peak Self or Impact concerns was much lower than those with peak Task concerns. Teachers with Task concerns are not only much more common among their colleagues, but the intensity of their concerns may make them more noticeable. Teachers are less likely to see or know teachers at the Self and Impact stages as these teachers are much less common and their concerns tend to be less intense.
In terms of the extent to which confirmation survey respondents themselves identified with each of the caricatures, there was also a high degree of correlation between each participant’s identified concerns type and the caricature with which they most closely identified. Almost every respondent identified most with the caricature that represented their concerns group during their first year of implementation. The only two cases that did not were teachers who had been categorized with peak Self-related concerns but who indicated that they identified most strongly with the Task-concerns caricature. In both cases, these were teachers whose Task concerns had ranked second-highest on their SoCQ profile after their Self concerns. The SoCQ profiles of both teachers had indicated that they were moving from Self-related concerns to Task-related
concerns. Given that the confirmation survey was administered a year after the SoCQ, it is likely that these teachers had moved into the Task-concerns stage. This may have influenced their perception of the caricature they found to be most relatable.

Some of the open-ended comments also confirmed the findings of the study as reflected in the caricatures. A teacher in the Task concerns group commented that she recognized “Sarah,” the Self-concerns caricature, in some of her colleagues. She wrote, “Some people were reluctant to adopt any of it, preferring to rely on old curriculum or their own teaching experience. They kept quiet so no one would know what they were doing.” On the other hand, a teacher in the Self concerns group indicated that she did not relate to “Tom,” the Task-concerns caricature. In her comment about Tom, she wrote,

I don't need in-depth unit planning. The units are fine. Also, planning with others in math is not that useful because every class is at a different place. I don't worry about doing everything with absolute fidelity because, as with other curriculums, you have to adjust according to what your class needs. I need to supplement Bridges often with my own tried and true materials/lessons.

This description aligns well with her identified Self-concerns profile, and further confirms the distinction between these two groups of teachers.

The confirmation surveys provided a form of member-checking for my analysis and synthesis of the data from the SoCQ and the interviews. The alignment between these three sources of data indicates a high degree of reliability across data sources in my study.
Limitations of the Study

While the study shows a high degree of reliability with consistency in the data across all of the measures used, certain factors in this study place limitations on the broader validity of the results in other contexts. While the distribution of concern-types in the interview sample was representative of the concern-types of the larger SoCQ sample, it is unclear whether or not this distribution of concern types among the 59 study participants is representative of all teachers across the three participating districts. Given that all of the Impact-concerns teachers were highly involved with the Bridges implementation due to their leadership roles, it may be that these teachers were more likely to respond to invitations to participate in the study, and were therefore overrepresented in the sample. While consistency was found within subgroups across all participants in the study, more data would be needed to determine the extent to which these concerns and needs were influenced by demographic factors such as gender identity, racial/ethnic identity, or years of experience. They could also well be influenced by the contexts in which teachers practiced, such as previously-used mathematics curricula, professional learning support available, and the number and type of other initiatives happening in each state or district. The focus of this study was on teachers in the first year of using the Bridges in Mathematics curriculum. Further study would be needed to determine the validity of using the research caricatures developed in this study to understand teachers using other reform-based mathematics curricula, or those in later years of implementation.
This chapter presented the findings of the study and how they answered questions about the concerns of different teachers with regard to the classroom implementation of the *Bridges in Mathematics* curriculum and what they perceived as barriers or bridges to their classroom implementation of the curriculum. In the final chapter, I discuss the implications of these findings for policy and practice, and I make recommendations for how curriculum leaders can most effectively support different teachers in light of their needs and concerns.
Chapter 5: Discussion/Conclusion

“Organizations adopt change--individuals implement change” (Hall & Hord, 2020, p. 18). Implementing change is a personal process. Particularly in the first year of doing something new, the affective dimension of personal thoughts, feelings, and experiences with an innovation can dominate teachers’ experience of change. For those tasked with leading and supporting teachers’ use of the innovation, understanding these concerns and how they affect teachers is an important starting place. Therefore, the purpose of this study was threefold: (a) to understand the concerns of teachers and what they perceive as barriers to the classroom implementation of Bridges in Mathematics; (b) to identify teachers’ perceptions of the supports they believe will help them overcome barriers to implementation; and (c) to develop a framework describing the needs of teachers at various stages of concern and aligning these with teacher perceptions of barriers and bridges to the implementation of a standards-based mathematics curriculum.

The following research questions guided this study:

1. What are the concerns of different teachers with regard to the classroom implementation of the Bridges in Mathematics curriculum?

2. What do teachers at different Stages of Concern perceive as barriers or bridges to their classroom implementation of this curriculum?

In this chapter, I present a summary and synthesis of the findings of my study and situate these findings within a broader context or research literature on curriculum use. I then discuss implications for policy and practice, presenting recommendations for leaders who are facilitating the implementation of a new, standards-based curriculum.
Synthesis of Findings

In this study, I used the Stages of Concern Questionnaire to identify teachers at different Stages of Concern, and analyzed survey and interview data to identify similarities and differences across three groups based on their predominant concerns in their first year of implementing Bridges in Mathematics, a standards-based elementary mathematics curriculum. I developed research-based caricatures of teachers in the Self, Task, and Impact stages of concern and solicited feedback from participants, who confirmed that these descriptions aligned well with their perceptions of themselves and their colleagues. These findings showed that, while all teachers identified similar barriers to implementation, their feelings, needs, and concerns, as well as the supports they desired to address these things, differed in noticeable ways across the Self-, Task-, and Impact-concerns groups.

Those whose Self concerns were most prominent in their concerns profiles showed a strong desire for autonomy in their use of the Bridges curriculum. Given that those with Self concerns have peak concern scores in Stage 1 (Informational) and Stage 2 (Personal), this may have been because their lack of knowledge about Bridges or their personal concerns about potential consequences if they were not able to implement it effectively might have motivated them to take control of how they used the curriculum and maintain instructional systems that felt comfortable and safe. They wanted to ensure that students mastered mathematical skills, but wanted the freedom to modify the curriculum to teach in the way they felt best met those needs. They approached the Bridges curriculum as a resource for instruction, referring to the scope and sequence and
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lessons as a general guide, and picking and choosing elements to use in their instruction. They expressed a desire for supports that facilitated this autonomous approach, including ready-to-use adaptations of *Bridges* materials to use in classroom instruction and direct classroom assistance with students, as well as professional development that provided them with resources and strategies for streamlining and supplementing the written curriculum.

Teachers’ whose most intense concerns were *Task*-related were determined to implement the curriculum thoroughly and well, and frequently felt overwhelmed in the process. Their concern for student learning motivated them to persevere with the challenges of implementation, and they felt excited and proud as they saw their efforts rewarded with student engagement and understanding of mathematical content. They wanted support that would ease the burden of management tasks, such as time for shared materials preparation and lesson planning, and regular, ongoing professional learning opportunities where they could learn tips and tricks from experienced *Bridges* users.

