The Seven Year Itch: Sustaining and Scaling a Cognitively Guided Instruction Initiative

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Dedication

I'd like to thank my family for their support during the past three years, including my husband for making dinner on class nights and letting me 'borrow' his soldering table as my desk, and my adult children for their patience in scheduling visits. I'll see you in December!

Thank you to my friends, those whom I didn't visit, with forgotten birthdays. I hope to see you in the near future.

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Cheers!

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Executive Summary

Partner Organization:
University of California, Los Angeles (UCLA) Mathematics Project (Math Project) supports pre-kindergarten - grade 12 school administrators and teachers in high-quality math instruction within low-income urban school districts with an emphasis on social justice.

Background:
XX School District (District) is Math Project's largest partner. The Math Project - XX School District Cognitively Guided Instruction (CGI) Partnership (Partnership) is in its eighth year. CGI is a research-based professional development program for teachers, centered on children's mathematical thinking, in which children solve problems in ways that make sense to them. This is the largest-scaled CGI model to date, currently serving 250 elementary schools and early education centers. The goal is to scale it to all eligible schools in the District.

Problem of Practice:
Given that the goal is to scale to all schools in the district, Math Project would like to identify the strengths and challenges during the past seven years of the Partnership's implementation to inform continued scaling and sustainability efforts amid ongoing changes within the XX District.

Guiding Frameworks:
Two conceptual frameworks are considered, Cobb et al.'s Theory of Action (2018), in which the reform initiative addresses the larger system issue, viewing teacher's instructional practices as one part of the larger system in which it is situated, and Lave and Wenger's Communities of Practice (1991), in which learning is viewed as a social process of participation with more knowledgeable others.

Project Questions:
PQ1: How has the CGI Partnership sustained and scaled to date?
PQ2: What is the present status of Math Project within the CGI Partnership?
PQ3: What is needed to sustain and scale the CGI Partnership in its eighth year and beyond?

Project Design:
This is a quality improvement project with a qualitative approach, exploring participants' lived experience with the Partnership through 24 interviews of Math Project and District leaders, principals, teacher-leaders, support staff, and a focus group of teacher-leaders.

Three Key Findings:
PQ1: How has the CGI Partnership sustained and scaled to date?
Finding #1) Three factors that supported the sustaining and scaling of the CGI Partnership in XX District were:

a) Ongoing support for the initiative
b) Opportunities for choice and flexibility in implementation
c) A focus on building and maintaining strong relationships to support the implementation of the initiative.

PQ2: What is the present status of Math Project within the CGI Partnership?
Finding #2) This is an inflection point for Math Project in the Partnership as District leadership and policy changes threaten to outweigh the organizational strengths of the Math Project.

PQ3: What is needed to sustain and scale the CGI Partnership in its eighth year and beyond?
Finding #3) The Partnership's challenge is in the District internalizing the CGI initiative into District policies and practices, only then can the Partnership be considered "at scale."

Recommendations:
Building on the findings that elements of support, choice and relationships are key to successful sustainability and scaling of the initiative to date, the recommendations are organized around these three key factors.
Support:
1) Increase District senior leadership engagement
2) Re-align the Partnership vision
3) Increase District math leader support
4) Encourage principal participation

Choice:
1) Request 'curriculum fidelity' waiver on instructional materials
2) Schools elect to be CGI schools
3) Coordinate teacher-leader identification
4) Instill teacher-led cycles of inquiry

Relationships:
1) Overcome teacher resistance
2) Renew focus on equity
3) Engage community with media strategy
4) Address organizational growing pains

Key Words: teacher professional development, scaling an initiative, teacher-leaders, Cognitively Guided Instruction, university-school district partnership

Introduction

Student test scores in mathematics are continuing to decline in schools across the country (U.S. Department of Education, 2023). Reforming math instruction is challenging work (Rosenquist et al., 2015), with researchers Cobb and Jackson declaring, "The history of large-scale improvement efforts that involved significant changes in teachers' instructional practices is primarily one of failure" (2011, p. 33). However, one notable exception is when the math reform initiative is based on Cognitively Guided Instruction, or CGI (Schoen et al., 2018).

CGI is a professional learning program for teachers. CGI recognizes that all students bring mathematical knowledge into the classroom and that they can extend that knowledge. Teachers present children with a variety of number sense activities and story problems to solve to support the trajectory of children's thinking. Students solve them in ways that make sense to them. Students share the details of their strategies, and discuss them with their peers, building conceptual understanding. Teachers listen to the details of the students' thinking to support their instructional decision-making. Teachers use an asset-based lens to analyze student work to understand what students know and can do, and plan next steps. Through the process, students develop mathematical knowledge, personal agency and come to see themselves as mathematicians (Carpenter et al., 2015, Schoen et al., 2022).

A CGI teacher-leader shared that the approach also has a positive effect on teachers,

> She (the teacher) said it totally changed this year for her. She went from a person who was hating to come to work every day because it was just this really negative place to come, to kids saying, 'Can we do math right now?' She was changing the way she talked to them, that it was about, 'Oh, wow! Look at what you did," rather than what you didn't do. Her scores went through the roof.

This Capstone project explores how a university organization partnered with a school district to change the way that math is being taught by introducing CGI professional learning for teachers in pre-kindergarten through elementary grades. The focal organization is UCLA Mathematic Project (Math Project). Their largest partner is the XX School District. Over seven years, their Cognitively Guided Instruction Partnership (Partnership) has grown from ten schools to 250 schools. The problem of practice is one of sustaining and scaling the CGI initiative to all eligible schools in the District. The purpose of this Capstone is 1) to look at what has worked in the past 2) identify the status of the Partnership for Math Project in the present 3) and to make recommendations to sustain and scale the initiative in its eighth year and beyond. By exploring the literature within the areas of common goals, equity, teacher-efficacy, and principal and district leadership, the interplay of these elements for sustaining and scaling will be made evident.

Organization Context

First, we'll look at the context of the university, then the school district, followed by the background of this university-school district partnership.

Partner Organization: The University of California Mathematics Project

UCLA Mathematics Project (Math Project) supports pre-kindergarten - grade 12 school administrators and teachers in high-quality math instruction within low-income urban school districts with an emphasis on social justice. Math Project is part of Center X at UCLA where practitioners and researchers work together to integrate research into practice in all disciplines on projects throughout the state (UCLA, 2023). The Math Project - XX School District Cognitively

Guided Instruction (CGI) Partnership (Partnership) is entering its eighth year. The Math Project leadership team includes:

- Megan Franke, Ph.D., Professor, Graduate School of Education & Information Studies, UCLA, and the Math Project faculty liaison
- Janene Ward, Ed.S., Math Project Associate Director of Elementary Education, Co-Director of the UCLA-District Cognitively Guided Instruction (CGI) Partnership, and primary point of contact for the Partnership
- Karen Recinos, M.Ed., Math Project Associate Director of Early Childhood Education

The Partnership is just one of Math Project's many programs. Math Project's Partnership support staff includes ten CGI coaches and three program coordinators. Together, with 200 teacher-leader consultants who provide the facilitation and coaching to school sites, they champion the CGI goal for student learning in mathematics of "learning with understanding" (Carpenter et al., 2015, pp. 184-185). I worked with Janene Ward to identify the problem of practice and focus for the Capstone project.

The School District

XX School District (District) is Math Project's largest partner. It is a pre-kindergarten - grade 12 urban school district with a student body of 90% Students of Color, approximately 10% White, with about 80% of students eligible for free or reduced-price meals. The District has had three superintendents in the span of the Partnership from 2016-2023. It has been a turbulent period, highlighted with multiple restructurings within the District, pivoting to remote learning during the COVID pandemic, and new goals in academic areas. The educator goals from the District's Strategic Plan 2022-2026 include providing high-quality instruction, participation in ongoing professional learning, and focusing on equity-driven teaching, meaning that all students

are provided with what they need to be successful (District website, 2023). The District numeracy goal for students in grades 3-8 is to move students ten points a year closer to proficiency on the Smarter Balanced Assessment, or as the website states it, 40 points closer to proficiency over four years, an aggressive goal. The National Assessment of Education Progress (NAEP) test scores show the District's scores in math declining over the past few years, a trend seen nationally (U.S. Department of Education, 2023).

Positionality Statement

I have a personal interest in this quality improvement project. I was the elementary mathematics coordinator in the District's central office from 2012-2020, and the Partnership lead. I retired from the district in January 2020; and I was a consultant with Math Project in 2022. As a consequence, I have had the privilege of supporting the CGI work from both sides of the Partnership. In my research I will strive to maintain a neutral stance and keep bias and heuristics in check.

Partnership Background

The Partnership began in 2016 as a research-based model of reform to address the modest, single-digit improvement of student standardized test scores in math in grades 3-5/6. Scores were not improving fast enough in the District. The District mandate was to 'teach the standards, not the curriculum,' meaning that teachers had flexibility in using instructional materials to meet the needs of their students. District leaders identified that many teachers were rotely using their textbooks and teaching as they had been taught through direct instruction while emphasizing procedures over conceptual understanding. Starting in 2012-2013, the District math leaders worked on developing teacher content knowledge and pedagogy by focusing on the California (Common Core) Math Standards and Framework. In an effort to align all the regions

of the District in math instruction, there was an emphasis on number talks, which are a short mental math exercise at the beginning of the math time, and three-phase problem-solving lessons, which are word problems that emphasize student discourse and sense-making. One hundred teacher-leaders were selected in 2013-2014 to participate in a yearly fellowship program, training a group to facilitate professional learning. These actions prepared the District's teachers to be introduced to the CGI principles.

Children's Mathematics: Cognitively Guided Instruction, by Carpenter et al. (2015) lays out the research foundation for CGI. Math Project's faculty leader is Dr. Megan Franke, a co-author of the book. CGI is a set of principled ideas aligned to a conceptual framework and considers teachers as learners, providing them with the time and support to learn within their teaching practice so that the learning becomes generative (Carpenter et al., 2004).

Marketing CGI was necessary to get buy-in throughout the local regions. What is CGI? What does CGI look like, and sound like in action? One model CGI school was identified within the District and tours were scheduled. Senior leadership participated in school tours and information sessions to build awareness and support of CGI. The then-District Chief Academic Officer (CAO) had previously worked at UCLA's Center X, the parent organization for Math Project. The CAO supported CGI and lobbied for District funding. In 2016, the CAO charged me, as the central office elementary mathematics lead, with creating a CGI initiative. With support from the District leaders, we began an action research project with Math Project. Math Project provided the expertise; the District collected the data. The team started running seven different CGI models with ten schools, including:

-partnering an experienced CGI school with a new-to-CGI school

-partnering an early education center for ages 2-4 with a nearby elementary school, and

-providing schools with a choice in the grade levels starting the work

-transitional kindergarten - kindergarten,

-primary grades (grades K-2),

-upper grades (grades 3-5, or grades 3-6, depending on the school site),

-or whole school.

For the first several years, teachers at participating school sites were provided with eight two-hour sessions of professional learning during the school day, thirty hours of coaching at the school site during the year, and the option to participate in paid online courses and three week-long, in-person summer institutes. Over time, the number of sessions of professional learning and the number of days of coaching support evolved, varying from four to twelve days, depending on the model of the school. The District collected pre- and post-data on teacher attitudes and content knowledge, and student attitudes and content knowledge. Data showed that students were using more valid strategies, more advanced strategies, and both student and teacher attitudes toward math improved (Franke, personal communication, June 2017).

Principals applied for their school to be a CGI school, showing they had structures in place to support the initiative, structures that included professional learning communities, number talks and three-phase problem-solving, and a school budget to support substitute coverage for teachers to participate in coaching during the school day. Principals participated in annual CGI Leadership Days, online courses for administrators, and monthly Principal Zoom support calls with Dr. Franke and experienced CGI principals. Dr. Franke also spoke annually at the principal and assistant principal meetings.

Changes to the models were made along the way, with the ‘partnering of schools’ option ended due to larger costs and scheduling difficulties. Providing the schools with entry points at

different grade levels continued, and the schools added additional grades as they moved through the years with CGI. The original plan was a five-year commitment to take CGI district-wide, and it is now continuing year-to-year. The COVID pandemic stalled the growth, but CGI support continued virtually to existing Partnership schools. Today, CGI professional learning is offered face-to-face in 250 schools.

Data is used by the District to track students in CGI schools. District-level assessment data includes quarterly assessments developed by the math leaders. Math Project developed annual CGI pre- and post-assessments for student content knowledge and a math attitude survey. Currently, a third-party organization is analyzing the District's student data from CGI schools.

This is a challenging time for the Partnership. The most recent change of superintendent calls to mind the tendency of school districts to make fast and disruptive changes in the name of large-scale reform (Bryk et al., 2021). When scoping the Capstone project, the Math Project Co-Director wondered if the project was going to be able to sustain amid the changes happening in the District. Will the Partnership continue?

Problem of Practice

The problem of practice is one of sustaining and scaling a reform initiative through a university-school district partnership. This quality improvement project will look back at the past to see how the Partnership has sustained and scaled to date, consider the present with an analysis of Math Project's strengths, weaknesses, opportunities and threats, and look to the future for the next steps in sustaining and scaling.

Traditional education reform initiatives from the top down are not productive (Fullan, 1994). However, instead of growing infrastructure from above, CGI is growing from within the

ranks of the teachers (Carpenter, et al., 2004). The program rests on the idea that teacher-leaders will share their work with the teachers in the building and in the nearby schools. The conjecture is that engaging with other teachers in this way will support teacher-leaders in increasing their self-efficacy. Math Project initially thought that scaling was limited by the number of teacher-leaders to facilitate the work, in other words, it was a problem of human capital.

Synthesis of Evidence

The literature review was conducted using the Vanderbilt University Library. A review of the literature started with search terms included 'professional learning,' 'scaling,' 'cognitively guided instruction,' 'teacher-leaders,' and 'teacher efficacy.' It became obvious that there was more than human capital involved in this problem of practice. Another round of search terms included 'research-practice partnerships,' 'university-district partnerships,' and 'principal development.' I began exploring conceptual frameworks to understand the breadth of the problem, including Lave & Wenger's Communities of Practice and Cobb et al.'s Theory of Action. A combination of Communities of Practice and Theory of Action highlights the unique attributes of the variety of players across the CGI field and informed my interpretation of the literature.

Key Terms. *Sustain* means to "maintain," according to the Cambridge Dictionary (n.d.). I will use it in this context to mean keeping an educational initiative actively in use within a classroom even after the support for the practices has been ended (Coburn et al., 2012). *Scaling*, or scaling-up, in education is defined as reproducing a proven and effective classroom practice or innovation in additional classrooms (Cobb & Smith, 2008; Klingner et al., 2003). A more salient definition in education, according to Coburn, includes internalizing the change to the degree that it is now a part of the culture, only in that way can the initiative continue (2003). The initiative

becomes an internal reform when the teachers and principals, schools and the district continue to sustain and spread the initiative's principles on their own, without outside support (Cohen-Vogel et al., 2022). At a district level, true internal reform means that the initiative's principles impact the district policies and professional learning, only then can the initiative be termed, 'at scale' (2003).

The definition of '*research-practice partnership*,' is a specific type of partnership in which a problem of practice is addressed over time (Vetter et al., 2022). According to Henrick et al., research-practice partnerships have the intended goal of increasing student progress through an organized joint effort between parties (2016). While this definition may be interpreted to imply that the university is actively engaged in research with the district, this is not the case with this Partnership, as the District is collecting the data, the Math Project is not. However, the intended goal of the Partnership was the same, with both parties working towards increasing student progress. I will use the term "*university-school district partnership*" to show this distinction.

University-School District Partnerships

Research and practice should support each other (Schoenfeld, 2016). According to Stigler and Hiebert, research does not make its way into U.S. classrooms often because of a lack of alignment between classroom teaching research and educational policy research (1999). A university-school district partnership helps bridge that gap by bringing together the various parts of the educational system around the classroom as a laboratory (2016). Purposeful matching of the school district and university means matching needs with research practices, based on mutual respect and trust (Maass et al., 2019). Or the research can be done together with both parties. In the research-practice partnership, Middle School Mathematics and the Institutional Setting of

Teaching Project (MIST), university research was done "with" the districts, rather than "on" the districts involved to inform improvement efforts (Cobb et al., 2018, p. 2). Each participating district received an annual Feedback and Recommendations Report that detailed the progress the district was making towards its goals related to middle grades mathematics (Rosenquist et al., 2015). This is an example of program evaluation built into the model. In this way, the research-based ideas spread. Outside experts provide the innovative ideas that are then put into practice in the partnership based on mutual goals and trust (Stein et al., 1999).

System: The Educational Structure

Research impacts policy on many levels within the system. The movement from external reform to internal reform may start at any level of the system. Scaling is a joint activity requiring buy-in from all levels; Darling-Hammond and McLaughlin call it, "Top-down support for bottom-up reform" (1995). Carpenter and Franke specifically address the issue of scaling CGI in a report for the RAND Corporation, reflecting the bottom-up change, because it is the teachers and school administrators who notice the difference it makes in students' progress, improved attitude towards math, and self-identity as mathematicians (Glennan et al., 1995). Teacher-leaders then lead the professional learning for others, akin to a grassroots effort. Recognizing the importance of the top-down piece, Carpenter and Franke advocate involvement with the district's mathematics leaders and senior leadership to provide the infrastructure for the scaling up within the district (Glennan et al., 1995).

Elmore claims that it is the educational institutional structure that gets in the way of educational reform, as the system shuts down anything threatening the 'core of schooling' (1996, p. 4). What Elmore observed in reform efforts was, "…a weak, diluted, hybrid form emerged in some settings in which new curricula were shoe-horned into old practices…" (1996, p. 13). That

is not sustaining a reform practice. Sustaining an initiative with its principles intact means altering the system. Jackson et al., on assessing why initiatives often fail at scale, explain that not enough attention is paid to the system level contexts in which teachers work (2015). It is not just that teachers teach how they were taught, but the system perpetuates it. According to Cobb and Smith, scaling up leads to sustaining on a larger playing field when there are networks of support, with a shared vision, and mutual accountability (2008).

