Mathematics professional development for elementary teachers: Building trust within a school-based mathematics education community

Paola Sztajn*, Amy J. Hackenberg, Dorothy Y. White, Martha Allexsaht-Snider

Department of Mathematics and Science Education, The University of Georgia, 105 Aderhold Hall, Athens, GA, 30602-7124, USA

Abstract

Despite increased attention in professional development to building communities of teachers, few studies have investigated the development of trust in these communities. This paper presents issues related to trust in a professional development project at an elementary school. The project aimed for school-based elementary teachers and university-based mathematics educators to work together to improve mathematics instruction at the school by developing a mathematics education community of learners, where learners were conceived of as both the teachers and the mathematics educators. This paper addresses the following question: What factors in the project supported the development of trust among mathematics educators and teachers as the community was formed? More specifically, the paper is about one aspect of trust, namely, building school-based elementary teachers’ trust in the university-based mathematics educators. We point to three factors that helped the development of trust and we use care theory to further understand and discuss these factors in the context of in-service teacher education initiatives.

© 2006 Elsevier Ltd. All rights reserved.

Keywords: Teacher community; Community of learning; Trust; Care theory; Mathematics professional development

1. Introduction

Advances in educational research areas such as cognition, school reform, and teacher change have raised important issues for professional development initiatives with teachers. Two of these issues are the role of communities in teachers’ learning processes and the concept of schools as cultures. On one hand, research on situated cognition and communities of learners (e.g., Lave & Wenger, 1991) has pointed to the significance of social interactions and communication in learning processes. On the other hand, research on schools and reform (e.g., Fullan, 1990) has highlighted the importance of understanding schools as organizations, therefore considering schools, and not individual teachers, as the fundamental unit of change in reform initiatives. These two research-based developments, when considered together, suggest the value of in-service teacher education initiatives that are situated within communities of teachers-as-learners in schools. We refer to such communities as teachers’ learning communities.

Research on professional development has also pointed to the centrality of both teachers’ learning...
communities and school-wide efforts in successful teacher education initiatives. Wilson and Berne (1999) examined the research literature on contemporary professional development and analyzed successful initiatives. They identified three themes that cut across different effective projects. Two of these themes relate to teachers’ learning in communities. First, “all of the projects involved communities of learners that are redefining teaching practice” (p. 194). And second, the projects privileged “teachers’ interactions with one another” (p. 195). Hawley and Valli (1999) defined research-privileged “teachers’ interactions with one another” (p. 194). And second, the projects

First, “all of the projects involved communities of learners that are redefining teaching practice” (p. 195). Hawley and Valli (1999) defined research-privileged “teachers’ interactions with one another” (p. 194). And second, the projects

One of the principles in their model for professional development is conducting professional development initiatives that are school-based and integral to school operations. Together, these reviews of research on professional development reinforce the value of initiatives that are situated within learning communities in schools.

Regardless of the growing indication that work within communities is important for teachers’ professional development, researchers are only beginning to understand the ways in which teachers participate in these communities and how communities are built (Grossman, Wineburg, & Woolworth, 2001; Gutierrez, 2000; Little, 2002; Palincsar, Magnusson, Marano, Ford, & Brown, 1998). Wilson and Berne (1999) noted that each successful professional development project they analyzed struggled with how to build community, and in particular, with how to build trust among participants in these communities. We contend that, despite emerging discussions in the professional development research literature about teachers and communities, how trust among participants is built as communities develop has not been widely investigated. Trust seems to be taken for granted in many reports about professional development projects that work with teachers in learning communities.

This paper presents issues related to developing trust in a professional development initiative. Project SIPS (Support and Ideas for Planning and Sharing in mathematics education) aimed for school-based elementary teachers and university-based mathematics educators to work together to improve mathematics instruction at Adams Elementary School (a pseudonym) by building a mathematics education community of learners at the school. This community included the entire school staff and university-based mathematics educators (two faculty members and one graduate assistant). The project underscored the importance of working with a school as a unit of change in mathematics education. Trust—initially defined as “assured reliance on the character, ability, strength, or truth of someone or something; one in which confidence is placed,” according to the Webster’s Ninth New Collegiate Dictionary—was a fundamental aspect of the project.