Teachers whose profiles reflected peak concerns at the *Impact* stage were teacher leaders with a strong interest in collaborating with others to teach *Bridges* more effectively across their schools and districts. They had strong backgrounds in mathematics content and teaching practices and wanted to be part of a coordinated effort to use the *Bridges* curriculum in ways that supported growth in these areas for teachers as well as for students. In addition to a concern for cultivating students’ deep understanding of mathematical content and mastery of skills, their student learning concerns focused on nurturing students’ mindsets and attitudes toward mathematics and their ability to engage
in mathematical discourse. These teachers wanted support with finding other teachers with similar ideas and concerns to collaborate with as they planned *Bridges* units of instruction, and wanted professional development opportunities embedded in classrooms where teachers could work together to observe and rehearse high leverage teaching practices in *Bridges* lessons.

It is interesting to compare these findings with those of other researchers studying teachers’ use of standards-based mathematics curricula. In a meta-analysis of the differing assumptions and theoretical perspectives demonstrated by researchers in various studies of curriculum use, Remillard (2005) notes that some researchers conceptualize teachers as enactors who either follow or subvert materials, whereas others view teachers as more active designers and meaning-makers who draw upon or interpret curriculum materials from a position of agency. Still other researchers see teachers in a collaborative relationship with the curriculum materials, engaging in dynamic interaction as the curriculum is enacted in the classroom.

In a later study, Remillard (2012) explores and theorizes this interactive relationship teachers develop with curriculum materials as they use them, considering how teachers are positioned by and through their use of curriculum materials as particular types of users. She contends that curriculum developers use particular forms of address through the structure, look, voice, medium, and genre of their materials that mediate teachers’ interactions with the curriculum. Likewise, teachers position themselves in relation to the materials with varying degrees of authority and autonomy. Therefore, teachers’ relationship with curriculum materials is bi-directional, with each influencing
how teachers read and use the curriculum. Synthesizing this research with the findings of my study, curriculum developers also have a role to play in responding to teachers’ stages of concern. Just as many curricula have differentiation options to support or challenge students at different stages in the learning process, they could also embed professional learning resources to support or extend teachers’ use of the materials according to their stages of concern. Streamlining teacher-facing materials to facilitate early informational or management concerns would provide accessible entry points for beginning stage users. Including links to digital resources would provide additional layers of support with deeper mathematical content or more advanced instructional practices. These changes would enable teachers to advance and refine their use of the curriculum over time. Likewise, differentiated opportunities for learning through self-guided study, or a pathway of professional development that is structured around professional learning progressions, can ensure that teachers receive support that aligns with their current needs and helps resolve them in a way that promotes continuous growth.

In theorizing the interactions between teachers and curriculum materials, Remillard (2012) describes what she refers to as *modes of engagement*. She writes that “mode of engagement refers to what a teacher does in her transactions with a particular curriculum resource, how she engages, infuses meaning, and makes sense of its offerings. A teacher’s mode of engagement reflects her beliefs and epistemological stance” (p. 115). In the first two years of a study of teachers using a recently-adopted, standards-based mathematics curriculum, Remillard (2012) described three different modes of engagement that illustrate how these teachers read and interacted with the curriculum
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materials. One teacher engaged in what Remillard described as “reading for worksheets,” pulling out familiar-looking elements of the curriculum to support their preferred teaching style. Another engaged in “reading for the script,” identifying the steps in each lesson and taking great care to fulfill their perceived role of teaching it as the authors intended. A third teacher in Remillard’s study engaged in “reading for big ideas,” identifying the mathematical emphasis in each lesson and reading the teacher support sections to ensure that their instruction focused on these mathematical aims. While my study did not explicitly look at how teachers engaged with the instructional materials themselves, these descriptors appear to bear a notable similarity to the teachers in my study with Self, Task, and Impact concerns, respectively.

It would be interesting to ask the teachers in my study about their own conceptualizations of curriculum use and how they position themselves in relation to the Bridges materials. It seems that the teachers in the Self-concerns group valued autonomy, and positioned themselves with authority and agency in choosing which elements of the curriculum to draw upon and deciding for themselves how to enact them. Teachers in the Task-concerns group seemed to place a greater degree of authority over what was taught in the curriculum itself, positioning themselves as enactors who sought to implement the curriculum with fidelity. Teachers’ in the Impact concerns group did not fit well into either of these categories. Further insights from the research literature may offer an additional perspective on these teachers.

In a paper describing the challenges in measuring teachers’ use of curriculum materials in research, Chval et al. (2011) contend that fidelity is a problematic measure of
curriculum use, and instead propose an alternate construct of *textbook integrity*. They define *textbook integrity* as the degree to which the district-adopted curriculum materials influence the content, pedagogy, and nature of student activity over the course of a school year. They measure textbook integrity by collecting data about how regularly teachers use the curriculum materials, what portion of the curriculum is used to determine content emphasis and instructional design over the course of the school year, and the extent to which the instructional strategies used by the teacher are consistent with the pedagogical orientation of the curriculum materials. The teachers in my study who fell into the *Impact*-concerns group described their approach to the *Bridges* curriculum in ways that seem consistent with this notion of *textbook integrity*, expressing strong commitment to use *Bridges* daily, not only to determine scope and sequence and instructional design, but also to shape their pedagogy in ways emphasized by the *Bridges* materials.

These possible characterizations of *Self*-concerns teachers valuing curriculum autonomy, *Task*-concerns teachers valuing curriculum fidelity, and *Impact*-concerns teachers as valuing curriculum integrity are worthy of further exploration. Characterizing *Self*, *Task*, and *Impact*-concerns teachers in these ways would require observation and measurement of the ways teachers are actually using the curriculum materials, something that was beyond the scope of my study. Stages of Concern is just one dimension of the Concerns-Based Adoption Model (CBAM). The model includes two additional dimensions—Innovation Configurations (IC) and Levels of Use (LoU) that could be useful here. The IC dimension defines different ways of using the curriculum, describing each of the components of the curriculum and describing variations of use which range
from poor to ideal. The way an individual implements or adapts the various components of the curriculum is influenced by their individual perspectives, which connects this dimension to their Stages of Concern (SoC) profiles. The data in this study may provide some indication of teachers’ approaches to curriculum adaptation and implementation, but the IC dimension could be used to actually measure what these configurations look like for each teacher. While SoC measures the affective aspects of teachers’ response to the curriculum, the LoU dimension measures the behaviors that accompany the teachers’ feelings and concerns. LoU determines the degree to which teachers are actually using the curriculum with their students, and measures it by describing a continuum of eight levels of specific behaviors that range from non-use, to mechanical use, to more integrated use. Teachers’ expressions of their feelings and concerns can provide hints about these behaviors but cannot measure them directly. Further study of Bridges teachers using these other two dimensions of the CBAM model could shed further light on how teachers’ concerns and feelings about the curriculum impact the ways they use and enact it with their students.

These other dimensions of CBAM can also provide further guidance for curriculum leaders supporting teachers’ curriculum implementation. Since the CBAM model is described as a bridge from adoption to full implementation (see Figure 2.1), the Levels of Use dimension describes where a teacher is along that bridge, the Innovation Configurations dimension describes what their implementation looks like at that point, and the Stages of Concern dimension provides insight as to why they might be where they are. Identifying teachers’ concerns is a critical starting point for support, as the resolution
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of teachers’ concerns is necessary for progress across the implementation bridge. But in order to be fully effective, curriculum leaders also need to identify what teachers’ classroom curriculum use looks like and measure the effects of various interventions on teachers’ growth. The use of the Stages of Concern framework lays a crucial foundation, and the LoU and IC dimensions provide critical context for ongoing support.