Cognitively Guided Instruction: Teacher Professional Learning

Franke claims that CGI is poised to change the core of educational practice through teacher professional learning that has "…visions for rich, student-centered, inquiry-oriented environments that foster students' capabilities and identities" (Kazemi et al., 2022, p. 1054). What is it about CGI that makes it so unique as to buck the system?

CGI's goal is for students to understand the math (Carpenter et al., 2015). In classrooms where learning with understanding is taking place there are four themes apparent from the CGI conceptual framework:

> Knowledge is connected. Knowledge is generative. Students describe, explain, and justify mathematical thinking. Students identify themselves as mathematical thinkers who see that mathematics should make sense and that they have the power to make sense of it (2015, p. 185).

CGI is not a traditional instructional approach; it is not how math teaching is taught in most college teacher preparation programs. It is not what teachers experienced when they were students in their classrooms growing up. It is not a curriculum. And it is not the embodiment of the commonly accepted educational model that a student is an empty vessel, into which the teacher pours knowledge.

It is very challenging to change a teacher's practice (Rosenquist et al., 2015). Hiebert and Morris note that historically there has been an attempt to improve the teacher, rather than the practice (2012). Teachers are sense-makers, according to Cochran-Smith and Lytle; they do not want to be 'fixed' (1999). Instead, CGI recasts teachers as learners who are 'positioned competently' to take risks by trying out new student-centered pedagogy and beliefs (Gibbons, Kazemi & Lewis, 2017). Carpenter and Franke developed the CGI professional learning so that there is a direct connection to teachers' practice. While the focus is on the student work and thinking, the teacher develops their own content knowledge to understand what it is the student is expressing and deepens their own pedagogical knowledge so that they know where to take the student next on the learning trajectory. For teachers, the learning occurs in that struggle to understand a student's problem-solving strategies (Glennan, et al., 1995). With CGI, the teacher is a facilitator (Moses & Cobb, 2001), instead of the infamous 'sage on the stage.' Making sense of new practices and knowledge is supported by participation with more accomplished others (Lave & Wenger, 1991), leading to old beliefs being questioned through self-reflection. Battey and Franke note that teachers may reflect on their personal negative experiences with mathematics, including the racialized and gendered limitations they experienced, as a step in transforming their learning (2015).

Teachers' personal learning leads to collective learning. Kazemi et al. found three distinct areas on which to focus schools' collective CGI professional learning, 1) set goals for teacher learning that include addressing equity, 2) create a teacher learning system with coach-facilitated "math labs" in which analyzing student work and co-planning are an ongoing practice, along with grade level and faculty meetings that maintain an instructional focus, and 3) prepare principals to participate across the teacher learning system, in the math labs, in the classroom,

interacting with the students, rather than being a passive observer, and celebrating their work by inviting students to share their thinking (2002). The principal keeps the focus on the collective "why" behind the initiative and uses storytelling about the CGI work at the school to keep the vision alive (2002). This mutual engagement includes shared goals.

Considerations for Scaling

The literature focuses on several elements that impact scaling, including goals, equity, teacher efficacy, teacher-leader participation, teacher-leaders as coaches, learning networks, principal participation and District leader participation.

Goals. Aligning student goals from all stakeholder groups is required for success in sustaining and scaling an education initiative (Maass et al., 2019). The student learning goals supported by mathematics professional organizations center on deep conceptual understanding, and the specific goals spelled out in the grade level standards for each state. The National Council of Teachers of Mathematics (NCTM) supports the elements of focus, coherence and rigor, as does the Common Core State Standards in Mathematics (CCSSM). These three principles in math instruction are defined as: 1) focus, the emphasis on the grade level standards, 2) coherence, the big ideas across grades, and 3) rigor, or the equal intensity of deep conceptual understanding, skill, and problem solving (McLean & Ong, 2015). These "ambitious" goals for student learning combine conceptual understanding and procedural fluency, which require "ambitious" teaching practices to support them (Gibbons & Cobb, 2016, p. 238). For the teacher, maintaining student engagement with cognitively challenging tasks means new instructional practices (Boston et al., 2017), requiring ongoing professional learning. CGI is specifically called out in the California framework as an instructional model aligned with the California CCSSM (2015). This

framework provides the common goals for the university-school district partnership and is a critical piece to center the learning in the CGI classroom.

Students in CGI classrooms demonstrate their learning through shifts in their participation in the class, according to Carpenter and Franke (Glennan et al., p. 52), as students engage in discourse and problem-solving together. While no one CGI classroom will look exactly like the next CGI classroom, there are common elements of number sense activities, real-world problem solving, and students discussing their strategies with each other. The strategies follow a developmental progression with the teacher supporting students to question and respond to other student's thinking and problem-solving. As students discover new strategies and new ideas, a web of connectedness is woven. When a student is deemed "proficient" on the standardized test, they are meeting the grade level standards, which include conceptual understanding, procedures, and sense-making. Aligning goals also means aligning assessments, so that students are tested on what they are taught. Assessment takes a variety of forms. Formative assessment is used in the CGI classroom (Schoen et al., 2022), with teachers' practices including looking at student work with grade level professional learning communities and making decisions about next steps to move students along a trajectory of learning.

Equity. Deficit thinking and implicit racial attitudes impact how teachers teach math. According to Delpit, teachers bring their deficit views of students into the classroom (2012). Learning happens within social contexts, with Joseph et al., highlighting the roles of collaborative team learning and inclusive pedagogies, specifically with the Black girls' movement (2019), leading to sharing power within the classroom (2017). Battey and Franke's approach to equity within CGI is for teachers to notice and highlight the brilliance of students of color, through sharing stories of their students' mathematical thinking (2015). "The focus is to support teachers in gathering

counter evidence to challenge dominant deficit narratives about students of color. This builds a teacher community that tells different stories as they develop their mathematics teaching," (Battey & Franke, 2015, p. 433). This means telling contrasting stories from the popular ones in mass culture, in which it is socially acceptable to not be good at math, where the 'math gene' is called out as the determining factor in success in math, and where biased cultural beliefs lead to many students of color being placed in low-ability math groups and kept out of calculus (Ladson Billlings, 1997). Ullucci and Battey note that a conversation that is overtly racial may lead to disengagement, defensiveness, and cause people to disassociate with being racist (2011). By engaging in a counternarrative about their students, teachers begin to change their own minds about the potential of their students of color, according to the work of Perry, Steele, and Hilliard (2003). And it's not just issues of race. Mathematical identity is affected by gender, ethnicity, and socio-economic status, as well, with students' negative perceptions restricting their participation in learning (Greeno & Gresalfi, 2008). CGI uses an asset-based approach, focusing on what a student can do, rather than what a student cannot do. By using an "affirming lens," teachers are positioning their students as competent. Telling the stories of how their students surprised them is one example of rewriting the narratives. Challenging deficit narratives, reframing stories, these are just some of the equity-based approaches that CGI professional development takes (Battey & Franke, 2015), building teachers' sense of self-efficacy.

Teacher Efficacy. Self-efficacy is the way that people view their ability to act in certain contexts (Zee & Koomen, 2016). Bandura's social cognitive theory addresses the connection between how individual's beliefs about their own capacity to think and act influence their motivations (Bandura, 1993), with those having maximized self-efficacy visualizing positive scenarios to guide their work, and those having minimized self-efficacy visualizing failure scenarios.

According to Bandura, teachers' beliefs about their self-efficacy can impact student achievement (1993), although a meta-analysis of 40 years of research suggests that more empirical evidence is needed to make that claim (2016). Given a larger unit of analysis, the schools' collective belief systems of efficacy can lead to the schools' academic progress either increasing or not. Another study found that teachers' feelings of self-efficacy, coupled with their school administrators' leadership practices, had a significant influence (47.0% of the variance) in the innovation behavior of teachers within a school (Zainal & Mohd Matore, 2021). Teacher innovation starts with curiosity and interest from the teacher in recognizing that there is a problem that needs to be changed, which leads to teachers experimenting with workable solutions and assessing the impact. Teachers then reflect on their abilities to sustain the new practice, either adopting or discarding the new practice based on their feelings of self-efficacy. This is a cycle of inquiry. Teachers' belief systems develop during this change process (Myers et al., 2020). It is important that teacher self-efficacy be considered by district leaders and policy makers in enacting reform efforts (2021), with professional learning recognized as one factor in building that sense of self-confidence (Nolan & Molla, 2017).

Teacher-Leader Participation. Instructional change is shaped by teacher-leaders (Cassata & Allensworth, 2021). However, the key to sustaining and scaling a professional learning model is having a system in place to prepare the teacher to become the teacher-leader of the innovation's work. According to Katzenmeyer and Moller, there are three characteristics that show readiness for teachers to be considered as teacher-leaders: "competence, credibility, and approachability" (York-Barr and Duke, 2004, p. 281), elements that can be fostered through administrative support. This preparation system trains teacher-leaders to act in an expanded role as facilitators and coaches, to customize the learning for the local context, and advocate for policies to support

its goals (Tekkumru-Kisa & Stein, 2017). A situative perspective, meaning 'learning by doing,' focuses on designing customized learning environments to encourage teacher-leaders' capabilities (Greeno, 2006). Those teacher-leaders with increased abilities then need opportunities to take on more responsibility (Greeno & Gresalfi, 2008). The teacher-leader model requires thoughtful planning to select and prepare candidates, with a system in place to provide a variety of opportunities to participate.

What are the traits of an effective teacher-leader? Fairman and Mackenzie describe five characteristics demonstrated by the teacher-leaders in their study: Modeling, Sharing, Coaching, Collaborating and Advocating (2015). Modeling is more than showing how to do something, here it is used to demonstrate an openness and disposition to new ideas, to risk-taking. Sharing involves ideas and thoughts, as well as material resources. Coaching has many facets, including planning, observing, and debriefing. Collaborating involves co-planning, co-creating, co-evaluating resources and practices with others. And Advocating means playing a part in the engagement with the larger community for change (Cassata & Allensworth, 2021). Teacher-leader efficacy in these practices, Cassata and Allensworth found, was related to the presence of others within the school community advocating for reform. According to Cobb et al., a skilled facilitator will excel at setting explicit goals for teacher learning, be able to press the group for deeper thinking and reflections, and get others to share their ideas, all within the context of developing teacher efficacy (2018).

Teacher-Leaders as Coaches. An instructional coach is a teacher's best predictor for increasing instructional capacity according to Smith et al. (Cobb et al., 2013). Teacher-leaders in their coaching role may be those more accomplished colleagues for teachers, but they need specialized training in content and coaching, and that requires extensive support (Cobb et al., 2011), or

coaching for the coaches, with district leaders often responsible for providing it (Gibbons et al., 2019). According to Gibbons & Cobb, teacher-leaders may have the content and pedagogical knowledge, but it is the ability to establish a trusting relationship which makes coaching successful (2016). Teacher-leaders also need professional learning on coaching conversations, including planning and debriefing, a cycle which occurs in every instance of coaching, prompting the novice teacher to have a goal for the activity and reflect on the instruction (2016). Co-teaching is another activity in which teacher-leaders as coaches may influence teachers' instructional practices in real time, with opportunities to pause and consider options, and then debriefing afterward to reflect on the implementation of the goals of the lesson. Effective coaching practices include setting goals with the teacher, discovering where the teacher is on a trajectory of practice, and jointly participating in next steps to support the teacher's growth (2016).

Traditionally, principals have been kept out of the loop on coach-teacher support, as the coach is not an administrator and ought not to appear to be acting in an evaluative way. However, in some schools with successful coaching models, Gibbons et al. showed that informal coach-principal conversations helped in coordinating support for the coaching (2019). However, principal and coach support are just a portion of the contributions from the community.

Professional Learning Communities/Teacher Networks. Carpenter and Franke remind us that a community is needed to assist teachers in the challenge of changing their instructional practices with CGI (Glennan et al., 1995, p. 70). Professional learning communities (PLCs) and teacher networks serve as structures in several areas. Grade levels may be working together on common goals and planning, common tasks, common assessments, looking at student work, reading books and discussing them; teachers may be observing each other and debriefing, or co-teaching

lessons to rehearse and refine strategies, these are some of the activities in which PLCs may be engaged. This social network of support for innovation motivates teachers in participating (Krainer et al., 2018). It also creates local "champions" at school sites, in which the teacher network can flourish and be leveraged for change (Cohen-Vogel et al., 2022, p. 13).

Principal Participation. Principals' practices as instructional leaders are cited by Cobb et al. as a crucial element for the success of mathematics initiatives (2018). The literature is consistent in stating that the principals should be knowledgeable in content and pedagogy in specific content areas so that they can assess the quality of teachers' instructional practices (Cobb et al, 2013; Boston et al.; 2017; Coburn, 2003). This knowledge extends to communicating what is expected, attending to practices in classroom observations and providing feedback to teachers, including pressing for next steps (Boston et al., 2017). According to Robinson et al., there is a strong association between principals who participate in professional development with their teachers and increased student achievement (2008). This training in high-leverage instructional practice helps principals support the work of the instructional coach, both in classrooms and when participating in PD with their coaches (Cobb et al., 2011). The principal may provide multiple levels of support, including financial, as teachers work on sustaining initiatives, for example, providing funding for substitutes to allow teachers coverage for co-teaching, classroom observations, and planning and debriefing conversations. In addition, principals may buffer teachers from competing initiatives and negotiating tensions that arise between school and district policies (Kazemi et al., 2022). In this way, reform principles influence school policy (Coburn, 2003). Principals are also key in developing teacher leadership through providing teacher-leader opportunities (Cassata & Allensworth, 2021), and identifying and recruiting future teacher-leaders.

District Leader Participation. In the traditional top-down model, district leaders are charged with providing learning opportunities for school principals and coaches to develop plans and coordinate their support for high-quality instruction (Gibbons et al., 2019). According to McLaughlin and Mitra, that means district leaders need to be actively engaged in reform initiatives as learners, so that they have knowledge on how to best support the work and use that knowledge to inform decision making (Klingner et al., 2003). Ideally, the reform initiative would be connected in some way to the existing work of the district, so that the reform is viewed by the teachers as being in alignment with the work that they are already doing; that preparatory work of having goals and routines in place to ease the transition to the reform effort is part of the work of the district leadership team (Cohen-Vogel et al., 2022). Once the groundwork is laid, then starting small, with early successes, will lead to expansion, with customization and revision as a part of the growth cycle (2022). Scaling is not about doing more of the same. Scaling an initiative with the assistance of an outside partnership requires a shift of authority over time, as knowledge and administration is gradually transferred from the outside organization to the district (Coburn, 2003). Too often a district leader will give priority to 'our' professional learning or 'our' curriculum, and the reform dies. Scaling up includes a shift in ownership, it is no longer 'your' idea, it is 'our' idea; and unless that shift occurs, the initiative will not scale. The district will have internalized the reform when the district leaders change district policies and procedures to match the principles of the reform initiative (Klingner et al., 2003). The job of the district leader is to provide the built-in support for scaling up: the professional learning, facilitators, materials, time, support, and staff (Glennan et al., 1995).

Conceptual Frameworks

First Conceptual Framework: Theory of Action

My conceptual framework draws on two frameworks from the literature. Cobb et al.'s Theory of Action (2018) for reform initiatives addresses the larger system issue, viewing the teacher's instructional practices as one part of the larger system in which it is situated (Cobb & Smith, 2008). This framework connects to the problem of practice on each level of the educational structure. Cobb et al.'s Theory of Action (ToA) is comprised of three high-level parts (2018):

1.0) a coherent instructional system (that includes teacher's instructional practices)

2.0) principals' practices as leaders of instruction

3.0) district leaders' practices as supports

An instructional system that is connected and centered around "ambitious and equitable" student learning goals (Cobb et al., 2018, p. 222), means that all regions of the District share a grass-roots level goal of high-quality instruction supporting a diverse population. The supporting elements within the instructional system include:

1.1) teacher-learning subsystem

This teacher-learning subsystem includes:

1.1.1) job-embedded professional development,

1.1.2) participation in teacher networks of support

1.1.3) working with an experienced instructional coach

1.2) instructional materials and assessments

1.3) supplemental supports for currently struggling students

Figure 1, below, shows this web of connection with the student goals at the base. The interplay of all of these elements is what leads to the success of a reform initiative. This is a bottom-up model. By centering on the student goals, all parts of the system (district, school, classroom) are focused on the practices, tools and supports for student learning, with issues of equity entwined throughout the model. Then, the district can use backwards-mapping to develop supporting policies. This also highlights the importance of teachers working closely with a teacher-leader, or accomplished colleague on improving practice, and how critical it is for the coach to have expertise in the content, as well as skills in supporting other teachers' learning. This design-thinking approach is counter-intuitive to districts and provides a starting point for improvement science efforts (Cobb et al., 2018).