Implications

Understanding teachers’ concerns in their first year of implementing a standards-based mathematics curriculum such as Bridges is an important starting place in offering the differentiated support needed to overcome barriers to effective implementation. In this section, I discuss the implications of this research for policy and practice.

Recommendations for Curriculum Leaders

While the findings of this study are applicable for a variety of leaders, such as curriculum developers or school district administrators, my primary audience is instructional leaders who are directly supporting teachers in their first year of implementing a standards-based curriculum such as Bridges. These could be instructional coaches, teacher leaders, professional learning specialists, or building principals. In this section, I provide three specific recommendations for leaders who are facilitating teachers’ curriculum implementation.

1. Ask about teachers’ concerns, and listen before intervening

2. Operate from the assumption that concerns are legitimate

3. Create growth conditions by aligning support with concerns
These recommendations are grounded in the CBAM theoretical framework, the research literature on leading and supporting teacher change, and the findings of this study.

In my experience, recommendations such as these are rarely applied. After approximately ten years as a classroom teacher, I moved into a role in higher education, working with pre-service teachers. I had learned a great deal about effective instruction through my graduate work and my years in the classroom, and I was eager to teach others what I had learned. And while I believe in the critical role that professional learning plays in teacher development, I quickly learned that simply educating teachers about effective practice does not translate neatly into transformed classroom instruction.

I moved on in my career to working as a mathematics instructional coach, hoping that, by coming alongside teachers in classroom settings, I could not only teach them about effective mathematics instruction, but I could also model it for them and coach them in practicing it themselves. I found this was effective with some teachers, but not with others; many remained fixed in their use of traditional models of procedural instruction.

When I began working with the Math Learning Center, I had great hopes that a strong standards-based curriculum would be the key to transformed practice. After all, if teachers simply followed the curriculum, would that not engage their students in developing deep conceptual understanding through discourse-rich reasoning about meaningful mathematics? In retrospect, I should not have been surprised to find that it was not that easy. It was my curiosity about why these approaches fell short that brought me to the research questions in this study.
Missing from all of these approaches is a grounding in the concerns and perspectives of teachers. And, in my experience, I have found that my shortsighted naivety is common among instructional leaders. Perhaps because most leaders are, themselves, operating from the standpoint of Impact-level concerns, it is easy to overlook or dismiss Self and Task concerns, or to expect that a systemic focus on Impact concerns will automatically bring teachers along.

From both internal experiences in districts where I have worked as a mathematics curriculum and instruction specialist and external experiences as an outside consultant, I have seen over and over that most attempts to influence classroom instruction involve giving teachers instructional resources and telling them to use them. Leaders rarely take the time to understand implementation concerns from a teachers’ perspective. Certainly, teachers rarely feel that their concerns are heard. Even if the resources provided are strong, and even if teachers are offered professional development or coaching, in the absence of this foundational alignment with teachers’ needs and concerns, the implementation that happens behind classroom doors frequently falls short of leaders’ goals.

**Ask and Listen.** While the research caricatures derived from this study provide valuable portraits to enable curriculum leaders to recognize the concerns and needs of teachers they work with, it is important to remember that concerns are individual and complex, and each individual teacher has a unique concerns profile that is worthy of consideration. Therefore, my first recommendation for those who are leading and supporting the implementation of a new standards-based curriculum is to ask about
teachers' needs, and listen before intervening. Identifying and understanding these concerns has benefits for both leaders and teachers themselves. In his book *Transformative Dimensions of Adult Learning* (1991), Mezirow recommends the following for educators of adult learners:

The educator starts out accepting learners’ expressed needs and interests and develops programs to accommodate them. In the process of helping learners understand their needs, the educator helps them explore the reasons for these needs, which reside in assumptions or premises of the learners’ beliefs. (p. 217)

By giving teachers the opportunity to express their concerns, leaders can help teachers themselves critically reflect upon their own needs, while also providing a starting point for offering support.

If a teacher asks, “What will teaching this curriculum look like in my classroom,” it is important to clarify if, for example, they are trying to think through the structure of their daily schedule, or if they want to know if the curriculum will facilitate their efforts to promote discourse among their students. If the leader responds with a philosophical description of the pedagogy promoted by the program, and the teacher simply wants to know if they can structure their math block by rotating students through stations, the teacher can leave frustrated and unheard. Even if a leader understands that the question is a logistical one about rotating students through stations, it is important to probe to understand the beliefs or premises behind the teacher’s expressed need. Is it because, for example, the teacher feels that rotating stations are important for differentiated instruction, or because they have always taught math this way and are uncomfortable
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with the idea of change? Listening before intervening can ensure that the support provided addresses teachers’ perceived needs, and helps avoid the frustration and even resistance that can develop when these are not aligned.

The Stages of Concern Questionnaire (SoCQ, see Appendix A) can be a valuable way to gather valid and reliable data about teachers’ concerns. However, Hall and Hord (2020) suggest other simple ways to draw out teachers’ concerns. CBAM research shows that short interactions are critical opportunities to identify and respond to teachers’ concerns, especially when repeated often. One way to do this is through what Hall and Hord refer to as a One-Legged Interview. These short conferences, conducted in brief encounters in places like the hallway, the teachers’ lounge, or the parking lot, have been shown to be highly effective in supporting innovations in schools. According to Hall and Hord (2020), leaders who regularly take advantage of these critical moments are statistically more successful in facilitating change.

These One-Legged Interviews consist of two short parts. First, the leader opens with a brief open-ended question. This can be as simple as, “How are things going with Bridges?” or “How are you feeling about teaching math right now?” By listening carefully, and perhaps gently probing, a leader who is familiar with the Stages of Concern profiles described in this study can quickly gain an estimate of this teacher’s concerns and needs. The second part of the interview is to offer a brief response that acknowledges and addresses the teacher’s concerns. This could be as simple as a word of encouragement (e.g. “I was impressed to hear the depth of your students’ discourse as I walked through your classroom today. I know this curriculum is stretching you as a
teacher and I can see how your students are responding to your hard work”). Or, it could be a specific offer of a supportive action that directly addresses the teacher’s need (e.g. “I’ll talk to the PTA president to see if they can organize a group of parents to help prep materials for the next unit”). Roach et al. (2009) note that these short conferences require that these leaders be seen as accessible and informed members of the school community, but leaders who regularly make themselves visible and available in these informal spaces are most likely to be seen this way by teachers. Particularly if repeated frequently, these One-Legged Interviews can not only give insights into teachers’ needs and provide opportunities to respond, but the very act of asking and listening shows interest in teachers’ concerns, which is, itself, supportive.

Another strategy Hall and Hord (2020) recommend for asking about and listening to teachers’ concerns is the use of an open-ended concerns statement. While this is frequently included as a part of the SoCQ, it can also be given quickly and informally on its own. Teachers can be asked in an emailed survey or even invited to write on a blank piece of paper, “When you think about teaching *Bridges*, what concerns do you have?” Roach et al. (2009) note that these statements can be quick and easy to collect, but can sometimes be hard to interpret. Encourage the use of complete sentences rather than short words or phrases, which are more likely to require inference and interpretation. Teachers at all stages may express concerns about “planning time,” for example, but a longer sentence can help reveal if the teacher wants that planning time to find resources to replace or supplement lessons, time to prepare and organize materials for the lessons, or time to collaborate with other teachers about the big ideas of the lessons. When reading
teachers’ responses, consider the overall theme of the concerns. Do they sound primarily like Self, Task, or Impact concerns? In addition to the lists of concerns themselves, identifying the types of concerns expressed by individuals or groups gives a leader insight into teachers’ Stages of Concern and overall needs. Collecting this data prior to a staff meeting or professional development workshop can allow the leader to use that time in ways that will be most helpful to participants. According to the principles of Knowles’ (2012) adult learning theory, professional learning experiences will be most effective when teachers have input in planning them, and they are focused on issues that have immediate relevance and impact on teachers’ work. Eliciting teachers’ concerns by collecting open-ended statements is one way to ensure that professional development aligns with their needs.

**Legitimize Concerns.** When listening to teachers’ concerns, it is important to understand them within the context of that particular teacher’s perceptions and experience. Therefore, my next recommendation is that curriculum leaders operate from the assumption that concerns are legitimate. McClain et al. (2009) use the term *instructional reality* to describe what teaching looks like from the teacher’s perspective. They found in their research that they had to ask about teachers’ perceptions of the affordances, constraints, and demands of their instructional context in order to make sense of the different ways teachers used curriculum resources. They operated from the assumption that teachers’ instructional decisions were always reasonable and coherent within their own instructional reality. They wrote, “Operating with this assumption therefore enabled us to avoid taking a deficit view when examining the data and instead
highlighted the necessity of generating reasonable interpretations of the teachers’ instructional reality against which their practices can be understood” (p. 62). Even two teachers working in the same building can have vastly different values about teaching and learning, experiences of instructional obstacles and related frustrations, and perceptions of their obligations as teachers within their own context. Instead of dismissing a concern as unimportant or irrational, then, curriculum leaders can best address these concerns by understanding the perceived instructional reality of the teacher. Only then can a leader support the teacher in resolving these concerns to allow for change.

Within contexts of educational change, various types and expressions of resistance are natural and inevitable (Terhart, 2013). Leaders can have a tendency to experience perceived resistance as hostility. Terhart writes that discussing teachers’ resistance to school reforms and innovations can be difficult and delicate, because the topic of resistance is “steeped in mutual misperceptions, blame and a fair amount of moralising” (p. 481). Addressing resistance, then, requires leaders to avoid these pitfalls by listening to and validating the concerns behind it. Hall and Hord (2020) propose that understanding resistance against the landscape of the Stages of Concern allows a leader to understand the reasons behind resistance and address these concerns productively. A failure to do this can actually lead to increased resistance and a heightening of unresolved concerns. What is perceived as resistance may be an expression of Self-concerns, either Stage 1 (Informational) concerns, where a teacher feels they do not know enough about what is happening, or Stage 2 (Personal) concerns, where a teacher may have doubts about their ability to be successful. If communication is not sufficient to resolve a
teacher’s Stage 1 (Informational) concerns, their Stage 2 (Personal) concerns may naturally increase. However, if their Stage 2 (Personal) concerns are simply met with more and more information, this can intensify these personal concerns and lead to increased resistance. Likewise, a teacher with intense Task concerns at Stage 3 (Management) may actually revert to the Self-concerns stage if additional innovations and expectations are piled on when they already feel overwhelmed. Even a teacher at the stage of Impact concerns may lose enthusiasm for an innovation if they feel their concerns are continually overlooked as leaders focus on those with Self or Task concerns. Accepting each teacher’s concerns as valid and important is the starting place for responding appropriately.

Create Growth Conditions. Collectively, teachers in organizations undergoing change tend to progress across the Stages of Concern over time, developing from Self concerns to Task concerns, to Impact concerns as implementation progresses. However, individually speaking, this development is not a certainty, and cannot be forced. Teachers cannot be manipulated into letting go of their concerns; curriculum leaders must, instead, support teachers in resolving them. Therefore, my final recommendation is to create growth conditions by aligning support with concerns.

Fuller (1970), who first described the Self, Task, and Impact stages of concern upon which CBAM is based, noted that the emergence of concerns and the resolution of concerns developed under different conditions. Concerns tend to emerge under affective experiences, but resolution of concerns happens through more cognitive experiences. Building on this, George et al. (2006) write,
It is critical to note that the development of higher-level concerns cannot simply be engineered by an outside agent. Holding concerns and changing concerns is a dynamic of the individual. Providing affective experiences and cognitive resources in a timely manner certainty can supply the grist for the emergence and resolution of concerns, thereby facilitating the development of higher-level concerns. (p. 9)

The manner and timing of a teacher’s development in response to these experiences and resources is up to the individual, and may not occur at all. However, aligning these supports to a teacher’s concerns creates conditions more favorable to growth. Attempts to force this growth can backfire, further intensifying concerns or even causing teachers at higher stages to revert to lower-stage concerns.

In his work on transformative learning, Mezirow (1991, 2012) proposes three tools for adult educators in supporting learners’ progress through the stages of learning: critical reflection, discourse, and reflective action. Mezirow writes that, as we attempt to make sense of experiences, we “reflect to find similarities and differences between what we are currently experiencing and prior learning” (p. 104). Kreber (2012) describes approaches educators can take to foster critical reflection in adult learners by encouraging them to “identify the assumptions underlying their meaning perspectives or habits of minds that give rise to how they interpret particular situations, subject these to critical scrutiny, and explore alternatives” (p. 330). Reflection such as this can be most powerful when done in conjunction with collaborative discourse.
Mezirow (2012) defines discourse as “that specialized use of dialogue devoted to searching for a common understanding and assessment of the justification of an interpretation or belief” (p. 78). Such discourse allows learners to use the experience and insight of others to make sense of situations in their own lives. Hord and Roussin (2013) affirm the importance of discourse in the change process, writing that “a change leader’s role is to facilitate the conversations that invite others to own the desired change” (p. 3). This requires leaders to transfer ownership of learning to the learners, using discourse to facilitate this process. Hord and Roussin write, “Conversations are not the end, but rather the means to gain action and envision new behaviors of the innovation” (2013, p. 3). As with the innovation itself, learners are at different levels of readiness when it comes to engaging in discourse, which can make facilitating these conversations difficult. Mezirow writes that “discourse is not based on winning arguments; it centrally involves finding agreement, welcoming difference, ‘trying on’ other points of view, identifying the common in the contradictory, tolerating the anxiety implicit in paradox, searching for synthesis, and reframing” (p 80). Interestingly, Mezirow notes that “those just one phase ahead can be more influential in fostering transformative changes than those more advanced. Modeling is extremely useful in bringing about major transformative changes” (p. 218). Establishing norms such as setting and enforcing agreements that allow for equal opportunity for participation, addressing biases, hearing alternatives, examining assumptions, and seeking consensus, can help make meaningful discourse possible among learners at diverse stages of concern.
A final tool for supporting learners’ progress through the stages of transformative learning is reflective action. Mezirow defines reflective action as “making decisions or taking other action predicated upon the insights resulting from reflection” (1991, p. 108). This is contrasted with habitual action, which is a routine reliance on prior learning. Langer (1997) uses the terms mindlessness and mindfulness to describe these two types of action. She describes mindful learning as involving the continuous creation of new categories, openness to new information, and an implicit awareness of more than one perspective. Mindlessness, in contrast, is reliant on past habits of action or previously defined categories. In terms of learning and education, Mezirow associates mindlessness with an orientation on goals and outcomes rather than on the processes of creative problem solving (1991). Mindful transformative learning, then, “requires that the learner make an informed and reflective decision to act on his or her reflective insight” (Mezirow, 2012, p. 87). This might mean that the learner takes new action immediately, but it might also mean delayed action or even a thoughtful and well-reasoned reaffirmation of an existing pattern of action. “Taking action on reflective insights often involves overcoming situational, emotional, and informational constraints that may require new learning experiences in order to move forward” (p. 87). This includes significant challenges to one’s existing beliefs that may be experienced as emotionally threatening. Fostering this reflective action, then, involves several practical and ethical challenges for an adult educator. Roberts (2006) advises, “In order to mitigate the effects of disorienting dilemmas on adult learners, educators need to be empathetic and compassionate in their approach, and must provide support for the learners during the
process” (p. 104). Providing this support while encouraging reflection, discourse, and mindful action can help teachers resolve affective concerns through cognitive experiences.