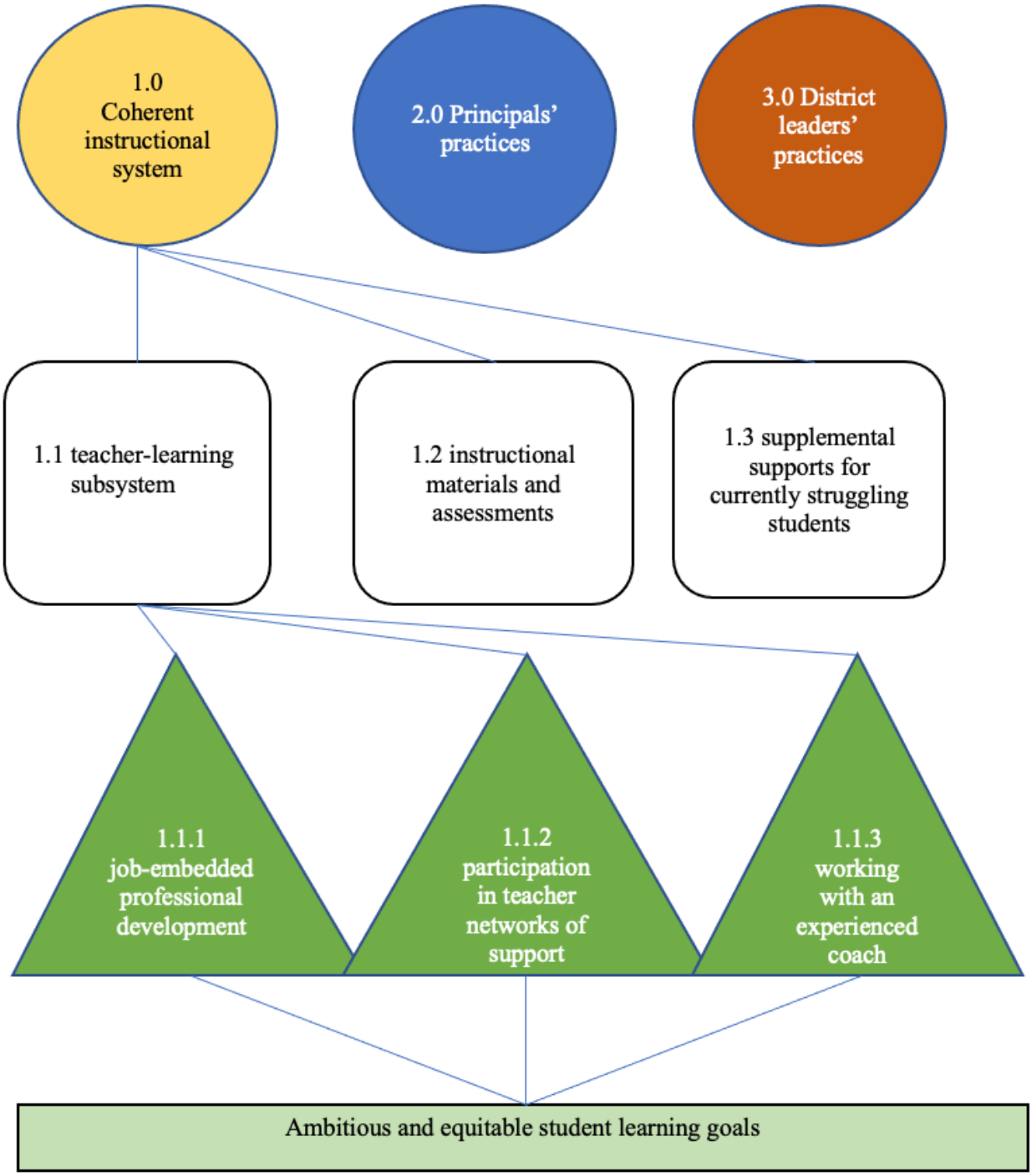
The second high-level part, principals' practices as leaders of instruction, highlights the profound influence of the principal in supporting the teachers' instruction, leading to mutual accountability. Principals who received substantial math-specific professional learning showed improvements in identifying high-quality instruction and gaps between a strategy 'as intended' and a strategy 'as implemented,' using a framework, and in working closely with an instructional coach. However, it was the indirect supports of principals that created an improved environment for math professional learning, including scheduling time for teacher collaboration during the school day, providing district experts for coaching and facilitating professional learning, and offering leadership/mentoring roles for teachers identified as exhibiting high-quality instructional practices. In contrast, those principals who focused on standardized test scores communicated that specific measure of student achievement as the "bottom line." This orientation impacts the teacher professional learning communities to switch their focus to high test scores, getting advice from teachers whose students are top scorers, rather than from accomplished practitioners of

high-quality instruction, leading to an unsupportive environment for high-quality math instruction (Cobb et al., 2018).

The third high-level part, district leaders' practices as supports, calls attention to the development of district policy. Developing improvement plans requires subject matter expertise, along with wisdom and judgement, and that expertise often goes unrecognized within districts (Cobb et al., 2018). District level math experts are ideally suited to inform senior district leaders who are making policy decisions in mathematics teaching and learning (2018). District level math leaders are often those selecting curriculum materials and designing professional learning for their use, providing teachers with new knowledge and new tools for instruction (Cobb & Smith, 2008). "Change process is social diffusion," according to Leong et al., starting with the teacher's instructional innovating, the coming together of principal support, leading to district curriculum policies to support reform (2021, p. 1307). This aligns with Elmore, who offers this insight for tackling a problem of scale: create new structures to support new practices and introduce incentive systems to grow them, including time to learn, time to observe, and on-going encouragement (1996). District policy is also responsible for assessment, not just of student learning, but of the initiative's progress. Data collection may take many forms, including teacher feedback on professional learning opportunities and teacher attitude surveys. As Bryk et al. reminds us, "We cannot improve at scale what we cannot measure" (2015). Measurement helps define growth.

Figure 1

Cobb et al.'s Theory of Action (2018, p. 222)



Growth can begin at any level. Instead of growing infrastructure, CGI is growing from within the ranks of the teachers. As teachers new to CGI are inspired by and motivated to change their practice by the influence of the experienced CGI teachers, so too, will they take on the role of supporting other teachers as their expertise grows (Carpenter et al., 2004).

Second Conceptual Framework: Lave and **Wenger's Community of Practice**

Lave and Wenger's Communities of Practice theory of learning is the second conceptual framework to be considered, framing learning as a social process (1991). The theory's basis is that knowledge is co-constructed by those participating within a specific context. Participation is learning. And there are many ways to begin to participate within the community (1991). This framework is helpful to understand the problem of practice in a relational way. When the community is represented as a circle, see Figure 2, below, and the goal for the learner is to get from the outside of the circle to the inside of the circle, the "peripheral" outer edge of the circle represents the first entry point into the community. "Legitimate peripheral participation" refers to the myriads of meaningful entry points by which the learner engages with the community as they move over time to full participation within the community (1991, p. 31). The practice of 'learning by doing' may be thought of as internships or apprenticeships. Access to practice, or 'doing', is the most important aspect of this model. This situated learning leads to identity development, as the learner moves through the steps of transitioning from "newcomer" in the community to experienced "old-timer" (1991), taking up the behaviors of experts at their craft. This is not an easy journey, as there are systemic forces that conflict with this learning, such as historical structures that hold tightly to the traditional forms of instruction, rather than support teachers in new ways of teaching. To pave the way, Lave and Wenger cite three necessary

elements for a learning community: mutual engagement, joint enterprises, and a shared repertoire (1991).

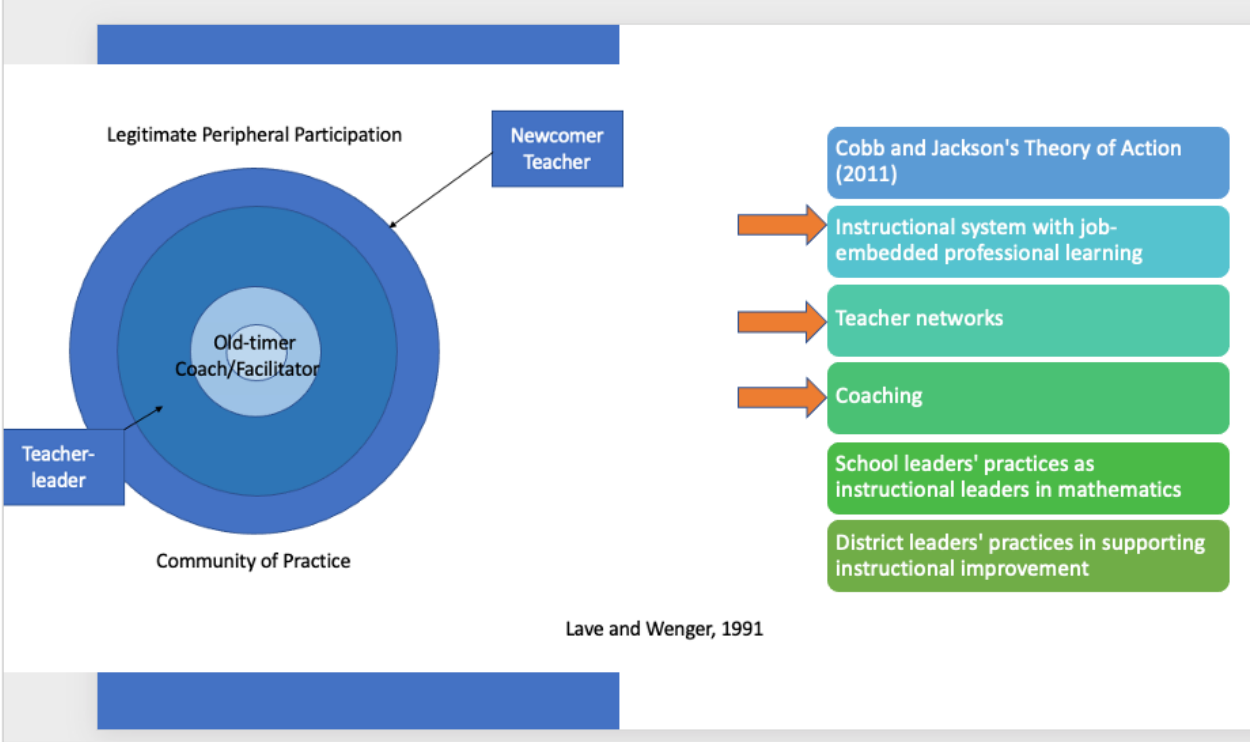
CGI is specifically cited as an example of situated learning in which the teachers' trajectories may follow a variety of paths as they focus on the details of children's thinking (Greeno & Gresalfi, 2008; Battey & Franke, 2015). As shifts in teacher participation occur, learning is happening, and these shifts lead to new roles and new identities for the teacher. The scaling of the model is predicated by the increasing participation of teachers as they take on expert practitioners' attributes. There is an expectation that a community mindset, vocabulary, and asset-based approach develops over time. Ideally, a teacher becomes a teacher-leader, and supports other teachers on their CGI journey. According to Lave and Wenger, "...we must not forget that communities of practice are engaged in the generative process of producing their own future" (1991, p. 58).

Concept Map

Combining the two theories into one model (Figure 2 Concept Map), Theory of Action (2018) with Community of Practice (1991), shows the influence of the teacher-leaders on three of the elements for improving mathematics teaching at scale. As teacher-leaders become more experienced and active in their supporting networks, they can then share their personal experiences through professional learning and coaching supports within other's classrooms.

Figure 2

Concept Map



This journey from teacher to teacher-leader is what provides the workforce to enable the Partnership to scale up. However, this model does not only represent teacher-leader learning. The principles of high-quality professional learning for teachers, teacher-leaders, principals, mathematics leaders and district senior leadership "should involve ongoing work with more accomplished others" throughout the system (Cobb & Jackson, 2011, p. 26), within this university-school district partnership.

Project Questions

A review of the literature helped clarify the many facets of sustaining and scaling an educational initiative and leads to three project questions. These project questions span the past, present and future of the Partnership.

- PQ1) How has the CGI Partnership sustained and scaled to date?
- PQ2) What is the present status of Math Project within the CGI Partnership?
- PQ3) What is needed to sustain and scale the CGI Partnership in its eighth year and beyond?

The first project question provides an opportunity to look more closely at the past and what was unique about the Partnership that supported its growth. This involves a deeper look at the preparation, joint goals, leadership, and choices made during the past seven years. In the second question, I examine Math Project's current strengths, weaknesses, opportunities, and threats to inform an understanding of the current implementation. The third question addresses what the future might hold.

Project Design

Project Type

This project design is a qualitative approach to explore the participants' lived experience with the Partnership through narrative inquiry. I conducted interviews with a representational sample of District senior leadership, math leadership, principals, and teacher-leaders, and Math Project leadership and support staff, and a focus group of District teacher-leaders. By exploring what has worked in the past, internal and external factors of the present, and suggestions for the future, the results of this project may be utilized to improve the quality of Math Project's participation in the Partnership.

Data Collection Plans

Qualitative data was collected in two ways: I addressed the project questions through 24 semi-structured individual interviews conducted in-person or virtually, and one in-person focus

group with nine District teacher-leaders at a CGI professional learning location. Table 1, below, shows a matrix of the project questions with the data sources and data collection method, followed by the data analysis procedures.

Table 1

Project Questions/Data Collection Matrix

Project Questions	Data Source	Data Collection Methods	Data Analysis Procedures
PQ1) How has the CGI Partnership sustained and scaled to date?	Math Project leadership and support staff, and District leadership, principals, teacher-leaders	Interviews, focus group: purposeful and snowball sampling, semi-structured design of questions	Qualitative, thematic analysis
PQ2) What is the present status of Math Project within the CGI Partnership?	Math Project leadership and support staff, and District leadership, principals, teacher-leaders	Interviews, focus group: purposeful and snowball sampling, semi-structured design of questions	Qualitative, thematic analysis, SWOT analysis
PQ3) What is needed to sustain and scale the CGI Partnership in its eighth year and beyond?	Math Project leadership and support staff, and District leadership, principals, teacher-leaders	Interviews, focus group: purposeful and snowball sampling, semi-structured design of questions	Qualitative, thematic analysis

Interview Participant Sampling and Recruitment Process

Purposeful sampling was used for selecting District senior leader and math leader interview participants based on their unique position to answer the project questions. For Math Project leadership, two of the three leaders were selected for interviews to provide information specifically on the early childhood and elementary aspects. Five current or former members of the Math Project staff were invited by email and phone calls, selected from a team of 13 staff

coaching and administrative positions, to represent a variety of tenure and responsibilities, and all participated, including a former employee.

District participation was difficult to achieve. I identified and extended invitations by email and phone to four District senior leaders who were actively involved in or overseeing the CGI initiative: the chief academic officer, the administrator of elementary instruction in the central office, the executive director of early education, and the administrator of instruction for one of the regions. Only one participated in an interview. District personnel recommended two math leaders as potential candidates for interviews, but they did not respond. There were five District math leaders at the time who were invited through email and phone calls for interviews; three of whom participated, representing three of the four regions in the District. Five principals were invited via email and phone calls for interviews, including two principals recommended by Math Project. Of these principals, four current and former District principals agreed to participate, representing one early education center and three elementary schools, located within three of the four regions in the District. Altogether, there was District representation from all four regions of the District.

For teacher-leader interviews, the sampling frame was snowball sampling, in which people recommend others to participate, to provide a range of perspectives from both District and non-district participants. There are 200 teacher-leaders in the Partnership. Math Project recommended two teacher-leaders who responded and were interviewed. 13 teacher-leaders were invited by email and Twitter. Nine teacher-leaders responded and were interviewed, six from the District and three from outside the District. In addition, I considered demographic representation in geographical location within (north, south, east, or west regions) or outside of the District, along with gender, and ethnicity. For demographic data, refer to Table 2.

Table 2

Interview and Focus Group Demographics

District Region	North 15	South 2	East 3	West 3	Non-District 3	Math Project 7
Gender	Female 28	Male 5				
Ethnicity	White 21	Latinx 6	Asian 4	African American 2		

Individuals were invited to participate through a combination of emails, texts, phone calls, and Twitter, with 24 participants completing the interviews: a) nine teacher-leaders b) one senior district leader c) four principals of CGI schools d) three district math leaders e) two Math Project leaders f) and five Math Project support staff.

Interview Protocol Development

Interview discussions explored the alignments of district goals, professional learning, leadership, and support from both Math Project and the District. Semi-structured questions for the interviews were adapted from the Cobb et al., (2023) MIST Instruments as they were aligned with the Theory of Action conceptual framework and designed to address reform initiatives in mathematics. I customized the questions for the various stakeholder groups. Drafting and revising the questions for the interviews was an iterative process with input from my professor and writing cohort. The interview questions were checked for alignment with the research questions, reviewed by a former principal for validity, and then rehearsed. Confidentiality was maintained by assigning a randomly generated number to the participant using Gigacalulator.com. The transcript was identified by the participant's number. A secure crosswalk document matched the participant's name and number. The complete set of interview questions

for all participants is in Appendix A: Instruments. An example, showing the questions posed to CGI principals, is included below:

Principal Interview Questions:

1. What is the District's picture of high-quality mathematics instruction in pre-school through elementary school?
2. How is the District supporting that vision?
3. What are your strategies this year for improving mathematics instruction?
4. What challenges are you facing?
5. How often are you observing math teachers?
6. What do you look for to see if the mathematics instruction is aligned with CGI?
7. How different are the teachers' views of CGI in your school and how do you know?
8. What are your expectations regarding differentiation for students?
9. How would you rate, on a scale of 1-10 with ten being the highest, the quality of math teaching in your school?
10. What changes have you seen in math instruction from when you started the CGI partnership until now?
11. To what do you attribute the changes?
12. What special support does your school provide for CGI?
13. How would you describe the role of the CGI teacher-leader?
14. What are your expectations for the types of support that the CGI teacher-leader should provide teachers and how do you communicate your expectations to them?
15. How do you know if the CGI teacher-leader is providing the types of support you just mentioned, and if the support is not being provided what do you do?
16. How would you characterize your working relationship with the CGI teacher-leader?
17. How do you support the work of the CGI teacher-leader?
18. What difficulties might you have had in working with a CGI teacher-leader, and what happened?
19. What CGI professional learning have you participated in during your time as a CGI principal?
20. Given your experiences with CGI, what do you think it would take to scale CGI to the whole district?
21. What advice do you have for new CGI principals?
22. Who do you go to for math support, and would you recommend that person as a CGI teacher-leader?