**Supporting Teachers at Different Stages of Concern**

Teachers’ progression across the *Self, Task,* and *Impact* stages of concern is an important factor in the progress of an innovation over time, and an overall movement toward *Impact* concerns can be a mark of successful implementation. However, research has shown that, even several years into an innovation, teachers still frequently have high levels of *Self* concerns (van den Berg, 2000). In order to help support teachers’ progress across the stages of concern, Hall and Hord (2020) describe both appropriate and inappropriate interventions for teachers at different Stages of Concern. Teachers with high Stage 1 (Informational) concerns need general, descriptive information about the innovation that contrasts it with existing practice and points out the potential benefits of the change. In-depth, detailed information or an extensive list of expectations at this stage are not helpful. Teachers with high Stage 2 (Personal) concerns need empathy and encouragement, with consistent communication about expectations and assurance of ongoing support. Ignoring personal concerns or applying pressure around use of the innovation is likely to make these concerns worse. Teachers with high Stage 3 (Management) concerns need practical support with the “nuts and bolts” of the innovation. All-day workshops, particularly those that emphasize the philosophy behind the innovation and advanced implementation strategies may frustrate these teachers, who see this as time better spent whittling down their to-do lists. Opportunities for teachers to
get their specific questions answered by experienced users or messages about key things to be doing “this week” are more helpful. Impact-level teachers with high Stage 4 (Consequence) or Stage 5 (Collaboration) concerns need to be recognized and encouraged to continue in their efforts toward maximizing the impact of the innovation. Providing resources or opportunities to learn ways to enhance their use of the curriculum will likely be welcomed by these teachers, particularly if they are able to connect and collaborate with others who share these Impact-stage concerns. Focusing all efforts on teachers with Self and Task concerns and assuming that Impact-stage teachers can work things out on their own can frustrate and discourage these teachers’ efforts and limit their potential for positive influence on others.

I will close my dissertation with descriptions of what this differentiated support could look like for Sarah, Tom, and Ilana, the caricature representations of Self, Task-, and Impact-concerns teachers. Like the caricatures themselves, these descriptions are grounded in the data of this study, but are written with a somewhat exaggerated emphasis on each concern type. While these supports align well with the caricatures they are designed to address, it is important for leaders to recognize that teachers' concern profiles are more nuanced and complex, and any individual teacher may need supports described in any or all of these descriptions. Even so, these descriptions can help a leader to prioritize the time and resources allocated to supporting different teachers in ways that are likely to be most productive.

**Supporting Sarah.** The caricature of Sarah (see Figure 5.1) portrays a teacher whose primary concerns are Self-related. A leader who wants to support Sarah’s
implementation of a new standards-based curriculum will need to determine whether her concerns are more informational or personal and, particularly if the personal needs outweigh the informational ones, to ease pressure for implementation while supporting her through this stage.

**Figure 5.1**

*Caricature of a Teacher with High Self-Related Concerns*

“Sarah” uses the new curriculum as a resource in mathematics instruction. She wants to ensure that her students master important skills, particularly those related to computational fluency, ideally in a fun and engaging way. Sarah strongly values having autonomy in how she chooses to use the curriculum with her own students.

Initially, Sarah felt stress and pressure about the new curriculum, but once she began to streamline it, she felt more at ease.

While Sarah would like supports such as ready-made curriculum materials and classroom assistance with managing students, her greatest desire is to be granted the freedom to modify and adapt the curriculum to her own tastes and teaching styles.

**Ask and Listen.** A first step is to ask Sarah about her feelings and concerns, and to identify the needs behind them. Clarifying what these needs are is important for Sarah as well as the leader offering support, as her initial response may be that “It’s going fine” and she has “figured out how to make things work.” It is likely that Sarah’s primary concerns are either Stage 1 (Informational) or Stage 2 (Personal), but probing may be required to help Sarah clarify what they are and what she needs. Does her desire for autonomy reflect a need for more information about what the curriculum has to offer? Do her personal beliefs about teaching and learning mathematics conflict with what she sees reflected in the program? Is she unsure whether she has the ability or adequate support to teach the curriculum as designed and concerned about the consequences if she is not
successful? Any of these are possible, and clarifying these with Sarah is an important prerequisite to providing a supportive response.

**Legitimize Concerns.** It is critical that, whatever Sarah expresses, the leader believes that these concerns are reasonable and valid within Sarah’s instructional reality. Even if substantial information has already been communicated, it may be that Sarah has not been able to absorb all of that information, or that it was provided at a time when she didn’t know what her questions were in order to seek out the answers. Even if Sarah’s views conflict with current research on productive beliefs about mathematics teaching and learning, it is important to assume that her beliefs are rooted in a desire to feel successful as a teacher and to see her students as successful learners. If Sarah feels she lacks the ability or resources to teach the curriculum successfully, or is worried about accountability measures such as standardized test scores or performance evaluations, it is important to work with her to identify resources and assurances that provide the safety and security for her to risk trying something new.

**Create Growth Conditions.** Only once Sarah’s needs are understood and validated can a leader determine conditions that will facilitate her growth. Providing a *Frequently Asked Questions* resource with short, targeted responses can equip Sarah with accessible opportunities to meet her informational needs. A simplified resource bank with streamlined explanations of curriculum components and baseline expectations for using them can provide an accessible entry point for curriculum use. Professional learning experiences that promote critical reflection about instructional beliefs and practices, and collegial discourse about them, can allow Sarah to learn from her colleagues, confronting
her beliefs and practices and developing them in productive ways. Short, specific action steps such as a structured instructional routine tied to a specific lesson in the curriculum can give her an opportunity to try out new practices and observe their impact on student learning. It is important to note that these experiences might be most suited to contexts such as a collaborative community of practice or a relationship with an instructional coach rather than a staff-wide professional development workshop. Supports such as these can ease Sarah into implementation and lay a foundation for more rigorous implementation in the future.