Interview Process

Before beginning the interview, participants were asked to read and sign a district-approved consent form adapted from Boston University. Thirty-minute in-person or virtual interviews were scheduled during June-July 2023. The in-person interviews were conducted at a

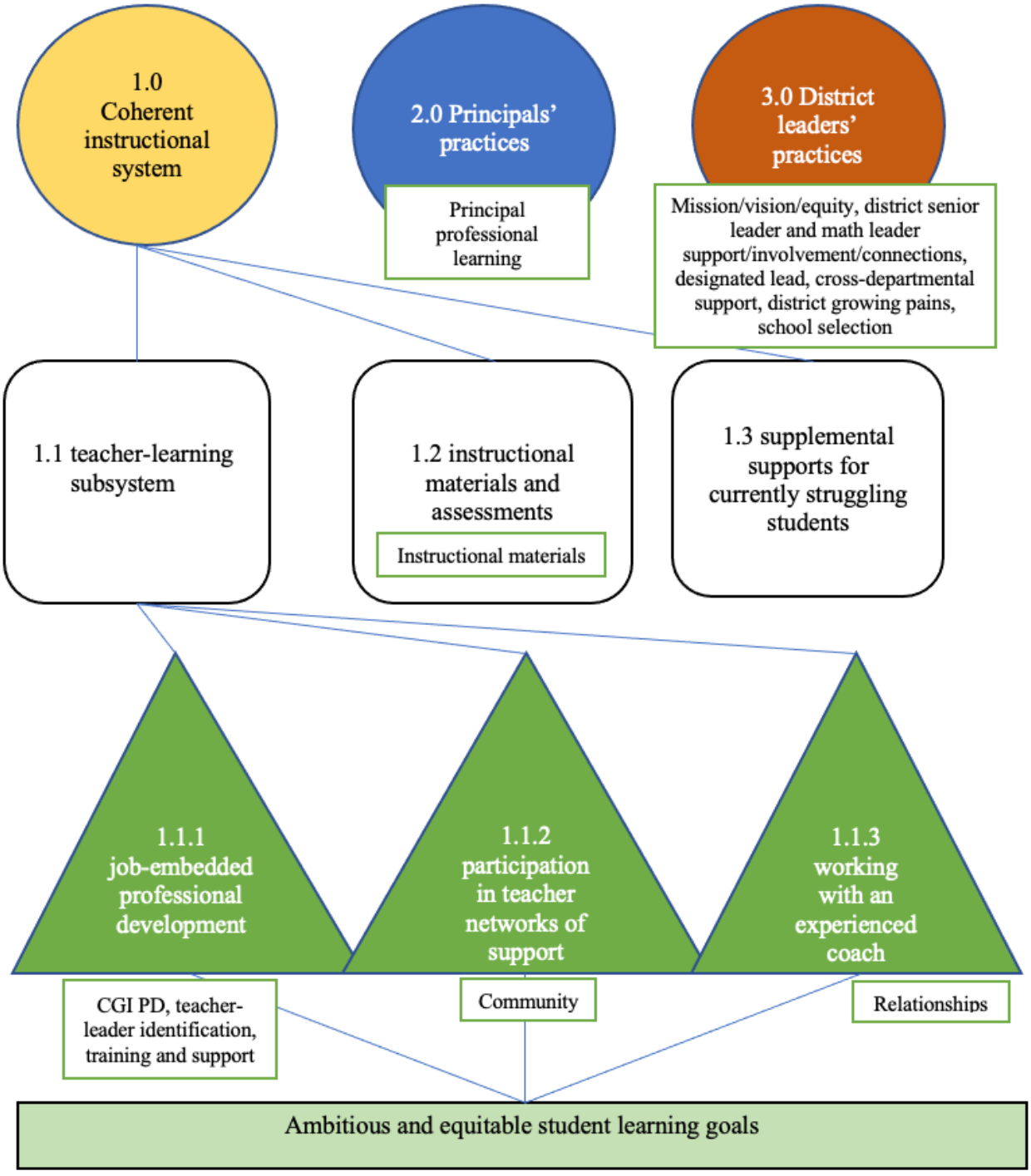
variety of locations, including school sites, District offices, and private homes. In-person interviews were recorded on a cell phone, uploaded and transcribed using Rev.com. Transcripts were checked and edited for accuracy. The virtual interviews were recorded and transcribed on Zoom, with the transcripts checked and edited for accuracy. Recordings were deleted after the transcript was produced. All participants were presented the opportunity to review their transcripts, which resulted in some additional edits or notes to some transcripts. All transcripts and consent forms were uploaded to a secure Vanderbilt University Box file with a crosswalk document for confidential information.

Interview Analysis Process

Transcripts were uploaded, coded, and processed by the investigator, using Dedoose software for analysis to assist with pattern recognition, revealing common themes for consideration in addressing the problem of practice. The interview data was analyzed using deductive coding, coming from the theoretical frameworks, with 31 codes. The main, or parent code, was further broken down to include a sub-code, or child code, when I encountered responses that needed more nuanced designations. I started doing multiple reads of the data, counting the number of entries within each code. Then I grouped codes together to show their alignment with the Theory of Action, see Figure 3, below. The codes are in rectangular boxes, positioned below each of the elements of the Theory of Action to show where they fit in the schema. Using "A Sample Process for Developing Themes," by Ravitch and Carl (2021, p. 284), I began to look for patterns, grouping and combining codes and finding emerging themes. I reviewed the research questions and the theoretical frameworks to see how the emerging themes fit with a broad picture of the data. I wrote memos to record my growing understandings.

Figure 3

Graphic of the Theory of Action with Grouped Codes



Interview Results

The interview results are displayed in Table 3 in Appendix C. The parent and child codes, if used, are displayed on the left, followed by the number of responses for that code, then the sample quote(s). The far-right column shows the themes in which the coded sections were eventually placed. These themes will be discussed in more detail in the Findings section. An excerpt of Table 3 is included below to show an example of the layout.

Table 3 Excerpt

Codes for Interviews

Parent Code	Child Code	Number of Responses	Quotes	Emerging Themes
Principal's practices	General	109	"I had to be unafraid to bust through a lot of prior district protocols on how we were gonna spend money and how I was gonna pay the teachers to participate." "I knew that teachers needed multiple opportunities to practice what they had learned. …that was brought back to the next professional development. So, we just kept cycling through… I walked into the classroom, and I could see that people had, the teachers had internalized it and were doing it."	Support
Principal's practices	Principal's expectations of teacher leaders	11	"The principal expects me to be a thought partner to new teachers of CGI and new teachers in general, to be a point person that people can ask questions of, to co-teach lessons and provide PD to answer any questions she has and to look at our data and make sense of it."	Support
Selecting CGI schools		6	"She's been doing the groundwork, talking to principals about what does this partnership entail? What is it, what? What were you supposed to be doing prior to entering the partnership? And then after, right? So, I think, Ha! We've seen what a difference, right, when we go into the partnership that schools are ready."	Choice

Focus Group Participants Sampling and Recruitment Process

The teacher-leader focus group consisted of an additional nine District teacher-leaders. The site for the focus group was selected because it offered a four-day CGI professional learning workshop for new teacher-leaders in June 2023, providing the largest number of potential participants in one location. The geographical location of the focus group was in the north region, increasing the number of participants representing that area. Experienced District teacher-leaders assigned by Math Project to facilitate the professional learning at the site were invited to participate through a personal verbal invitation and the focus group was conducted during the lunch break when the teacher-leaders were onsite.

Focus Group Protocol Development

The focus group questions were informed by the Communities of Practice conceptual framework and the Theory of Action framework. The questions focused on the highlights and challenges of the CGI work, roles and responsibilities, the professional learning and support received, and the District's current plan for high-quality math instruction. As with the interview questions, drafting and revising the questions was an iterative process with input from my professor and writing cohort, and the questions were reviewed by a former principal for validity. Confidentiality was maintained by assigning a random letter to each participant, and the letter was used in the transcript and secure crosswalk document. Below are the focus group questions:

Teacher-Leader Focus Group Questions:

1. How did you become a CGI teacher-leader?
2. What is one the highlights of being a CGI teacher-leader?
3. What is one of the challenges of being a CGI teacher-leader?
4. Please describe what the principal of your assigned school expects of you as a CGI teacher-leader.
5. How does your assigned principal support your CGI work?
6. How have the Math Project Saturday learning sessions and monthly small groups supported your teacher-leader work?

7. What are some of the ways that Math Project can additionally support teacher-leaders?
8. Have you attended any District sponsored professional learning for teacher-leaders in any curriculum area? How have you connected that with your work?
9. What are the ways that the District can additionally support teachers in becoming teacher-leaders?
10. What do you think is needed to take CGI to scale in the District, meaning that every school is a CGI school?

Focus Group Process

First, the participants signed the District-approved consent form. The protocol for the focus group was one I have dubbed 'the equal voice protocol,' that provides time for a written reflection before a group discussion. Participants were given a random letter for identification. Participants wrote their individual answers to each of the numbered questions on separate square post-it notes, along with their identifying letter. They then placed the post-it notes on the poster with the matching question that was displayed on the walls of the room. The moderator selected a question, read the written responses, then opened the discussion to the group. Questions are discussed individually, as time allowed. The full focus group protocol is shown in Appendix 7. The discussion was recorded on cell phone and uploaded and transcribed using Rev.com.

Focus Group Analysis Process

The focus group analysis process began like the interview process, in that transcripts were uploaded, coded and processed by the investigator using Dedoose software to assist with pattern recognition. The focus group data was initially analyzed using the same deductive coding used for the interviews, coming from the theoretical frameworks. I started by doing multiple reads of the data, counting the number of entries within each code. I also looked at the focus group data for Project Question 2 using a SWOT (strength, weakness, opportunities, threats) analysis. A SWOT analysis is commonly used to reveal the balance of internal and external forces facing an organization to inform decisions about an initiative. The process of

identifying elements in each of the four areas can be used both to collect data and to analyze data that has already been collected. I had not originally intended to use a SWOT analysis, but I was introduced to the method and thought it might provide an interesting lens by which to view the present state of Math Project in the Partnership. Because I was using the SWOT analysis after the data collection, I did not specifically ask the focus group to respond to those designations. Instead, I coded them from the data. I followed the matrix outlined in the University of Kansas/Center for Community Health and Development Community's Tool Box (Renault, 2006). Prompting questions lead to listing specific designations of internal 'strengths' and 'weaknesses' and external 'opportunities' and 'threats.' The SWOT analysis can then be viewed as comparing various pairings of the elements, for example, opportunities and weaknesses, to develop strategies for recommended actions.

Focus Group Results

The responses to the focus group questions are shown in Table 4, below. Reading from left to right, on the left is the parent code, followed by the child code, if used, then the number of responses, followed by a sample quotation. The theme column shows the three themes of support, choice, and relationships for project questions 1 and 3, and shows the SWOT analysis themes of strengths, weaknesses, opportunities, and threats for project question 2. I compared the focus group responses and interview responses and found alignment in the three theme areas. Full results from the SWOT analysis are included in Table 5 in the Findings section.

Table 4

Content Data Analysis: Focus Group

Parent Code	Child Code	Number	Quotes	Themes
Support for teacher-leaders		18	"I'm able to grow as a professional in my own understanding of learning math, being surrounded by others doing the same work, and who encourage or inspire me as a highlight."	Support
Instructional materials		2	"It was a little bit inconsistent to where I asked, "Are you allowing for flexibility with the curriculum? Are you allowing for the flexibility of CGI?" "Yes, absolutely." And then when I go to the classrooms, the teacher said, "No, we have to go page by page." And so, there was kind of an, a disconnect between what the principal showed and what the principal told her staff."	Choice
Networks of support	Community of Practice	4	"The collaborative nature reinvigorates my teaching and helps me stay focused on finding joy in the kids. And one of the highlights of being a teacher leader is being able to confirm my learning and being able to be with my CGI family."	Relationships
			Roles, coaching, number of meetings	
Working with a coach		3		Relationships

Parent Code	Child Code	Number	Quotes	Themes
University practices		3	"Collaborating with CGI folks, people who believe in math teaching like I do, growing my craft with like-minded professionals that share in their instructional beliefs and philosophies of education." "great job," variety of support structures	Strengths
Teacher-leader identification		2	"…oftentimes we're asked to step into instructional leadership roles because potential is seen in us, but we're not necessarily taught how to coach."	Weaknesses
Teacher-leader training	Teacher-leader responsibilities	9	"We spend so much time analyzing student thinking, but we've never really had an opportunity to analyze facilitator moves. And to spend time with one another to talk about what was beautiful about that or why, what was the intent behind that move? And so, we've studied our craft working with kids, but we haven't studied our craft working with one another."	Opportunities
Assessment		1	"The district needs to stop looking at data superficially and start looking at growth over time."	Threats
Teacher participation		20	"These trainings are done in the summer. Not everyone gets to be able to do them for whatever reason. But maybe having them throughout the school year	Support

Parent Code	Child Code	Number	Quotes	Themes
Selecting CGI schools		2	"Again, I would caution rushing all schools to join unless there's real commitment."	Choice
Networks of support	Teacher-leader small group	4	"We can be supported by bringing us all together more often to share ideas and learn from each other."	Relationships

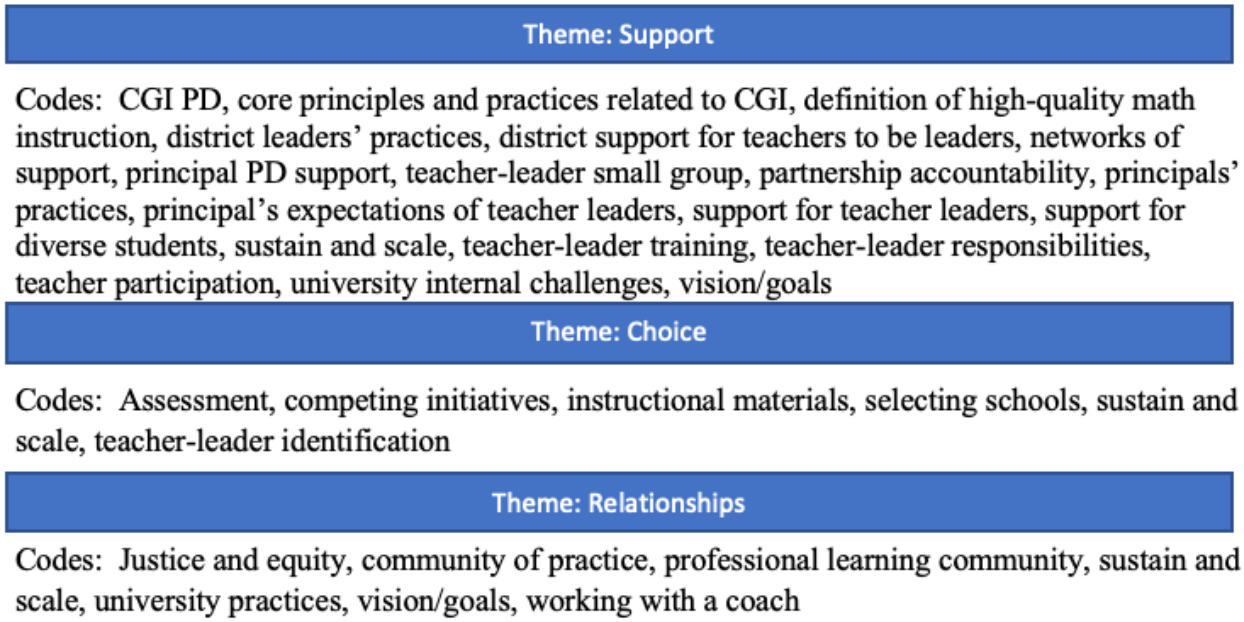
Combining Interview and Focus Group Results

Triangulating data from the two data collection methods, the interviews and the focus group, supports validity. I coded the interview data first, and then coded the focus group data to test the findings from the interviews and grouped quotes for each code from both interviews and the focus group, resulting in about a thousand entries. Participant validation was provided by participants voluntarily reviewing their transcripts. My structured reflexivity practices included memos, notes post-interview, and my on-going journal.

Subsequent read-throughs and grouping of the coding continued, with data filling three buckets of emerging themes, displayed in Figure 4 below. The themes of Support, Choice and Relationship are in the blue boxes, with the supporting codes underneath each box. These themes echo the literature in which Carpenter and Franke cite necessary elements that support scaling up, including relationships and teachers choosing to participate, (Glennan et al., 1995, pp. 73-74).

Figure 4

Emerging Themes Organizing Figures



These themes also align with Lave and Wenger's Community of Practice, with an emphasis on the role of the community in the movement of teacher-leader 'newcomers' to 'old-timers,' as the more experienced 'other' provides the relationship and support needed to move from the periphery of participation into the center of participation. The role of choice is highlighted in how the newcomer selects 'legitimate peripheral participation' as an entry point into the community of practice.

Findings

Over the past seven years, three factors that supported sustaining and scaling of the CGI Partnership in the XX District were 1) Ongoing support for the initiative 2) Opportunities for choice and flexibility in implementation and 2) A focus on building and maintaining strong relationships to support the implementation of the initiative. Currently, the CGI Partnership with XX District is at an inflection point. Sustaining and scaling the CGI Partnership into the future

will require ongoing collaboration and prioritization of the CGI effort as the District internalizes CGI into its policies and practices.

Project Question 1

How has the CGI Partnership sustained and scaled to date?

Finding #1

The three factors that supported the sustaining and scaling of the CGI Partnership in XX District were 1) Ongoing support for the initiative 2) Opportunities for choice and flexibility in implementation and 2) A focus on building and maintaining strong relationships to support the implementation of the initiative. I'll discuss each theme specifically below.

Theme: Support

When participants talked about examples of supports for the CGI initiative, they described three types of supports:

1) Partnership (Math Project) supports
2) District leadership supports
3) Supports for principal learning

The theme of support for the initiative begins with an aligned mission/vision, which forms the basis for the work, and then extends to each participant group.

Aligned Mission/Vision

An aligned mission/vision with a focus on equity was critical at the beginning of the Partnership. Discussions of equity were included in CGI professional learning sessions at the beginning of the Project and are central to the Partnership work, according to teacher-leaders. District math leaders reported supporting a unified vision across the regions when the Partnership initially began with a vision of student-centered classrooms with an emphasis on

student thinking and discourse, supported with the tools of number talks and three-phase problem solving lessons.

Equity, described in CGI practice as using an asset-based lens by which the teacher views students and their work, highlighting what students can do, was cited by participants as a central focus of the CGI Partnership vision. There is agreement between the District and Math Project about emphasizing equity. The District supports equity-driven instruction. An example of the impact of equity in influencing belief systems can be seen in the reflections of teacher-leaders. A teacher-leader valued the mathematical identity work that is part of equity-based instruction with students in CGI, "…it is helping kids to see themselves as mathematicians, to not be afraid about math, to not be stressed out by it."

District Senior Leadership Support

Aligned support across District leadership was cited by participants as critical for sustaining and scaling the initiative. As a participant shared, "The bottom line, leadership matters, period." And another one echoed, "When all of the leadership players are aligned, it's transformative." A math leader shared that the CAO, regional superintendents and directors attended the CGI professional learning and tours at school sites, participating in discussion groups with principals from visiting schools. The District central office math lead had been the designated CGI point of contact, interfacing with the regional and central office math leadership. "Having someone who was about the work and about doing the work in partnership with us, I think that's what led to success," according to Math Project leadership, "This work really needs someone there shepherding it in the day-to-day."

District Math Leaders' Involvement and Support of CGI

District math leaders reported being actively engaged in the early CGI action research project, participating in the design of online courses, and facilitating and participating in videotaped sessions of CGI Leadership Days. A Math Project leader talked about collaborating with District math leaders on the approach they took together in the early action research,

> ...we're going to go into schools, we're going to try some different professional development models out, and kind of see how the work gets picked up. Let's orient ourselves to kids' thinking, create opportunities for us to notice the details of students' thinking.

District math leaders reported initially integrating CGI philosophy into their math professional learning within their region. District math leaders recommended schools to join the CGI initiative and recommended teachers to become teacher-leaders, often pairing both. "They (Math Project) really need to rely on us to recommend people. I have tried to do a very strategic job of trying to align the right teacher-leader with the right school," according to a District math leader.

District Cross-Departmental Support

A District math leader shared that CGI was incorporated into District cross-department projects to increase awareness of CGI in other District offices, including a three-year improvement science project with the District's equity office and the California Office to Reform Education (CORE), saying, "I feel like we definitely need more of that (CORE), more of that deep work…because the more the people who learn about the intersections between these things, the better because they will believe, and they'll want to implement it." This also built

connections with CGI and District senior leadership as they participated in the regular CORE meetings.

Supports for Principal Professional Learning

Participating principals cited many opportunities for ongoing CGI learning and support. For example, CGI principals were invited and expected to attend Saturday Leadership Days, three times a year. These sessions were led by Dr. Megan Franke and videotaped for online courses by the District. “By listening to other principals, I had the opportunity to understand, I gained the confidence that I was on the right track…to discuss the ‘whys’ of what we were doing,” according to a CGI principal, continuing, “I felt emboldened to go back to the school and have conversations.” CGI principals were invited to attend thirty-minute Zoom calls with Dr. Franke and two experienced CGI principals, scheduled for the week their school received professional learning. One principal interviewed shared, "I participated every week for years to demonstrate my interest...that I was committed.” District-wide principal training included Dr. Franke’s presentations at the annual principal professional organization meetings. “The key is to invite. You have to invite even those of us that are already embedded in the work,” said one principal, indicating that the CGI principal learning is ongoing to effectively sustain the CGI work at their school site.

Theme: Choice

Another theme that emerged as critical to the CGI initiative sustaining and scaling within the XX District relates to the presence of choice. The areas of choice that made a positive difference to participants included the choice to participate in the initiative, choice related to the use of instructional materials, choice in the types of professional development, and choice regarding teacher-leader identification and training. In each of these areas, participants described

how having choices allowed them to find entry points into CGI that worked for them and their site, allowing CGI to take root. According to a Math Project leader, "When it's a school site's decision (to participate in CGI), when it's the principal's, really buying into the work, that impacts how deep the work can go and how sustainable it is at the school site."

CGI School Selection

Originally, CGI school selection was optional and competitive, according to a Math Project participant. School sites applied to be chosen as a CGI school, each school receiving a five-figure investment in professional learning support from the Math Project. CGI principals said they demonstrated readiness to participate with existing systems of support in place, including number talks, three-phase problem solving, funding support for substitutes, and teacher support through professional learning communities. Because participation in the CGI initiative was voluntary and selective, the principals whose schools were chosen were excited about and invested in participating. A principal described how motivating it was when their school was selected to be a CGI school, "Really letting teachers choose a practice and study it fully with the best experts in the field and reading and seeing what's happening in other districts and within our own district really empowers teachers to be their best."

Instructional Materials

Having choice in the use of instructional materials made it easier for schools to implement CGI, many participants shared. For example, teacher-leaders discussed their freedom to create their own story problems and number sense activities to meet the needs of the students. One teacher-leader said, "How can we leverage this work, so that kids can really be engaged in problem-solving as opposed to marching to curriculum that doesn't make sense to them." Teacher-leaders reported that while the District provided curriculum to the schools it was

optional to use it as the District's mathematics central office had a philosophy dating back more than twenty years of "We teach the standards, not a curriculum."

CGI Professional Learning

Schools having choice in the type and format of the professional learning they receive impacts the ability of the initiative to sustain and scale. According to a Math Project leader, Math Project initially provided a variety of high-quality teacher professional learning models to match the number of years that the school was involved in implementing CGI, with schools selecting an annual focus on either number sense reasoning routines or problem-solving, and which grade levels would be involved. This support during the school year was supplemented with optional Summer Institutes and District-created online modules featuring videos with Dr. Franke. Math Project participants share that the CGI professional learning became even more customized to the school sites as the years progressed, with principals planning with the CGI teacher-leader for professional development in specific areas to address school needs

Teacher-Leader Identification, Training, and Support

The role of choice in identifying, selecting, and training teacher-leaders, the human capital, to lead the CGI initiative at school sites is directly connected to the ability of the CGI Partnership to sustain and scale. The number of schools participating in the Partnership is limited by the number of teacher-leaders to go to the school sites. "We really depended upon the local (region) to identify schools, identify teachers that we could pull into the teacher-leader pipeline," said a Math Project participant. Recommendations for teacher-leaders came from both the District and Math Project, with a math leader describing what they look for in a candidate, "Are they curious, do they have humility? How would they fit in our community? If they have some CGI knowledge." A principal described what they look for, "The fact that they understand the

work, they've been a part of the practice." Another principal shared that they felt a responsibility to develop leadership in their teachers, "We make sure they get the right training and opportunity at our school first, and then they can go on to other schools."

Theme: Relationships

The final theme that emerged related to program characteristics that led to the initiative sustaining and scaling was relationships. Study participants described the importance of two different sets of relationships that were key, the relationships between Math Project and the District, and Math Project and the community of practice.

Math Project and the District

When the Partnership began and for the first several years, the District math leaders worked and learned together with the senior leadership. That higher level of participation supported the Partnership's continued growth, but as participation ebbed during COVID, so did awareness of CGI. The varying levels of CGI support has created animosity within one region, with a need to repair relationships according to several math leaders. As a leader noticed, "Where the culture of leadership and identity structures are clear, and the relationship are strong…those (regions) seem to be in the work, as opposed to a (region) who might be more insular." Building a relationship is a first step, but it is also in every step along the way as relationships are revisited, repaired, and renewed. "We lead from a place of relationships," according to a Math Project representative, indicating that sustainability and scalability are both influenced by the quality of the relationships.

Math Project and the Community of Practice

The broader community of practice includes parents, board members, math professional organizations and the national CGI community. Parents were included in CGI information

sessions through the District's Office of Student, Family and Community Engagement, individual schools hosted family nights and parent workshops. A recent presentation to the school board has elevated the Partnership to reporting about their CGI work at that level, with a math leader remembering, "I've gone to the board… and they all said, 'How do we broaden and expand this work?' Math Project leaders are featured speakers at math professional organizations on both a state and national level. Sharing the CGI work with the greater community promotes sustaining and scaling the initiative by increasing awareness of the link between research and practice.

Project Question 2

What is the present status of Math Project within the CGI Partnership?

Finding #2:

The data reveal that this is an inflection point for Math Project within the CGI Partnership with XX District, as threats to Math Project out-weigh its strengths in the present. These threats are primarily due to District restructuring and personnel changes, resulting in senior leadership positions in both the central and regional offices held by those with a lack of knowledge of CGI.

SWOT Analysis

The present status of Math Project within the CGI Partnership is addressed next. Data from the focus group, combined with the interview data, led to the development of Table 5, the Math Project SWOT Analysis. I viewed strengths and weaknesses as internal to the organization, with topics that were within the nexus of control for Math Project. Opportunities and threats I viewed as external to the organization, with topics that were guided by outside forces, in which the organization was in a position to be reactive. The two boxes at the top show Math Project's

internal strengths and weaknesses. The two boxes at the bottom show Math Project's external opportunities and threats. This analysis informs PQ2, showing where Math Project is at the present time.

Table 5

Math Project SWOT Analysis

Internal Strengths	**Internal Weaknesses**
• CGI has a base of strong support, rooted in over 30-years of research • Math Project work is led by Dr. Megan Franke, one of the founders of CGI • Currently in 250 elementary schools and Early Education Centers in the District and growing • Entering 8th year of Partnership • Emphasize justice and equity theme • Collaborative and supportive community with a strong emphasis on trust, helping each other, and the sharing of ideas and resources • An ability to pivot quickly to meet the needs of the District • Support for teacher-leaders, principals • Choice in PD, grade-levels • Relationships with teacher-leaders	• Shortage of teacher-leaders to do the CGI professional development • Negative association with CGI in one District region • Lack of relationships with District cross-departmental units • Lack of communication strategy, social media presence, updated website • Need to address the growing pains of staff expansion, billing operations • District leader participation has decreased
Seize External Opportunities	**Mitigate External Threats**
• Partnering with District regions allows for differentiation and support for those schools that choose to participate • Leverage CGI experienced practitioners in leadership positions throughout the District • Promote CGI through the community with media coverage, conferences, trade publications • Build CGI resources, video library for teachers	• Change in Superintendent has led to restructuring of regions and personnel • The District senior leader overseeing the Partnership for the last five years recently left the position • Lack of awareness and understanding of CGI among District administrators and leaders • New District mandate: Core curriculum to be taught with fidelity • New District emphasis on cycles of inquiry • Lowest performing 100 schools now mandated to be CGI schools • School budget support for CGI varies • There is no regional-based professional learning support for CGI • Emphasis on improving students' standardized test scores

Strengths. Math Project's strengths include a recognition of the leadership of Dr. Megan Franke, whose pioneering work in over 30 years of CGI research has led to the eight years of this ongoing Partnership, and a CGI presence in 250 elementary schools and early education centers in this one District alone. The Math Project community is strong in its support of justice and equity and is actively engaged in changing the way the world thinks about math. It has a strong collaborative community; and that supports the ability to pivot quickly to meet the needs of the District. On-going professional learning support is provided to teacher-leaders and principals to lead the CGI work in the schools. "I hope it makes them feel empowered to make decisions that are right for the young people in front of them," according to a teacher-leader. Schools are provided with choices on areas in which to focus the professional learning and at which grade levels. And intentional relationships are fostered with the teacher-leaders and Math Project coaches, and with the principals and Math Project leaders to strengthen the individuals' commitments to the CGI work. As a principal shared about the successful CGI experience at their school site, "It takes your community."

Weaknesses. The internal weaknesses of Math Project in part stem from a decision made by the District to restrict the number of teacher-leaders eligible to support the CGI Partnership in the 2022-2023 school year, as the District hired these talented, CGI-trained people for a new out-of-the-classroom position that had funding restrictions. If there are not enough teacher-leaders, it's a problem, according to a Math Project participant. And there was a problem in the last school year. According to Math Project, "We had a teacher-leader shortage and that had an impact in the support we were able to provide to schools." By removing approximately 100 out-of-the-classroom teacher-leaders from the Math Project teacher-leader ranks, the District unintentionally hampered the CGI work. Instead of cutting back on the number of schools to be

supported in CGI, Math Project released partially trained teacher-leaders to facilitate the professional learning at school sites, without enough Math Project coaching support, resulting in a lesser-quality professional learning experience at some school sites. These principals raised concerns. This resulted in a negative CGI school experience, mostly centered in one District region. Math Project shared that the District is now requiring that new CGI schools each nominate two teacher-candidates to begin with a year of teacher-leader preparation training to increase the numbers of future teacher-leaders.

Other weaknesses include a lack of relationships with District cross-departmental units, and a lack of a communication strategy, with a District math leader describing where they get their math instructional leadership ideas, "I do a lot of Twitter and a lot of podcasts," which highlights the need for Math Project to develop a social media presence and updated website.

The growing pains associated with Math Project staff include the recent unionization of some positions at the university, communication protocols, and billing issues for teacher-leader consultants, as the staff grapples with meeting the needs of the growing number of schools. "We need to address our structural issues first before we do any kind of expansion," says a Math Project staffer. Says another staffer, "The system that we're in prevents us from moving quickly."

And the final area of weakness is that District leader participation has decreased over time, with a Math Project leader sharing their perception, "It's so important for us to be partners with the district leadership, so that we are speaking the same message, so that when the teachers go to training, they're not hearing two versions of 'how do we do mathematics."

Opportunities. Seizing external opportunities, Math Project's positive experience with the District's west regional office in conducting four weeks of summer professional learning is

leading to a possibility of additional contracts with other District regions. As CGI practitioners move into leadership roles throughout the District, there is an opportunity to capitalize on their expertise and connections, with a District math leader saying, “We are in that place where we need to lean into administration, we need to lean into systems.” A Math Project staff member shared, “If we can just keep this movement and the ripples spreading out, I think that we’re going to just make our schools a better place for kids.” Additionally, Math Project may consider increasing its presence in the greater community through media coverage, professional conferences, and trade publications, and by building up the CGI resources, creating and utilizing video, both for instruction and as a resource for teachers. A teacher-leader talked about introducing video at the CGI school site for the students to explain their problem-solving thinking in a way that can be shared with the teachers through a technology platform, “The kids are like little You-tubers, ‘First I did this, then I did this.’ And I was just amazed by some of the stuff I’m hearing.”

Threats. Mitigating external threats is more difficult. The last change of superintendent, and the resulting restructuring and personnel changes, has elevated a senior leadership with a lack of awareness and understanding of CGI. The District central office senior leader who supervised the Partnership for five years recently moved to a regional position. With all of the changes in leadership, not one District person remains of the original senior leadership team. A District math leader said, “If the regional superintendent doesn’t want to push for this initiative to happen and to be observed and to be supported and to come to life in the school sites, then their AIs (Administrators of Instruction) cannot necessarily make that happen on their own.” The District has changed its view on curriculum fidelity in math, with a Math Project leader sharing that the

District had requested that core curriculum be used with fidelity in the 2023-2024 school year, which may potentially impact CGI's sustainability.

The District has placed a new emphasis on cycles of inquiry for teachers, requiring Math Project to integrate inquiry cycles into the CGI coaching at school sites. "Over time we've developed into a work group model… we're going to bring student work to every session, we're going to talk about it…what does this mean, where are we going to next?" shared one participant in describing an inquiry cycle. Cycles of inquiry can be perceived to be a threat if the goals are set by the administration, rather than from the teachers.

Another threat is that schools are now assigned to be CGI schools. "Some (regions) were starting to have different ideas of which school should be selected, going from having had schools who had some understanding of CGI…to schools that were now coming in cold," according to a Math Project leader, continuing, "We've seen the difference, right, when we go into the Partnership that schools are ready." With more schools assigned to be CGI schools, one principal commented, "If they (schools) feel forced, even if it's sound teaching, you might get resistance." According to one participant, "It became less about building from existing momentum and more about who do we need to fix." The lowest 100 performing schools have now been mandated to be CGI schools, instead of allowing the schools a choice to participate. Lack of choice in school site selection may create resistance that impacts scaling moving forward.

Other threats include a recognition that support for CGI varies, both at the school level and the regional level, school budgets may or may not include substitute release coverage or payments for teachers to CGI attend professional learning, and District math leaders report that while there is some alignment across the regions around discourse and problem-solving, there is

no regional-based professional learning support for CGI. A math leader said the District, "Needs a CGI plan for implementation, not just a CGI plan to provide professional development…district-wide systems would be really helpful so that every region is focusing on CGI in some way, shape or form." Last year, the District senior leadership placed a large emphasis on improving students' standardized test scores. This is not a priority for the Math Project in the short term.

These SWOT elements serve to paint a picture of Math Project in the moment. The SWOT analysis revealed that outside threats are off-setting internal strengths. Math Project is operating from a position of strength, recognizing and addressing their internal weaknesses, like staffing and training, and moving to seize external opportunities, by adding cycles of inquiry and supporting the schools selected by the District. However, the District senior and math leadership have made the Math Project external threats more difficult to overcome by not integrating CGI into ongoing District work or organizational learning. Instead, it might be perceived that the District has treated Math Project as an outside vendor, relying on them for providing staffing and content for teacher professional learning, but without integrating CGI into the District's central office and regional work, goals, or long-term plans. According to a District senior leader, this is a time to re-evaluate the Partnership,

> We should not think that the project is not working because we're not seeing the kinds of results that we would expect.... There are always going to be some missteps, changes in leadership, changes in vision. What we need to do is a reevaluation of where we are with the initiative. It is in over 200 schools now. We don't want to let that go. We want to make sure that we maintain what's already there. Certainly, think about ways that we can grow it, and then moving forward, how can we be more thoughtful in the

implementation of the work so that it does have the kinds of impacts that we know are possible.

Project Question 3

What is needed to sustain and scale the CGI Partnership in its eighth year and beyond?

Finding #3

Sustaining and scaling the CGI Partnership into the future will require ongoing collaboration and prioritization of the CGI effort as the District internalizes the CGI work into its policies and practices.

When participants talked about sustaining and scaling the CGI Partnership in XX District in the future, they returned to the three themes that have provided sustainability and scaling to date, Support, Choice and Relationship. Analysis of participants' responses shows that when support, choice, and relationships are not present, scaling is threatened. Participants said support is diminished when District senior leaders do not know enough about CGI to actively engage in the work, and the central and region offices withdraw District math leaders' support from integrating CGI into District work. Choice is eliminated when the District mandates teaching the curriculum with fidelity, and when schools are assigned to participate in CGI based on low-performing standardized test scores. Partnership relationships deteriorate when there is no designated District CGI contact in a managerial position for many months to handle the day-to-day ongoing operations. A participant shared, "If (Math Project) goes away, how does (the District) continue the work?"

Theme: Support

Support for future sustaining and scaling includes building on an aligned mission/vision with a focus on equity, increased support from District senior leadership, including addressing

the District's "growing pains," and coordination between the District's various offices in internalizing the CGI work into the District's practices and policies.