Supporting Tom. The caricature of Tom (see Figure 5.2) portrays a teacher whose primary concerns are Task-related. A leader who wants to facilitate Tom’s implementation of a standards-based curriculum must identify and understand his management concerns and provide support that will help him feel less overwhelmed by the demands of preparing and using the materials.

**Figure 5.2**

*Caricature of a Teacher with High Task-Related Concerns*

“Tom” is striving to implement the curriculum with as much fidelity as possible. He wants to give his students rigorous instruction focused on both computational fluency and conceptual understanding. He also wants them to demonstrate mastery of standards on state tests and district report cards. Tom values the curriculum’s alignment to standards and wants to be sure that he is covering what he is supposed to be covering.

While Tom appreciates having a curriculum that is already laid out for him, he frequently feels overwhelmed and pressured as he tries to keep up with curriculum and district expectations. As the first year of implementation progressed, he was encouraged and proud when he saw results in student learning.

Tom wants support in easing the burden of materials and lesson prep by being given time for in-depth unit planning and advance materials prep, ideally sharing the load with colleagues. He wants professional learning experiences to focus on implementation tips and tricks from experienced users and watching the lessons in action.
**Ask and Listen.** Due to the overwhelming number of details on Tom’s mind, it may be difficult for him to stop and think long enough to identify and express specific needs. Providing time and space for Tom to figure out what his needs are so that he can communicate them to the leader is a critical first step. He may need to be encouraged to express his needs specifically rather than in generalities such as “I just need more time to get everything done.” Because Tom is likely focusing primarily on what is in front of him at any given moment, it is important to touch base with him frequently to understand his immediate needs, checking in regularly to make sure his short-term needs are met and identifying new needs as they arise.

**Legitimize Concerns.** Expressly acknowledging the demands inherent in implementing a new standards-based curriculum is an important way to lower the intensity of Tom’s concerns. Empathy, in and of itself, demonstrates support for Tom and can help reduce his stress level. Being truthful and matter of fact about the challenges teachers will face in the first year is an important way to show that they are expected and that teachers will be supported in overcoming them. These demands are a natural part of implementing a new curriculum, and leaders need to communicate early and often about plans to address them as they inevitably arise.

**Create Growth Conditions.** Support for Tom should be highly practical. Leaders must anticipate the tasks that will need to be done at the start of the year and at the start of each unit. Ideally, this should be done with guidance from experienced users who have dealt with these challenges first-hand and can develop specific to-do lists of what needs to be done. Provide preparation time for Tom and his colleagues to divide and conquer
specific tasks, as well as question and answer time with experienced users who can offer tips and tricks to make implementation easier. If possible, utilize paraprofessionals or volunteers to help with basic tasks to allow teachers to focus on more complex issues related to management and instruction. Time and support for unit planning is also important, but this should focus on the key concepts in each unit and the structures and routines that describe what the lessons will look like, saving most professional development about philosophy and pedagogy until management concerns have reduced in intensity. Specific, practical supports such as these can help teachers feel more positive and successful in the first year, preparing them to focus on more Impact-related issues moving forward.

**Supporting Ilana.** The caricature of Ilana (see Figure 5.3) portrays a teacher whose concerns are primarily Impact-related. She has the potential to be a positive influence in the school’s implementation of a new standards-based curriculum, and may already have a role that can help her lead and influence her colleagues. Supporting Ilana requires leaders to be intentional about understanding her concerns and entrusting her with opportunities to address them with other teacher leaders.

**Ask and Listen.** As with all teachers, it is important for leaders to take the time to ask about Ilana’s concerns. They can be easy for leaders to overlook because they are usually less intense than the high Self and Task-related concerns of the majority. Leaders’ attention is often focused on those whose needs appear to be most urgent. Listening and responding to Ilana’s needs can be a valuable investment in the overall process of
curriculum implementation, as she is already thinking about ways to maximize its effectiveness and can be a model for other teachers moving forward.

**Figure 5.3**

*Caricature of a Teacher with High Impact-Related Concerns*

“Ilana” strives to implement all components of the curriculum. She wants to ensure that her students and her fellow teachers develop deep conceptual understanding of mathematics content, as well as a confident mindset and attitude of excitement toward mathematics. She strongly values creating a classroom community that is characterized by student discourse.

While Ilana acknowledges the work involved in implementation, she feels well equipped and supported by the curriculum and is confident in the impact it will have on her students.

Ilana wants to provide support to other teachers by leading efforts in unit planning and preparation. She is looking for opportunities to collaborate and network with others, even those outside of her own school and district. She wants professional development on high leverage teaching strategies and facilitating productive discourse, ideally within a lab classroom environment.

**Legitimize Concerns.** It is important to recognize that Ilana’s concerns are just as valid as those whose needs appear more pressing. However, because her concerns often align with a district’s long-term vision of effective curriculum use, it is also tempting for leaders to rush into providing all teachers with *Impact*-level supports before the majority of them are ready. Ilana’s needs are neither more nor less worthy of attention than those of other teachers, and leaders need to validate her concerns without attempting to impose them on others.

**Create Growth Conditions.** Ilana is likely to want other like-minded teachers to collaborate with as she looks for ways to maximize the curriculum’s impact. She may already have knowledge of effective teaching practices and wants to find ways to develop these as she teaches the new curriculum. Because her colleagues with *Self* concerns may
want to exercise autonomy in picking and choosing what they use from the curriculum, and her colleagues with Task concerns may be busy and overwhelmed with management details, Ilana may find it difficult to find someone who shares her desire for collaboration. Leaders can help to identify other teachers with similar concerns and provide opportunities for them to work together. This may require forging partnerships across multiple schools, or restructuring teaching placements to provide Ilana with at least one collaborative partner. Visits to Ilana’s classroom to observe and provide feedback on her teaching can help her refine her instructional practice while providing leaders with a vision of what effective implementation can look like. Investing time and resources to support Ilana’s concerns can pay off in future years as she models and leads others in effective curriculum use.

**Conclusion**

Ultimately, the goal of curriculum leaders working with teachers in the implementation of a standards-based mathematics curriculum is to encourage high-quality implementation for maximum impact on student learning and growth. Many leaders are, themselves, focused on increasing the impact of the curriculum on student learning, and are eager to focus on these outcomes. Teachers with intense concerns at lower stages may be perceived as “laggards” or “resisters” and their needs may be dismissed as they are pressured to accelerate their use of the curriculum in ways that are perceived to be more effective. In the early stages of implementation, this can actually hamper teachers’ growth and sabotage the long-term goals of the innovation. The purpose of this work, then, is to help leaders effectively identify teachers’ concerns at the
beginning of the implementation process and provide early and ongoing support that is aligned to these needs, facilitating the resolution of Self and Task concerns before they become entrenched and helping all teachers grow toward a full, impact-centered curriculum implementation. Asking about teachers’ concerns, and listening before intervening; operating from the assumption that concerns are legitimate; and creating growth conditions by aligning support with concerns are the best ways curriculum leaders can help all teachers grow toward effective curriculum use. In the long run, this will help ensure that the student learning that is attained through the enacted curriculum aligns with the standards-based goals that the curriculum is intended to promote.
References


[http://doi.org/10.1080/00220670109598756](http://doi.org/10.1080/00220670109598756)


IMPLEMENTING A STANDARDS-BASED MATH CURRICULUM

Hall, G. E., Wallace Jr., R. C., & Dossett, W. F. (1973). *The Concerns-Based Adoption Model: A developmental conceptualization of the adoption process within educational institutions.* Austin, TX: University of Texas at Austin, Communication Services Division, Research and Development Center for Teacher Education.