According to participants, the District and Math Project don't appear to have the same goals in mind. The District's vision is most often expressed as one of numbers, based on the annual state testing, moving more students to the designation of 'Proficient.' Math Project's vision is to center instruction on children's mathematical thinking, with a goal of "learning with understanding" (Carpenter et al., 2015, pp. 184-185). A senior District leader's perspective is,

> We want every child to love math and to feel capable and curious about the mathematical world around them. There is a 'what' of teaching math, which is the content standards through the state math framework...The framework is our guide. The programs are a resource. … CGI is a framework-aligned approach, so CGI is the 'how,' the set of principled ideas that guide teachers...thinking about the 'what' and the 'how,' creating that plan and then using data to measure the impact of that plan.

Another District leader shares that it is all about the test scores, "There is more emphasis on getting these 40 points up...whatever we can do to make that happen and everything else is secondary." Highlighting justice and equity in the math classroom is an area of agreement on which to build in the future.

The District's changes in personnel and structure due to new superintendents has resulted in 'growing pains,' according to participants. District math leaders highlight a need for senior leadership to visit CGI school sites District-wide for instructional rounds to understand more about what CGI means and find value in it. "Administrators of Instruction (AIs) need to go to other districts and other states and places where CGI is blooming...we get very insulated... and we don't do a very good job of looking out and learning from the rest of the country or the rest of

the world," says a District math leader. "Our leaders at the executive level, they don't either have the time or sometimes the patience to devote to that learning," echoes another. Other participants continue, "I don't know if enough attention has been brought to educate administrators. I don't know if they could tell you what CGI is," says one, and another, "If they don't know, then they can't lead…that's the big disconnect."

CGI principals ask for future professional learning support for their directors, with one principal voicing, "If our directors could have ...a little PD (professional development) series around CGI over the course of a year, that would really help them develop their understanding over time.... just kind of connect the dots.... nobody's connecting all the pieces together." According to another principal, "It (new initiatives) gets diluted and weak, because 'riding on the winds of change,' if I can be poetic, is scary; and it's fraught with 'who's going to take responsibility?' if it doesn't work out." Another principal continues, "Which is why change is so slow, (leadership) people don't have any knowledge of what's going on in the schools." A District senior leader says, "My goal is to set our principals up, and I know this is shared in the four regions, set up our principals to be that lead learner with their teachers, to sit alongside their teachers, study the work that they're engaged in, in their classrooms."

Regional support for CGI is cited as a future consideration by participants. "It hasn't felt like CGI was a priority. It felt like they (the regions) have their secret sauce, and CGI doesn't quite fit in with that," says a Math Project leader, continuing, "We do it this way, and we don't really want you here. But since you're here, we'll find some teachers that would like to work with you." A regional math leader shares that they are very careful in how they talk about the work,

> When you say CGI, I'm very careful not to use those three letters. We call it 'problem-solving.' We call it 'listening to students' ideas.' We call it the definition of what CGI is without saying "CGI," because it really is a bad word...I still use CGI, once they know and I've built relationships with schools and principals, then I bring in the three letters...but if I start with that, it can be dangerous.

Participants ask for better coordination between District Offices in the future. We need, "one voice, one message," according to a participant. Competing initiatives are highlighted as a concern. The ever-growing variety of different programs, curriculum and approaches create conflicts for instructional staff and confusion for teachers about what to prioritize. According to a Math Project leader, teachers say, "I already have a kit. I already have a curriculum. Where is there space for CGI?" A leader continues, "I've noticed that a lot of schools tend to be over-resourced, and by that, I mean there're so many different initiatives and things going on that it's overwhelming." As another leader shared, "There're a lot of competing initiatives against CGI."

There is concern expressed by teacher-leaders about misalignment and validity of district-wide assessments, that measure skills rather than conceptual understanding, and concerns about the superficial analysis of quarterly and annual assessment data. "It feels like there's 'leadership through fear," according to a math leader, when it comes to the District's emphasis on test scores and monthly "Data Talks" with the superintendent and principals of low-performing schools. Analysis of the existing data from the CGI pre- and post-assessments has not been a priority for the District, nor has it been widely shared, something that District math leaders are asking for. A District senior leader prompts for a better way of assessing CGI progress in the future and asks, "What we could do better is to think about how to measure the impact in ways that are aligned to implementation, where we know that the coach, and the

principal, and the district, and Math Project have been really well aligned. What were the differences and outcomes for students there versus schools where that's not happened?"

Future work in fostering CGI pedagogy provides opportunities for Math Project to partner with other District offices, including special education, multicultural, technology, access/equity, and the micro-credentialing program, according to a District math leader. A senior District leader comments, "I don't think we have cross-departmental conversations in the ways that we could. And I think that's an area of growth for us."

Theme: Choice

Having choice in schools being CGI schools, choice in instructional materials, choice in professional learning, and choice in selecting and training teacher-leaders were again cited by participants as necessary for future sustaining and scaling of the CGI Partnership in XX District.

CGI schools for 2023-2024 includes the remaining 35 of the 100 lowest performing schools in the District. "The stress of being on this list (100 lowest performing schools) was very, very much felt... Teachers are shamed, publicly, because of their test scores," according to a Math Project coach, concerned about the possibility of future stigma being attached to CGI schools.

Fidelity to the curriculum was cited by teacher-leaders as a recent District change that removes the aspect of teacher/school choice from instructional materials. "They (teachers) don't come to elementary school with a really strong content background in math, and therefore they rely very heavily on the curriculum," says a District math leader, justifying the change. However, curriculum fidelity is an issue for CGI implementation, according to many participants, impacting future work with the initiative.

Choice extends to the future CGI professional learning for teachers. Math Project's customization of professional learning for school sites has been well-received, say teacher-leaders and principals. A District senior leader says, "I think Math Project has done a really nice job," and wants principals to "...prioritize instruction in a way that they can maximize the learning opportunities for their teachers. Because the more their teachers learn, the better they will become at their craft…we are lifelong learners, the work never stops." Additionally, the new state framework has been approved, creating a timely opening for making connections between CGI and the framework in the future, according to the leader. Teacher-leaders and principals will continue to customize the professional learning for school sites using a cycle of inquiry model, according to Math Project, and through a more formal coaching schedule announced this school year.

There is voiced concern about choosing enough talented teacher-leaders to facilitate the CGI professional learning in the future, according to Math Project leaders. Identifying teachers to participate in future teacher-leader training is cited as an issue by both the District and Math Project. Few math leaders are in classrooms enough to recommend teachers, with one sharing, "I haven't been in a classroom in the last four months!" A senior district leader reflects, "I don't think we've done a good enough job within our school sites and within our structures within each region to identify those teacher-leaders and to ensure that they have the support that they need to grow in their leadership."

Another area of concern expressed by participants is in the readiness and preparation of those future teacher-leaders. Many teacher-leaders cited a need for more of Math Project's coaching/co-facilitation training for the teacher-leaders at the school sites. "There's nothing that matches having that experience…you are getting hands-on real-time experience doing the

coaching, and you're able to hear when a teacher pushes back, how a coach can coach through that." Teacher-leaders suggested the District could provide professional learning on facilitation and coaching in the future. "Our District does not do a good job of supporting teacher leadership as a whole...you learn what you need to do on the job...you don't really get a lot of learning in how to lead or how to coach," confesses a math leader. "Part of the reason that the (coaching) impact is partial is because we can't complete the coaching cycle hardly ever," says a teacher-leader in the focus group, a sentiment echoed by five others. According to another teacher-leader, "We're not necessarily taught how to coach. We've not taught how to make those facilitator moves...We've studied our craft working with kids, but we haven't studied our craft working with one another."

Theme: Relationships

The theme of relationship is again cited by participants as a necessary consideration for future sustaining and scaling of the CGI Partnership with XX District, where relationships at all levels is needed, especially in the areas of community of practice and in addressing Math Project growing pains.

A CGI community of practice, being part of a collaborative and supporting professional group, with an emphasis on building a sense of trust, both at the school site, and throughout and outside the District, is highlighted by participants. Teacher-leaders asked for additional support from the CGI community of practice in the future, including technology communication tools for the sharing of information, videos of students and classrooms, and a platform for crowdsourcing questions.

Another area that affects trust and relationships is Math Project's rapid growth in the number of schools it's supporting, which has resulted in 'growing pains' of its own. They are

overwhelmed with administrative burdens for some staff, according to participants, with a lack of enough support staff hindering the team's ability to manage data, payroll, and organizational logistics effectively. The recent unionization of the team has meant new ways of working. Teacher-leaders frequently reported that Math Project faces challenges with timely payment to facilitators and coaches, and a lack of clarity in payment breakdowns, something they would like fixed in the future. A Math Project staffer reports that they are required to use the greater university's payroll office. Payroll issues drew many responses during the interviews and focus group. A teacher-leader said, "We get paid very sporadically, that's nothing I know that they can control, because they turn it over to accounts payable." Math Project staff addressed the issue, "Our administrative responsibility is massive; it just takes a lot of structures, and we don't necessarily have the personnel..." Another participant said, "I think we need to address our structural issues first before we do any kind of expansion, we need an expansion of support." There is a need for better communication, a more efficient and reliable payment system, and clear protocols to address payroll concerns in the future.

"At Scale"

Sustaining and scaling the CGI Partnership into the future will require ongoing collaboration and prioritization of the CGI effort as the District internalizes the CGI work into its policies and practices. In order to sustain and scale, the Partnership needs to work towards a shared vision, which has deteriorated since the Partnership was at its peak. What will it look like for the Partnership to accomplish that renewed, shared vision in the future? A District math leader discusses what it looks like to them to meet the goals of the Partnership,

> When we all hit our 40 points, and we know we've reached them right? To me, that's not one of my goals. I know that I'm fine, like I've nothing against that goal. But to

> me, that doesn't mean that kids are learning math. I feel like when you walk in a classroom during math time, and you see everybody engaged and having fun, and there's noise, and they're on task, and that's how you know, is when that happens more times than it doesn't, when it's the minority of teachers that are doing, 'Open up your book. Let's all read page number 2, number one.' When I don't see that as much, then I'll know that goals have been met with that instruction.

Will the goal of being "at scale" ever be met, or will it need to evolve as students move into higher grades? A math leader looks to the future, "I can't just look at the CGI elementary work, it's what's happening in the middle schools, what's happening in our high schools?" And it may be that some schools opt out before the goal is achieved. Participants suggest developing a plan for schools to "graduate" or to end CGI support with a prescribed path to transition to independence, rather than quit. "When we do have a school that is choosing to step away…. We can't hold on to them if they don't want to do the work," says a Math Project staffer.

A math leader reflects on what success means, "When I'm in a PD and I'm hearing teachers shift their language to an asset-based language, and really seeing what students can do, really hearing them elevate what students already know. And through observation, walking into a classroom where everyone's talking except the teacher, that to me, is golden."

Recommendations

Recommendations are informed by the findings and supported with evidence from the literature, including the conceptual frameworks, and grouped by the themes of support, choice and relationships.

Theme: Support

Given the findings related to the lessening of District senior leader participation, the first recommendation is that District senior leaders engage with, prioritize, and support the CGI initiative. Ways to do this include engaging District senior leaders in ongoing professional learning opportunities, such as guided tours of CGI schools. The professional learning opportunities for District senior leaders should also include engagement with the research on the benefits of CGI and sharing of success stories related to the positive impact on student learning. Math Project may demonstrate the alignment between CGI and District initiatives, encouraging policy decisions that align with CGI principles and practices. McLaughlin and Mitra, claim effective district leaders are actively engaged in reform initiatives as learners, to inform decision making (Klingner et al., 2003). Coburn suggests that reformers need to target key leadership with knowledge about the reform so that it can be used in day-to-day operations and decisions (2003), eventually shifting the ownership of the reform.

The second recommendation in the area of support is to agree upon and recommit to a shared mission/vision between Math Project and the District for the CGI Partnership. According to Rosenquist et al., successful educational partnerships begin by agreeing on a problem of practice and an alignment of vision, with common understandings of goals for students (2015), and Maass et al., reminds us that aligned student goals from all stakeholder groups are required for success in sustaining and scaling an education initiative (2019).

The third recommendation within support is to increase District math leader participation and cross-office collaboration to encourage integrating CGI into practices across the District. Math Project may invite the District math leaders to participate in and attend CGI teacher-leader and principal events, including Saturday learning sessions, leadership sessions and professional

learning planning sessions. Math Project may contact other District offices about partnering over common themes, including Education Transition Office (ETO), Multilingual/Multicultural (MMED), Special Education, and Access, Equity, and Acceleration (AEA), District Parent and Community Engagement Branch. A new area to explore is the District's micro-credentialing program. Math Project could work with the District to request a micro-credential be created for CGI, as part of the menu of micro-credential services, and assist in its development. In this way, more expertise in CGI is developed in District math leaders and teacher-leaders. The most effective senior district leaders, for example Chief Academic Officers, relied on their math experts when making policy decisions in mathematics teaching and learning (Cobb et al., 2018).

The fourth recommendation is to increase principal support and accountability by requesting that District directors encourage and hold their CGI principals accountable for participation at CGI professional learning events, both at their own schools and for District-wide leadership events. The District - CGI Partnership Benchmarks document provides principals and District leadership with "look-fors" when observing classrooms. On-going professional learning for administrators on the use of the document supports principals in creating an environment for teachers in which they are encouraged to take risks, try new things, and reflect on their practices as they refine CGI approaches. According to Robinson et al., there is a strong association between principal participation in professional learning with their teachers and increased student achievement (Cobb et al., 2013).

Theme: Choice

As the presence of choice is evidenced in the findings as being a necessary component of sustaining and scaling the CGI Partnership, this choice may extend into the approach to instructional materials is a factor in sustaining and scaling CGI throughout the District. While

CGI is not a curriculum, and as such may be utilized with any curriculum, some instructional materials call for teachers to model specific strategies for students, emphasizing procedures over the development of conceptual understanding. This instructional approach of a teacher modeling procedures does not align with the CGI goals of centering instruction on children's thinking. The first recommendation under the theme of choice is for Math Project to request the Elementary Administrator waive the "curriculum fidelity" mandate for all CGI schools. This requires the support of District math leaders and regional leadership. District level leaders are often those selecting curriculum materials and designing professional learning for their use, providing teachers with new knowledge and new tools for instruction (Cobb & Smith, 2008).

The second recommendation in the area of choice is to pause adding new schools to the CGI initiative until the District and Math Project agree on the prerequisites needed for a school to participate in CGI. A basic understanding of what to expect when agreeing to be a part of the CGI initiative, having school structures in place to support the CGI work, and the buy-in of the school's principal and teachers is needed for a new school to fully participate in the CGI Partnership. Carpenter and Franke specifically call out teachers making the choice to participate in CGI as critical for scaling (1995).

Having a steady pipeline of trained teacher-leaders to facilitate and coach the CGI professional learning at school sites is critical to sustaining and scaling the initiative. The third recommendation within the category of choice is for Math Project to request District permission for math "interventionists," those out-of-the-classroom CGI teacher-leaders who were prevented from participating the previous school year, to have the choice to lead CGI work at their assigned school site. Math Project may request that District region math leaders continue to recommend future teacher-leaders and encourage the math leaders' classroom visits to see potential teacher-

leaders in action by accompanying them on tours of CGI school sites. With the support of District math leaders, Math Project may request the District senior leadership create a fellowship program for math instructional leaders. Once teacher-leaders are identified, they need professional learning on content, facilitation, and coaching (Gibbons & Cobb, 2016). Additionally, Math Project may create a library of supporting videos of CGI classrooms, students explaining their work, and online learning resources for teacher-leaders to access, as Myers et al. highlight the way CGI uses video as a learning tool for teachers to analyze student thinking (2020).

The District's request for including cycles of inquiry within the CGI professional learning may be used to actualize another aspect of choice in CGI schools. The fourth recommendation in this area is that these are teacher-led inquiry cycles in a problem of practice of their choice, not administration-led. This approach provides opportunities for teachers to genuinely engage in areas in which they are interested by reading research, trying out new ideas, looking at student work, giving each other feedback, and planning next steps. Teacher-led inquiry supports growth over time and ties formative assessment to ongoing instruction. There is concern that District-created assessments may not accurately determine the success of CGI. Math Project may recommend to the District renaming the CGI pre- and post-assessments to "pre-survey" and "post-survey" to remove the stigma of "assessments." Request the district process these data in a timely fashion and share the results with Math Project and the District math leaders. According to York-Barr & Duke, an 'inquiry orientation' is one hallmark of effective teacher-leaders (2004).

Theme: Relationships

Based on the findings, trusting relationships are a necessary component of sustaining and scaling the CGI initiative. According to a teacher-leader, "Trust is imperative if you want teachers to take a risk to see the results." There are varied receptions of the CGI initiative at school sites, with mixed responses from principals and teachers. As CGI principals play a critical role in championing CGI with their staff, a trusting relationship with their teacher-leader is paramount. Teacher-leaders collaborate with these principals to focus on building trusting relationships through customizing the CGI professional learning and coaching for their assigned sites and aligning the support with the school's goals. The first recommendation in this area of relationships is a focus on overcoming teacher resistance by requesting that CGI principals, with their leadership teams and their assigned teacher-leaders, attend CGI Leadership Days together to plan and kick-off the school year and maintain support throughout the school year. In past years, these groups met side-by-side. Combining the two groups will encourage relationship building. While there are some Math Project coaches and teacher-leaders who support more than one school, there could still be groupings arranged to support developing these personal connections. As a Math Project leader shared, "Megan Franke always says that the teachers who are the most resistant at the beginning are the ones who actually change the most," and become the biggest advocates of CGI. A model based on relationships is an example of "learning, thinking, and knowing relations among people engaged in activity in, with, and arising from the socially and culturally structured world" (Lave & Wenger, 1991, p. 67).

The second recommendation in the context of relationships is emphasizing the equity work within the Partnership by including an explicit discussion of equity in each professional learning session. Math Project may also contact the District Education Transition Office (ETO) about

partnering in equity work. The asset-based approach of CGI aligns with the District's Culturally and Linguistically Responsive pedagogy. Henrick et al., call out the renewed attention to equity within effective research-practice partnerships (2016), also applicable to university-school district partnerships.

The CGI relationships extend outside of the District community to the greater mathematics professional community and the layman community. The third recommendation within the area of relationships is for Math Project to develop a media strategy to increase awareness of and promote CGI principles to a greater community, both layman and professional. Updating the website on a regular basis with interactive content, re-engaging in a social media presence, hosting and participating in podcasts and videocasts, collaborating with and speaking at conferences hosted by national professional organizations, introducing a CGI email newsletter will promote the success of CGI in districts throughout the state and across the country. Highlighting teacher and student first-person CGI stories through local media outlets will build a visible base of support. Utilizing video and web-based technology leads to an increasingly large audience of teachers and provides access to those who might not have it otherwise (Kraft et al., 2018).

And the fourth recommendation within the theme of relationships is for Math Project to address 'growing pains' by hiring more support staff and distributing responsibilities. Fixing the missing communication link in the billing office system, reconciling the payment received with the hours worked, and insuring prompt follow-up to questions will ensure that Math Project is in a position to sustain and scale the CGI Partnership. Addressing this issue will contribute to smoother operations, increase efficiency, and enhance job satisfaction. Bandura notes that feelings of efficacy influence how staffs in schools support their organization, either by

"vitalizing or demoralizing," which can be applicable to the university organization, as well (1993, p. 141).

Table 6

Math Project Recommendations

Support			
1. Increase District senior leader engagement	2. Re-align the Partnership vision	3. Increase District math leader participation	4. Encourage principal participation
Choice			
1. Instructional materials curriculum waiver	2. Schools elect to be CGI schools	3. Coordinate teacher-leader identification and training	4. Teacher-led cycles of inquiry
Relationships			
1. Overcoming teacher resistance	2. Renew focus on equity	3. Engage community with a media strategy	4. Address internal organizational growing pains

Limitations

Timing was a primary limitation in this quality improvement project. The timing of the data collection window began the first week of summer vacation and continued through the summer break, affecting participation. There was limited participation from District senior leadership, even though the project was sponsored and approved by the District's research office. Representation from the District central office was lower as there was a lack of response to interview requests. Future projects may find other ways to engage the District's full cooperation.

Conclusion

This is a period of re-evaluation for the Partnership. With a mutual desire to internalize the initiative into District policy and practices, it is possible for the Partnership to sustain and scale CGI effectively. Otherwise, the Partnership is one in name only, and Math Project takes on the role of outside vendor. While quality improvement work is non-generalizable, this could be viewed as a case study in sustaining and scaling an initiative, contributing to the need for explicit models for a better understanding of university-school district partnerships.

Since the sharing of these preliminary findings with Math Project, prior to the 2023-2024 school year starting, changes have been made. The District has assigned a CGI math lead after many months of not having one, the District senior leader supervising CGI has recently stepped down, the Math Project and the District now have a standing weekly meeting, and an oral contract has been agreed to. The CGI school site customization of professional learning now includes teacher inquiry cycles, with Plan-Do-Study-Act cycles, and principals have agreed to provide substitute coverage for their teachers to participate in site-based coaching. Math Project's Dr. Megan Franke has personally reviewed its billing system and the Math Project administrative staff trained the teacher-leaders on how it works. The implementation and small group meetings on Zoom for teacher-leaders are now required and set on a specifically calendared "All Call" schedule. Some teacher-leaders who were prevented from participating in CGI last year by the District have been given permission to participate again, and the teacher-leader ranks are currently full. Math Project is actively collecting teacher-leader videos and photos of CGI 'stories from the field,' and making them available for use in classrooms.

In addition, the District has issued an informal request for proposal for a one-year contract for a Numeracy Strategy Consultancy to review the District's current numeracy strategic plan,

provide professional learning for senior leadership, and assist in the development of a new three-year strategic plan. I believe this indicates the District is gathering new information to inform an evaluation of the current strategic plan.

In conclusion, it is important to remember that the CGI Partnership is in the service of supporting all students in having access to high quality math instruction. Both the District and Math Project are intent on keeping children at the center of this math reform work, and as they work together towards this end, my hope is that these recommendations lead to future sustaining and scaling of the CGI Partnership.

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Appendices

Appendix A: Instruments

1. **Senior District Leadership Interview**

June-August 2023

CGI Partnership Capstone Project

Before recording: Ask online participants to change their screen name to an assigned random number.

I'm doing this interview for my capstone project at Vanderbilt University. I appreciate that you have agreed to be interviewed. I'm talking with key district leaders about this year's plans for improving early childhood through elementary school mathematics and specifically about the UCLA Mathematics Project – XX District Cognitively Guided Instruction Partnership. I'm curious about the development of principal instructional leadership and teacher-leaders, and on sustaining and scaling the CGI initiative.

Consent Form: Make sure the electronic or paper version is signed and returned before beginning the interview.

Thank you for signing the consent form. Your responses are confidential. The interview will be recorded. Please let me know if you'd like me to stop recording and I'll do that. What questions might you have?

Start recording:
It is _(date)_, at _(time)_. I'm _(name)_. I'm interviewing _(random ID number)_.

Clarifying
What is your current role in the district and how long have you been in the position?

Vision

1. What is the current District vision for early childhood through elementary school mathematics instruction?
2. Tell me about your initiatives for improving early childhood through elementary school math instruction. How does the CGI Partnership fit into the District work?

Principal Leadership Development

3. How does the District promote principal leadership?
4. How is the principal supported as a lead learner in mathematics?
5. How is the principal expected to use their professional learning at the school site?
6. What principal participation do you expect to see in supporting high-quality math instruction?
7. Thinking about the CGI partnership specifically, how are principals expected to support their teachers?

(Probe for principals providing a budget for sub-release time, attending the PD with teachers, participating in lesson study, or planning time with teachers, participating in the monthly principal support zoom calls, attending the principal leadership Saturday training sessions.)

Teacher-Leader Development

8. What are the District's plans for supporting the evolution of teachers to teacher-leaders?
9. What professional learning for teachers in facilitation skills or coaching are currently available in the district?
10. What credentials or badges or fellowships are currently offered by the district in mathematics?
11. Support across the Division of Instruction Offices has occurred in the past. For example, the Multilingual-Multicultural (MMED) Office provided teacher fellowships in math. The Special Education Office provided teacher PD in math for students with special needs. The Office of Access, Equity and Acceleration participated in improvement science work with the math team. Are these cross-discipline opportunities currently available to teachers?
12. What incentives are available to teacher-leaders who choose to stay in the classroom versus becoming school administrators, keeping great teachers in the classroom?

Social Justice and Equity

13. How are you addressing disparities between groups of students in elementary school mathematics?
14. The asset-based approach to math that is a hallmark of the CGI work has supported teachers in developing their students' mathematical identities. How do you see this approach to access and equity supporting the District's goals?

Sustaining and Scaling CGI

15. What do you think is needed to take CGI to scale in the district?

Is there anything that I haven't asked you that you would like me to know?

Thank you! Would you like to read the transcript of your interview?

(Adapted from the MIST Study, https://peabody.vanderbilt.edu/academics/departments/teaching-learning/mist/instruments/)

2. **District Mathematics Leaders Interview**

June-August 2023

CGI Partnership Capstone Project

Before recording: Ask online participants to change their screen name to an assigned random number.

I'm doing this interview for my capstone project at Vanderbilt University. I appreciate that you have agreed to be interviewed. I'll be asking about your role in the District, the current UCLA Mathematics Project – XX District Cognitively Guided Instruction Partnership, about CGI teacher-leaders, and what you believe are the necessary supports for sustaining and scaling the CGI initiative.

Consent Form: Make sure the electronic or paper version is signed and returned before beginning the interview.

Thank you for signing the consent form. Your responses are confidential. The interview will be recorded. Please let me know if you'd like me to stop recording and I'll do that. What questions might you have?

Start recording:
It is _(date)_, at _(time)_. I'm _(name)_. I'm interviewing _(random ID number)_.

Clarifying
What is your current role in the district? How long have you been in the position?

Current District Plan
1. What is the District's current plan for mathematics instruction?
2. Who or what has been influential in creating the district plan for mathematics?
3. How is the CGI initiative going?
4. In your opinion, is there conflict between initiatives in the region or district?

Supports
5. What support do you, or your office, offer to principals as they implement CGI?
6. If you were to go into an elementary school, what would you look for to see if the principal was providing high quality instructional leadership in math?
7. If you were asked to observe a CGI teacher's math classroom, what would you look for?
8. What would you consider to be high quality professional development for elementary school math teachers?
9. What professional learning does your region/District provide to early childhood through elementary school teachers in math?
10. Have you attended any of the CGI PD? (School based sessions? Summer Institutes? Saturday learning sessions? Virtual mini conferences? Online courses?) Why or why not?
11. What math PD is available for students with special needs?
12. What materials have been developed for teachers to use in math (curriculum maps, etc.) and how do you support that use?

CGI Teacher-Leaders

13. What do you think CGI teacher-leaders need to lead the work?
14. Have you observed CGI teacher-leaders in their roles? (If so, was the teacher-leader presenting high quality math instruction/support? What did you observe? Were they effective?)
15. The asset-based approach to math that is a hallmark of the CGI work has supported teachers in developing their students' mathematical identities. How do you see this approach to access and equity supporting the district's goals?
16. Have you ever been involved in recommending CGI teacher-leaders? (If so, what do you look for in recommending that a teacher becomes a teacher-leader?)
17. What supports are currently in place in the district to provide classroom teachers with the skills sets they need to grow into successful teacher-leaders in any area?
18. What do you think is needed to sustain and scale the CGI work?

Relationships with Other District Offices

19. How is your office or region aligned with other District offices and regions in supporting math instruction?
20. To what do you attribute the differences in alignment?

21. Who do you go to for help with elementary mathematics?

22. In closing, what will it look like when the District goals for math have been reached?

Is there anything that I haven't asked you that you would like me to know?

Thank you! Would you like to read the transcript of your interview?

(Adapted from the MIST Study, https://peabody.vanderbilt.edu/academics/departments/teaching-learning/mist/instruments/)

3. Principal Interview

June-August 2023

CGI Partnership Capstone Project

Before recording: Ask online participants to change their screen name to an assigned random number.

I'm doing this interview for my capstone project at Vanderbilt University. I appreciate that you have agreed to be interviewed. I'm curious about your role as a principal in the UCLA Mathematics Project – XX District Cognitively Guided Instruction Partnership. I'll be asking questions about your responsibilities, your relationship with the CGI teacher-leaders at your school, and on sustaining and scaling the CGI initiative.

Consent Form: Make sure the electronic or paper version is signed and returned before beginning the interview.

Thank you for signing the consent form. Your responses are confidential. The interview will be recorded. Please let me know if you'd like me to stop recording and I'll do that. What questions might you have?

Start recording:
It is _(date)_, at _(time)_. I'm _(name)_. I'm interviewing _(random ID number)_.

Clarifying
How many years have you been a principal; how many years as a principal at this school?
What year of CGI support is your school currently in?

1. What is the District's picture of high-quality mathematics instruction in pre-school through elementary school?
2. How is the District supporting that vision?
3. What are your strategies this year for improving mathematics instruction?
4. What challenges are you facing?
5. How often are you observing math teachers?
6. What do you look for to see if the mathematics instruction is aligned with CGI?
7. How different are the teachers' views of CGI in your school and how do you know?
8. What are your expectations regarding differentiation for students?
9. How would you rate, on a scale of 1-10 with ten being the highest, the quality of math teaching in your school?
10. What changes have you seen in math instruction from when you started the CGI partnership until now?
11. To what do you attribute the changes?
12. What special support does your school provide for CGI?
13. How would you describe the role of the CGI teacher-leader?
14. What are your expectations for the types of support that the CGI teacher-leader should provide teachers and how do you communicate your expectations to them?

15. How do you know if the CGI teacher-leader is providing the types of support you just mentioned, and if the support is not being provided what do you do?
16. How would you characterize your working relationship with the CGI teacher-leader?
17. How do you support the work of the CGI teacher-leader?
18. What difficulties might you have had in working with a CGI teacher-leader, and what happened?
19. What CGI professional learning have you participated in during your time as a CGI principal? (e.g., CGI Saturday Principal Leadership Days, monthly CGI Principal Zoom sessions, online CGI courses, Division of Instruction PD, Regional PD, Elementary Principal Organization sessions)
20. Given your experiences with CGI, what do you think it would take to scale CGI to the whole district?
21. What advice do you have for new CGI principals?
22. Who do you go to for math support, and would you recommend that person as a CGI teacher-leader?

Is there anything that I haven't asked you that you would like me to know?

Thank you! Would you like to read the transcript of your interview?

(Adapted from the MIST Study, https://peabody.vanderbilt.edu/academics/departments/teaching-learning/mist/instruments/)

4. Teacher-Leader Interview

June 2023

CGI Partnership Capstone Project

Before recording: Ask online participants to change their screen name to an assigned random number.

I'm doing this interview for my capstone project at Vanderbilt University. I appreciate that you have agreed to be interviewed. I'm interested in understanding what it means to be a teacher-leader in the UCLA Mathematics Project – XX District Cognitively Guided Instruction Partnership. I'm curious about your teacher-leader responsibilities, your opinion on the CGI professional learning you've received, your relationship with the principal at your assigned school, and what advice you have for future teacher-leaders.

Consent Form: Make sure the electronic or paper version is signed and returned before beginning the interview.

Thank you for signing the consent form. Your responses are confidential. The interview will be recorded. Please let me know if you'd like me to stop recording and I'll do that. What questions might you have?

Start recording:

It is _(date)_, at _(time)_. I'm _(name)_. I'm interviewing _(random ID number)_.

Clarifying

How long have you been a CGI teacher-leader?
What is your school district? What position do you hold? What grade level(s)?

Highlights/Challenges of Teacher-leader Work

1. How did you become a CGI teacher-leader?
2. Please describe your teacher-leader responsibilities this past school year.
3. What do you typically do in facilitating CGI **professional learning** sessions?
4. What do you typically do in CGI **coaching** sessions? (Anticipated Responses: Observations, co-teaching, modeling/demonstrations, looking at student work, planning, coaching conversations)
5. How does this influence participants' mathematics instruction?
6. What guidance are you given about what to focus on when you observe others teach or what to talk about afterwards?
7. What follow-up conversations do you have after a classroom observation?

Assigned School Principal - Teacher-Leader Relationship
I'm curious about your relationship with your assigned principal.

8. What does your assigned principal expect of you as the CGI teacher-leader at the assigned school?
9. How does your assigned principal support your CGI work?
10. How does your assigned principal let you know what they want you to do? How do you let them know what you need?
11. Sometimes there is not a good fit. What happens if your assigned principal does not fulfill your expectations or vice-versa?

Teacher-Leader Professional Learning

Let's segue to professional learning specific to being a CGI teacher-leader.

12. How many Math Project learning sessions have you attended this year, including the two Saturday learning sessions and the two online learning sessions? How did these sessions impact your practice?
13. How many Math Project monthly small group meetings have you attended this year? How was this useful?
14. Does the District provide professional learning for teacher-leaders in any content area?
15. What are some of the ways that Math Project can additionally support teacher-leaders? (Anticipated responses:
    a. More support in content/facilitation skills/coaching
    b. More attention to building a community of practice
    c. More attention to internal housekeeping issues)
16. What are some of the ways that the District can additionally support teacher-leaders? (Anticipated responses:
    a. More teacher-leader release time
    b. Provide substitute coverage for the host school during CGI coaching days
    c. Release time to visit other CGI schools
    d. Allow out-of-classroom positions to be teacher-leaders
    e. Identify more teachers ready to be teacher-leaders)
17. What do you think is needed to take CGI to scale in the district, meaning that every school is a CGI school?

Is there anything that I haven't asked you that you would like me to know?

Thank you! Would you like to read the transcript of your interview?

(Adapted from the MIST Study, https://peabody.vanderbilt.edu/academics/departments/teaching-learning/mist/instruments/)

5. Math Project Leaders Interview

June-August 2023

CGI Partnership Capstone Project

Before recording: Ask online participants to change their screen name to an assigned random number.

I'm doing this interview for my capstone project at Vanderbilt University. I appreciate that you have agreed to be interviewed. I'm going to be asking you questions about the UCLA Mathematics Project – XX District Cognitively Guided Instruction Partnership, about your role in Math Project, about CGI teacher-leaders, and what you believe are the necessary supports in order for the initiative to be successful.

Consent Form: Make sure the electronic or paper version is signed and returned before beginning the interview.

Thank you for signing the consent form. Your responses are confidential. The interview will be recorded. Please let me know if you'd like me to stop recording and I'll do that. What questions might you have?

Start recording:

It is _(date)_, at _(time)_. I'm _(name)_. I'm interviewing _(random ID number)_.

Clarifying

What is your current role at Math Project? How long have you been in the position?

What are your current job responsibilities?

Math Project's Plan

1. What are Math Project's current goals for the CGI initiative for the upcoming school year?
2. How is the CGI initiative being received and how do you know?
    a. Do District senior leaders support CGI?
    b. Do District math leaders support CGI?
    c. Do the principals?
    d. Do the teachers?

3. In your view, how is the CGI initiative in conflict with other District initiatives?

Supports

4. I'm curious about Math Project's idea of high-quality instructional leadership in mathematics. What does that look like?
5. What support does Math Project offer to principals in elementary schools as they implement the CGI initiative?
6. What do you expect to see in a CGI classroom where the teacher has been involved in the CGI initiative for several years and received principal support?

7. The asset-based approach to math that is a hallmark of the CGI work has supported teachers in developing their students' mathematical identities. How do you see this approach to access and equity supporting the district's goals?
8. How does CGI meet the needs of specific groups of students (ELLs, African American students, Special Education)?
9. What follow-up, if any, is there by Math Project to see if the professional learning is being enacted in the classrooms?