Kember, D., & Mezger, R. (1990). The instructional designer as a staff developer: A course team approach consistent with the Concerns-Based Adoption Model. *Distance Education, 11*(1), 50-70.


https://doi.org/10.1016/j.tate.2013.11.002


https://doi.org/10.1177/0022487195046002007


IMPLEMENTING A STANDARDS-BASED MATH CURRICULUM


https://doi.org/10.1080/13664530.2010.494504


IMPLEMENTING A STANDARDS-BASED MATH CURRICULUM

(Eds.), *Thinking practices in mathematics and science learning* (pp.17-52).

Hillsdale, NJ: Lawrence Erlbaum.


Stickles, P. R. (2011). Using instructional logs to study teachers’ adaptation to curricular

Leadership, 61*, 12–16.

Tam, A. C. F. (2015). The role of a professional learning community in teacher change:
A perspective from beliefs and practices. *Teachers and Teaching, 21*(1), 22–43.

[http://doi.org/10.1080/13540602.2014.928122](http://doi.org/10.1080/13540602.2014.928122)

impact of middle grades mathematics curricula on student achievement and the

Terhart, E. (2013). Teacher resistance against school reform: Reflecting an inconvenient

[https://doi.org/10.1080/13632434.2013.793494](https://doi.org/10.1080/13632434.2013.793494)

The Math Learning Center, (n.d.). *Building Mathematical Thinkers*. Bridges in
Mathematics. [https://mathlearningcenter.org/bridges](https://mathlearningcenter.org/bridges)
IMPLEMENTING A STANDARDS-BASED MATH CURRICULUM


http://doi.org/10.3102/00028312036004879


Appendix A

Stages of Concern Questionnaire

This questionnaire is designed to gather data about your perceptions, feelings, needs, and concerns about implementing the *Bridges in Mathematics* Curriculum.

Your participation in the study will generate data to help identify how teacher concerns and the types of support they desire may look different for different teachers. Your responses will also help district leaders to implement the *Bridges* curriculum in a way that addresses teachers’ needs and concerns.

Completing the survey should take approximately 10-15 minutes. This does not obligate you to participate in later phases of the study.

While names will be included on the survey to facilitate follow up, all data will be kept confidential and will be reported only in aggregate form. Only Karen Prigodich will have access to the information and data that is collected.

- I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study.
- I understand that I may be invited to participate in follow up activities such as focus groups and individual interviews. Participation in these activities is optional and I can withdraw my participation at any time.

The purpose of this questionnaire is to determine what people who are using or thinking about using various programs are concerned about at various times during the adoption process.

The items were developed from typical responses of school and college teachers who ranged from no knowledge at all about various programs to many years’ experience using them. Therefore, *many of the items on this questionnaire may appear to be of little relevance or irrelevant to you at this time.* For the completely irrelevant items, please circle “0” on the scale. Other items will represent those concerns you do have, in varying degrees of intensity, and should be marked higher on the scale.

For example:

- This statement is very true of me at this time. 0 1 2 3 4 5 6 7
- This statement is somewhat true of me now. 0 1 2 3 4 5 6 7
- This statement is not at all true of me at this time. 0 1 2 3 4 5 6 7
- This statement seems irrelevant to me. 0 1 2 3 4 5 6 7
Select one response to each question below. Please respond to the items in terms of your present concerns, or how you feel about your involvement with the *Bridges* curriculum. We do not hold to any one definition of the innovation so please think of it in terms of your own perception of what it involves. Phrases such as "this approach" and "the new system" all refer to the same innovation. Remember to respond to each item in terms of your present concerns about your involvement or potential involvement with the innovation.

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<tr>
<td>Irrelevant</td>
<td>Not true of me now</td>
<td>Somewhat true of me now</td>
<td>Very true of me now</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Circle one number for each item.

1. I am concerned about students’ attitudes toward the *Bridges* curriculum.  
   0 1 2 3 4 5 6 7

2. I now know of some other approaches that might work better.  
   0 1 2 3 4 5 6 7

3. I am more concerned about another innovation.  
   0 1 2 3 4 5 6 7

4. I am concerned about not having enough time to organize myself each day.  
   0 1 2 3 4 5 6 7

5. I would like to help other faculty in their use of the *Bridges* curriculum.  
   0 1 2 3 4 5 6 7

6. I have a very limited knowledge of the *Bridges* curriculum.  
   0 1 2 3 4 5 6 7

7. I would like to know the effect of the *Bridges* curriculum on my professional status.  
   0 1 2 3 4 5 6 7

8. I am concerned about conflict between my interests and my responsibilities.  
   0 1 2 3 4 5 6 7

9. I am concerned about revising my use of the *Bridges* curriculum.  
   0 1 2 3 4 5 6 7

10. I would like to develop working relationships with both our faculty and outside faculty using this innovation.  
    0 1 2 3 4 5 6 7

11. I am concerned about how the *Bridges* curriculum affects students.  
    0 1 2 3 4 5 6 7

12. I am not concerned about the *Bridges* curriculum at this time.  
    0 1 2 3 4 5 6 7

13. I would like to know who will make the decisions in the new system.  
    0 1 2 3 4 5 6 7
<table>
<thead>
<tr>
<th>Item</th>
<th>Text</th>
<th>Numbers</th>
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<tbody>
<tr>
<td>14.</td>
<td>I would like to discuss the possibility of using the <em>Bridges</em> curriculum.</td>
<td>0 1 2 3 4 5 6 7</td>
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<tr>
<td>15.</td>
<td>I would like to know what resources are available if we decide to adopt the <em>Bridges</em> curriculum.</td>
<td>0 1 2 3 4 5 6 7</td>
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<tr>
<td>16.</td>
<td>I am concerned about my inability to manage all that the <em>Bridges</em> curriculum requires.</td>
<td>0 1 2 3 4 5 6 7</td>
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<tr>
<td>17.</td>
<td>I would like to know how my teaching or administration is supposed to change.</td>
<td>0 1 2 3 4 5 6 7</td>
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<tr>
<td>18.</td>
<td>I would like to familiarize other departments or persons with the progress of this new approach.</td>
<td>0 1 2 3 4 5 6 7</td>
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<tr>
<td>19.</td>
<td>I am concerned about evaluating my impact on students.</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>20.</td>
<td>I would like to revise the <em>Bridges</em> curriculum’s approach.</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>21.</td>
<td>I am preoccupied with things other than the <em>Bridges</em> curriculum.</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>22.</td>
<td>I would like to modify our use of the <em>Bridges</em> curriculum based on the experiences of our students.</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>23.</td>
<td>I spend little time thinking about the <em>Bridges</em> curriculum.</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>24.</td>
<td>I would like to excite my students about their part in this approach.</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>25.</td>
<td>I am concerned about time spent working with nonacademic problems related to the <em>Bridges</em> curriculum.</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>26.</td>
<td>I would like to know what the use of the <em>Bridges</em> curriculum will require in the immediate future.</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>27.</td>
<td>I would like to coordinate my efforts with others to maximize the <em>Bridges</em> curriculum’s effects.</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>28.</td>
<td>I would like to have more information on time and energy commitments required by the <em>Bridges</em> curriculum.</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>29.</td>
<td>I would like to know what other faculty are doing in this area.</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
</tbody>
</table>
Implementing a Standards-Based Math Curriculum

<table>
<thead>
<tr>
<th>Irrelevant</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not true of me now</td>
<td>Somewhat true of me now</td>
<td>Very true of me now</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Circle one number for each item.