CGI Teacher-Leaders

10. What do CGI teacher-leaders need to be able to do to lead the work at the school sites?
11. What have you observed when you see CGI teacher-leaders in their roles?
12. What is the process for recommending someone as a teacher-leader?
13. What do you look for in selecting a teacher-leader?
14. Once selected, what supports are provided to the novice teacher-leader?
15. What is the percentage of teacher-leaders who continue in the work into the next year?
16. Why might they not continue?
17. What supports does the District provide classroom teachers to grow into successful teacher-leaders in any area?
18. What additional supports might grow the ranks of the teacher-leaders to lead this work?
19. What do you think is needed to sustain and scale the CGI work?
20. In closing, how will you know when the goals for the CGI Partnership have been reached?

Is there anything that I haven't asked you that you would like me to know?

Thank you! Would you like to read the transcript of your interview?

(Adapted from the MIST Study, https://peabody.vanderbilt.edu/academics/departments/teaching-learning/mist/instruments/)

6. Math Project Support Staff Interview

June 2023

CGI Partnership Capstone Project

Before recording: Ask online participants to change their name to an assigned random number.

I'm doing this interview for my capstone project at Vanderbilt University. I appreciate that you have agreed to be interviewed. I'm curious about your Math Project responsibilities, your opinions on the supports and resources that you provide to the teacher-leaders, and what advice you have for sustaining and scaling the initiative.

Consent Form: Make sure the electronic or paper version is signed and returned before beginning the interview.

Thank you for signing the consent form. Your responses are confidential. The interview will be recorded. Please let me know if you'd like me to stop recording and I'll do that. What questions might you have?

Start recording:

It is _(date)_, at _(time)_. I'm _(name)_. I'm interviewing _(random ID number)_.

Clarifying

How long have you been with Math Project?
What position do you hold?

Highlights/Challenges of CGI Work

1. Please describe your CGI responsibilities this past school year.
2. What do you typically do in supporting the CGI work?
3. What are some of the highlights for you in the CGI work?
4. What are some of the challenges for you in the CGI work?
5. What might be some additional supports to help you in your work?

Math Project – Teacher-Leader Interactions

6. How is communication conducted between you and the teacher-leaders?
7. What is the expected turn-around time for an email or a call to be responded to?
8. Are the teacher-leaders responsive when you reach out?
9. How might communication between Math Project staff and teacher-leaders be improved?
10. When an issue arises with a teacher-leader, how is it handled?
11. What are some of the ways that Math Project can additionally support teacher-leaders?
12. What are the ways that the District can additionally support teacher-leaders?
13. What do you think is needed to sustain and scale CGI in the District?

Is there anything that I haven't asked you that you would like me to know?

Thank you! Would you like to read the transcript of your interview?

(Adapted from the MIST Study, https://peabody.vanderbilt.edu/academics/departments/teaching-learning/mist/instruments/)

7. Teacher-Leader Focus Group

June 2023

CGI Partnership Capstone Project

Before recording: Ask participant to change their name tent to an assigned random letter.

- Prepare the room with ten posters mounted around the room, one for each question, with the question number and question written on it
- Prepare materials for ten participants:
    - Copies of Teacher-Leader Focus Group Questions
    - Pens
    - Stacks of square post-it notes
    - Consent forms

Welcome! (Introduce myself.) I'm doing this focus group for my capstone project at Vanderbilt University. I appreciate that you have agreed to participate. I'm curious in understanding what it means to be a teacher-leader in the UCLA Mathematics Project – XX District Cognitively Guided Instruction Partnership. I'll be asking you questions about your teacher-leader highlights and challenges, your opinions on the CGI professional learning, and what you think is needed to grow CGI to all schools in the district. The results will be used for planning how to sustain and scale the CGI partnership into the future. You were selected because you are facilitating CGI professional learning at this location this week!

Please make sure to sign and date the consent form that you have been given. Place the signed form on the table and I'll be collecting them. Your responses are confidential. I will be recording our conversation. Please let me know if you'd like me to stop recording and I'll do that. What questions might you have before we begin?

Start recording:

It is _(date)_, at _(time)_. I'm _(name)_. I'm conducting the focus group at _(random ID letter location)_.

Let me begin by sharing a few norms for this focus group. We're all listening respectfully. We're recording, so one person is speaking at a time. Please silence your cell phones. My role is to moderate the discussion, not to participate in it. We'll be using an Equal Voice protocol. I'll pass out the questions, post-it notes and pens for you to write brief responses. Please briefly respond to each question on one post-it note, and include the question number and your assigned letter, to allow for follow up. When you're finished writing all of the post-it notes, please place them on the numbered poster that matches the question number. We'll take about five minutes for writing. Then I'll read some of the responses to get us started with our discussion.

Teacher-Leader Focus Group Questions:

11. How did you become a CGI teacher-leader?
12. What is one the highlights of being a CGI teacher-leader?
13. What is one of the challenges of being a CGI teacher-leader?
14. Please describe what the principal of your assigned school expects of you as a CGI teacher-leader.
15. How does your assigned principal support your CGI work?
16. How have the Math Project Saturday learning sessions and monthly small groups supported your teacher-leader work?
17. What are some of the ways that Math Project can additionally support teacher-leaders?
18. Have you attended any District sponsored professional learning for teacher-leaders in any curriculum area? How have you connected that with your work?
19. What are the ways that the District can additionally support teachers in becoming teacher-leaders?
20. What do you think is needed to take CGI to scale in the District, meaning that every school is a CGI school?

Moderator reads post-it notes silently as they are being placed, position some for discussion. Launch discussion:

I'm going to read aloud a few of the post-it notes, and I'll ask some of you to elaborate on what you have written. Start with Q2 (highlights), focus on Q3 (challenges), Q5 (principal support), Q7 (Math Project support), Q9 (District support).

Summarize by reading aloud notes on Q10 (scale): Now I'm going to read aloud the notes on Question 10, scaling.

I may be contacting you individually for follow-up interviews. Thank you for your participation in this focus group.

Appendix B: Interview and Focus Group Consent Forms

Informed Consent Form: Interview

Information and Purpose: The interview for which you are being asked to participate is part of a quality improvement capstone project. The doctoral student is interested in sustaining and scaling the UCLA Mathematics Project – XX School District Cognitively Guided Instruction Partnership. The purpose of this proposed quality improvement project is to document a university-school district collaboration, to analyze program evaluation evidence, and to advise on scaling the initiative to all schools in the district.

Your Participation: Your participation in this study will consist of an interview lasting approximately thirty minutes. You will be asked a series of questions about your experience with the CGI Partnership. You are not required to answer the questions. You may pass on any question that makes you feel uncomfortable. At any time, you may notify the researcher that you would like to stop the interview and your participation in the interview. There is no penalty for discontinuing participation.

Benefits and Risks: The benefit of your participation is to contribute information to the elementary mathematics community. There are no risks associated with participating in the interview.

Confidentiality: The interview will be recorded; however, your full name will not be recorded. Your name and identifying information will not be associated with any part of the written report. All of your information and interview responses will be kept confidential. Interviews will be recorded and transcribed for analysis. The doctoral student will not share your individual responses with anyone other than her supervisor and you if you would like to review the transcript of your interview after the interview is completed. Transcripts, recordings, and analysis will be stored in a secure Box account through Vanderbilt University. Data will ***only*** be used for the purposes of answering the research questions and/or hypotheses presented in the Project Overview. Publicly available discussions, presentations, and reports based upon the Confidential Information ***will not*** include information that would make it possible to identify an individual unless specific permission has been granted in writing to do so.

If you have any questions or concerns, please contact the doctoral student, Lisa Ward at lisa.ward@vanderbilt.edu, or her supervisor, Dr. Erin Henrick at erin.henrick@vanderbilt.edu.

By signing below, I acknowledge that I have read and understand the above information. I am aware that I can discontinue my participation in the study at any time.

Signature_____ Date_____

☐ By initialing this box, I agree to participate in the interview.
☐ By initialing this box, I agree to the audio/video recording of the interview.

(Adapted from Boston University Informed Consent Form Examples, https://www.bu.edu/linguistics/UG/course/lx700-f05/handouts/Informed%20Consent%20Examples.doc)

Focus Group Consent Form

Information and Purpose: The focus group for which you are being asked to participate is part of a quality improvement capstone project. The doctoral student is interested in sustaining and scaling the UCLA Mathematics Project – XX District Cognitively Guided Instruction Partnership. The purpose of this proposed quality improvement project is to document a university-school district collaboration, to analyze program evaluation evidence, and to advise on scaling the initiative to all schools in the district.

Your Participation: Your participation in this focus group will last approximately thirty minutes. The group will be asked a series of questions about your experience with the CGI Partnership. You are not required to answer the questions. You may pass on any question that makes you feel uncomfortable. At any time, you may notify the researcher that you would like to stop your participation in the focus group. There is no penalty for discontinuing participation.

Benefits and Risks: The benefit of your participation is to contribute information to the elementary mathematics community. There are no risks associated with participating in the interview.

Confidentiality: The interview will be recorded; however, your full name will not be recorded. Your name and identifying information will not be associated with any part of the written report. All of your information and interview responses will be kept confidential. Focus group discussions will be recorded and transcribed for analysis. The doctoral student will not share focus group responses with anyone other than her supervisor. Transcripts, recordings, and analysis will be stored in a secure Box account through Vanderbilt University. Data will ***only*** be used for the purposes of answering the research questions and/or hypotheses presented in the Project Overview. Publicly available discussions, presentations, and reports based upon the Confidential Information ***will not*** include information that would make it possible to identify an individual unless specific permission has been granted in writing to do so.

If you have any questions or concerns, please contact the doctoral student, Lisa Ward at lisa.ward@vanderbilt.edu, or her supervisor, Dr. Erin Henrick at erin.henrick@vanderbilt.edu.

By signing below, I acknowledge that I have read and understand the above information. I am aware that I can discontinue my participation in the study at any time.

Signature_____ Date_____

☐ By initialing this box, I agree to participate in the focus group.
☐ By initialing this box, I agree to the audio/video recording of the focus group.

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Appendix C: Table 3

Codes for Interviews

Parent Code	Child Code	Number of Responses	Quotes	Emerging Themes
Assessment		11	"I think one good thing connected to results is that we have the CGI assessments, the pre- and post-assessments. We have data on those, which is great. Does that data get shared widely? Presented widely? I don't know."	Choice
CGI PD	General	60	"No matter what you're going to get push-back from teachers. This is a new way of thinking. And you have to challenge, but just not too much. It's always just a little press every day all the time."	Support
CGI PD	Challenges of the CGI work	65	"In region east we find that, like CGI was almost like a trigger word because they were like, we already have the 3-phase lesson plan and 3-reads. And I'm like, it's the exact same thing."	Support
Core CGI principles/ practices		29	"CGI lends you to be a lifelong researcher, aside from a learner."	Support
Definition of high-quality math instruction	General	3	"I feel like when you walk in a classrooms during math time, and you see everybody engaged and having fun, and there's noise, and they're on task, and that's how you know."	Support

Parent Code	Child Code	Number of Responses	Quotes	Emerging Themes
Definition of high-quality math instruction	Classroom observations	20	"…being able to go in and do baby steps so that we're whatever level the school is at, they are always in the process of doing a little bit more." "So unfortunately, I never really got back into classrooms to see what was happening again."	Support
District leaders' practices	General	108	"I don't know if they could tell you what CGI is, or how the partnership with UCLA could be really supportive. I think it's because that people don't know math. ELA is a lot easier for some people to grasp, and some leaders might be afraid of what they don't know, and they may want to get smarter about certain things before leading the work with a partnership. And so, if you don't know math, you don't want to look like you don't know math to somebody you're in a partnership with." "I get the feeling like our office is up here, and everything else is down there, and that it's only out of compliance that other offices may be called upon. Sometimes it feels like a competition, and that oh, they're doing this. And that's not as good. And so, we're gonna stick like, it doesn't seem collaborative at all. It seems competitive. It would be nice if there was more coherence and collaboration."	Support

Parent Code	Child Code	Number of Responses	Quotes	Emerging Themes
District leaders' practices	Competing initiatives	33	"I've noticed that a lot of schools tend to be over resourced, and by that, I mean, there's so many different initiatives and things going on that that it's overwhelming."	Choice
District support for teachers to be leaders		20	"CGI micro-credential?" "Oh, that'd be amazing. I would go in a heartbeat."	Support
Instructional materials		2	"The district needs to stop adopting curricular tools that directly undermine the instructional practices of CGI."	Choice
Equity		18	"She was changing the way she talked to them, that it was about, 'Oh, wow! Look at what you did!' rather than what you didn't do and celebrated all the things they were doing." "I also want to include the marginalized populations that historically have not received voice in our work."	Relationships
Networks of support	General	1	"I want to look to you as a mentor and a resource."	Support
Networks of support	Community of practice	13	"…the communities of schools … it got very fragmented… I felt really very pulled away from the school sites and really, you know, wasn't really able to go visit or walk classrooms or chat very much with principals about things. We were kind of kept a little bit away."	Relationships

Parent Code	Child Code	Number of Responses	Quotes	Emerging Themes
Networks of support	Principal PD support	13	"I want them to be able to prioritize instruction in a way that they can maximize the learning opportunities for their teachers. Because the more their teachers learn, the better they will become at their craft. But they have to create a culture where that's something that teachers see as an ongoing process."	Support
Networks of support	Professional learning community	8	"To come together to celebrate every peak and every valley."	Relationships
Networks of support	Teacher-leader small group	17	"So, it's just like a space where we can sort of be vulnerable and know that whatever support is given is going to come from a place that we trust and that we respect."	Support
Partnership accountability		29	"It was clear what the vision was from the district perspective, and it helped what our division responsibilities will be in the partnership. So, I would say that …having someone who was about the work and about doing the work in partnership with us, I think that's what led to success. And had a really good momentum building." "I'm sending a text, and I don't get a response back for days... or maybe I don't even get a response back, like that's not a partnership, like we can't work that way, right?"	Support

Parent Code	Child Code	Number of Responses	Quotes	Emerging Themes
Principal's practices	General	109	"I had to be unafraid to bust through a lot of prior district protocols on how we were gonna spend money and how I was gonna pay the teachers to participate." "I knew that teachers needed multiple opportunities to practice what they had learned. …that was brought back to the next professional development. So, we just kept cycling through… I walked into the classroom, and I could see that people had, the teachers had internalized it and were doing it."	Support
Principal's practices	Principal's expectations of teacher-leaders	11	"The principal expects me to be a thought partner to new teachers of CGI and new teachers in general, to be a point person that people can ask questions of, to co-teach lessons and provide PD to answer any questions she has and to look at our data and make sense of it."	Support
Selecting CGI schools		6	"She's been doing the groundwork, talking to principals about what does this partnership entail? What is it, what? What were you supposed to be doing prior to entering the partnership? And then after, right? So, I think, Ha! We've seen what a difference, right, when we go into the partnership that schools are ready."	Choice

Parent Code	Child Code	Number of Responses	Quotes	Emerging Themes
Support for teacher-leaders		30	"I think that (the District) can do to support teachers is really support the work. So, what I mean by that is … the direction that you're going in … then follow that plan that we've put into place, and honor it, not change it because something else came up."	Support
Support for diverse students		13	"I've worked collaboratively with teachers who work in Special Ed, and I've had fully included kids in my class. And they respond so positively to CGI because they are not channeled into a certain direction, they are allowed to express themselves freely."	Support
Sustain and scale		73	"Leadership. We need strong leaders. I need strong leaders that believe in the work." "More time with AIs (administrators of instruction) with us (District math leaders) and leadership from (central office) together just to talk about CGI and roll out and make sure everyone understands what's gonna happen and, you know, maybe doing that, I don't know, three or four times a year."	Support, Choice and Relationships
Teacher-leader identification		39	"I think it's getting the word out. I think it's creating time and space for leaders to understand what the role is, and what the work is, and how this is good for your site."	Choice

Parent Code	Child Code	Number of Responses	Quotes	Emerging Themes
Teacher-leader training	General	42	"Our plan for this upcoming school year was to bring on two teacher-leaders from every school that's participating, particularly focusing on this, the 100 (lowest performing) schools. Bring on two teacher-leaders, they would not be involved in any coaching at all. This year, they would spend this year getting coached in their classroom…"	Support
Teacher-leader training	Teacher-leader responsibilities	20	"At first, like they might observe me. Then I would tell them, when I come back, I will observe you, and then, by the end I had them observe each other." "Teachers that were more comfortable with the work, we did usually where, like, they did part, and I did part."	Support
Teacher participation		16	"We work for those who are willing to open that door, right? To spread the word at their school site, so that more and more people invite us into their classrooms. But it is, it's mixed, the reception that we get at school sites." "I'll walk in during the instructional time and a lot of my teachers already started having a counting collection station so that students can freely go over and do counting collections, and you hear the language from the teachers and their staff during free play, they're asking the questions."	Support

Parent Code	Child Code	Number of Responses	Quotes	Emerging Themes
University internal challenges (negative tone)		45	"I just know that we're really short staffed." "If there was an error with my payroll. I wouldn't know." "I always think that it would be much easier if the check said, this is for this."	Support
University practices (positive tone)		36	"I completely trust the Math Project a hundred percent. So, and I know they're doing good things for our teacher-leaders to help build them up and see themselves as being advocates in many different ways, not just in their own classroom. So, I really appreciate and value that. I found it to be a really good system." "I know if I email anybody on the CGI team that they're there." "I feel like when we get communications from them. It's always so clear. …appreciate it the most because I try to model my communication with staff after that."	Relationships
Vision/goals		38	"We lead from a place of relationships." "Our district now has strategic pillars…it isn't CGI specific. So that means without a project umbrella that focus can look different from network to network." "I believe CGI is part of the current plan. Continuing with the CGI work and the CGI cohorts and adding new schools into that CGI family is part of the plan."	Support, Relationships

Parent Code	Child Code	Number of Responses	Quotes	Emerging Themes
Working with a coach		34	"We need more support and coaching from Math Project." "But part of the reason that the impact is partial is because we can't complete the coaching cycle hardly ever." "I am really blessed to have my coach. She has seen me grow from the moment I, you know, when I was a teacher and now, as a principal, so she has seen my trajectory."	Relationships

Appendix D: Interview and Focus Group Questions Aligned by Project Question

This is the link to a table of an expanded matrix with interview/focus group questions aligned by project question.