30. Currently, other priorities prevent me from focusing my attention on the Bridges curriculum.

31. I would like to determine how to supplement, enhance, or replace the Bridges curriculum.

32. I would like to use feedback from students to change the program.

33. I would like to know how my role will change when I am using the Bridges curriculum.

34. Coordination of tasks and people is taking too much of my time.

35. I would like to know how the Bridges curriculum is better than what we have now.

Please answer the following question:
When you think about implementing the Bridges in Mathematics curriculum what concerns do you have?

Are you currently in the first or second year of use of some major innovation or program other than this one? If so, please describe briefly.
Please complete the following:

Building:

Primary grade taught: (select all that apply)
  K
  1
  2
  3
  4
  5

Years of teaching experience (including this year):
  0-3
  4-10
  11-20
  21+

Including this year, how many years have you been implementing the *Bridges* curriculum (2nd Edition)?
  0 (Not using)
  1 (This is my first year)
  2 or more (I used 2nd Edition *Bridges* before this year)

Have you received formal training regarding the 2nd Edition *Bridges* curriculum (workshops, courses)?
  Yes
  No

I used 1st Edition *Bridges* prior to this adoption.
  Yes
  No
  NA

Do you teach *Bridges* in a Dual-Language classroom?
  Yes
  No

Follow-up interview:
  Yes
  No

What is your first and last name? (Required)
What is the best email address to contact you? (Required)
Gender? (Optional)
Race/Ethnicity? (Optional)
First Language? (Optional)

Thank you for taking the time to complete this survey. I deeply value your responses.

**Stages of Concern Questionnaire** (SoCQ 075) is available in the following SEDL publications:


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Appendix B

Individual Interview Protocol

1. Tell me a bit about how implementing the *Bridges in Mathematics* curriculum is going for you.

2. When you filled out the open-ended question on the online questionnaire about this curriculum, you wrote, [participant response]. Can you tell me more about this concern?

3. Are there components of the curriculum (Number Corner, Work Places, Problems & Investigations lessons, etc.) where you are experiencing particular barriers to implementing them well? What are the barriers? What supports might help you overcome those challenges?

4. If a friend asked you to pick three words to describe how this new curriculum makes you feel, what words would you choose?

5. If you could choose one support that would be most helpful to you in implementing the *Bridges* curriculum, what would it be? How do you feel it would help you?

6. Is there anything else you want me to know about your feelings, perceptions, or concerns about this curriculum?
Appendix C

Confirmation Survey

*Bridges in Mathematics* Teacher Descriptions

In this brief survey, you will have the opportunity to read three short vignettes that describe different teachers in their first year of using *Bridges in Mathematics*. You will provide feedback on the extent to which you feel they reflect you and/or other teachers you knew in the first year of using *Bridges*. Please note that the names used here are pseudonyms, and the descriptions are composites of data from several participating teachers.

As a reminder, you have signed a consent form to participate in this study that indicates that all data are fully confidential. Only Karen Prigodich will see your responses and data will only be reported in aggregate form. If you would like a copy of the consent form you signed, please contact Karen Prigodich at prigod@pdx.edu.

Email: [required]

**Caricatures:**

While the word “caricature” often has negative connotations, in its simplest form, a caricature is a rendering of a person where certain prominent characteristics are made more visible. In research, group “caricatures” are a type of composite description that emphasizes the salient characteristics of those it represents. In this study, it is not my intent to capture every characteristic of each participant in the group description, but rather to highlight the most distinctive features that members of each group had in common. The caricature descriptions are written as if they are about an individual teacher, but in actuality, they represent the most salient characteristics of all teachers within a particular group.

**Sarah:**

Sarah uses the new curriculum as a resource in math instruction. She wants to ensure that her students master important skills, particularly those related to computational fluency, ideally in a fun and engaging way. Sarah strongly values having autonomy in how she chooses to use the curriculum with her own students.

Initially, Sarah felt stress and pressure about the new curriculum, but once she began to streamline it, she felt more at ease.
While Sarah would like supports such as ready-made curriculum materials and classroom assistance with managing students, her greatest desire is to be granted the freedom to modify and adapt the curriculum to her own tastes and teaching styles.

To what extent does this description of "Sarah" fit with certain teachers within your school or district during the first year of Bridges implementation?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>To a great extent</th>
</tr>
</thead>
</table>

To what extent do you personally identify with "Sarah"?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>To a great extent</th>
</tr>
</thead>
</table>

(Optional) Please share any comments or feedback you may have with regard to this description of "Sarah".

Tom:

Tom is striving to implement the curriculum with as much fidelity as possible. He wants to give his students rigorous instruction focused on both computational fluency and conceptual understanding. He also wants them to demonstrate mastery of standards on state tests and district report cards. Tom values the curriculum’s alignment to standards and wants to be sure that he is covering what he is supposed to be covering.

While Tom appreciates having a curriculum that is already laid out for him, he frequently feels overwhelmed and pressured as he tries to keep up with curriculum and district expectations. As the first year of implementation progressed, he was encouraged and proud when he saw results in student learning.

Tom wants support in easing the burden of materials and lesson prep by being given time for in-depth unit planning and advance materials prep, ideally sharing the load with
colleagues. He wants professional learning experiences to focus on implementation tips and tricks from experienced users and watching the lessons in action.

To what extent does this description of "Tom" fit with certain teachers within your school or district during the first year of *Bridges* implementation?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>To a great extent</th>
</tr>
</thead>
</table>

To what extent do you personally identify with "Tom"?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>To a great extent</th>
</tr>
</thead>
</table>

(Optional) Please share any comments or feedback you may have with regard to this description of "Tom".

Ilana:

Ilana strives to implement all components of the curriculum. She wants to ensure that her students and her fellow teachers develop deep conceptual understanding of math content, as well as a confident mindset and attitude of excitement toward math. She strongly values creating a classroom community that is characterized by student discourse.

While Ilana acknowledges the work involved in implementation, she feels well equipped and supported by the curriculum and is confident in the impact it will have on her students.

Ilana wants to provide support to other teachers by leading efforts in unit planning and preparation. She is looking for opportunities to collaborate and network with others, even those outside of her own school and district. She wants professional development on high leverage teaching strategies and facilitating productive discourse, ideally within a lab classroom environment.
To what extent does this description of "Ilana" fit with certain teachers within your school or district during the first year of Bridges implementation?

| Not at all | 1 | 2 | 3 | 4 | To a great extent |

To what extent do you personally identify with "Ilana"?

| Not at all | 1 | 2 | 3 | 4 | To a great extent |

(Optional) Please share any comments or feedback you may have with regard to this description of "Ilana".