This article is about the first year of Project SIPS and addresses the following question: What factors in Project SIPS supported the development of trust among university-based mathematics educators and school-based elementary teachers as the community was formed? More specifically, in this article we focus on one aspect of trust, namely building teachers’ trust in the mathematics educators. For the development of SIPS as a teacher education project, trust needed to be in place; for the development of SIPS as a research project, trust needed to be investigated so we could better understand how the community evolved.

We use Noddings’s care theory (1984, 2001, 2002) as a theoretical tool to help us understand the development of trust. It is our view that care theory and the concept of caring relations support the analysis of how trust develops among people who are involved in a relationship (such as participating in a professional development initiative). Although Noddings uses teacher–student relationships to discuss caring relations in education, we use caring relations to conceptualize the trust-building process that occurred during the first year of Project SIPS and, more generally, to study professional development endeavors that focus on developing communities.

We begin the paper with a brief review of the literature on trust and care theory as they relate to communities of teachers. Next, we introduce Project SIPS and its organization, describing project activities during its first year. We discuss the project

1The authors of this paper are the two project directors, the graduate assistant and the external project evaluator. When it is important to identify roles in our report, we use the terms project directors, graduate assistant, and project evaluator, or the term “university-based mathematics educators” or just “mathematics educators” to refer to the two directors and the graduate assistant who worked more often at the school. In other instances, we use a collective “we” to represent the authors’ agreement on issues and concerns raised in the paper.
research and support our findings with data from group interviews conducted with participating teachers at the end of the first year of Project SIPS. We consider three factors that, from the teachers’ perspectives, contributed to the development of trust among teachers and university-based mathematics educators, and we use care theory to discuss the process of building trust.

2. Trust and care

2.1. The importance of trust in schools and learning communities

Grossman, Wineburg, and Woolworth (2001) cautioned that a community is not a “group of people sitting in a room for a meeting” (p. 943). For a group of teachers to emerge as a community, “the well-being of students must be central” (p. 951). In school-based professional development initiatives, such a group operates at the local level, “where face-to-face interactions, dialogue, and trust are necessary for building cohesion” (p. 946). In these communities, participants engage together in decision-making processes and share certain practices that define and nurture the community. Grossman et al. cautioned that for teachers to continue to grow professionally in such communities they need to be learners, “continuing [their] intellectual development in the subject matters of the school curriculum” (p. 951). Therefore, in Project SIPS, teachers were engaged in what we called a mathematics education community, that is, a community where all members continued to learn and develop their knowledge of mathematics and mathematics teaching, while attending to students’ mathematical learning and knowledge. This community was a partnership between school-based and university-based educators. Building such a community is neither a simple nor a short-term process.

Building community across institutions can be particularly challenging. For example, when describing the development of a partnership between university and schools, Jones, Yonezawa, Balleseros, and Mehan (2002) stated: “the first two years in the formation of our collaborative approach to partnerships primarily involved establishing trusting relationships with our colleagues in partnership schools” (p. 6, emphasis added). The authors continued to explain that the university educators had to “convince” local educators of their commitment. Jones and colleagues concluded that “establishing trusting and supportive relationships with schools is vital for the success of any school–university partnership” (p. 7). Their work indicated that trust among school-based and university-based educators is a complex issue to tackle.

Tschannen-Moran and Hoy (1998) claimed that trust is increasingly seen as a “vital element of well-functioning organizations” (p. 334). They examined various definitions of trust within organizations, both from a behavioral and an attitudinal perspective. Across all the definitions, the concept of vulnerability was the one common dimension found. “Where there is no vulnerability, there is no need for trust” (p. 337), the authors noted. They considered a multidimensional definition of trust as “one party’s willingness to be vulnerable to another party based on the belief that the latter party is: (a) competent; (b) reliable; (c) open; and (d) concerned” (Mishra, as cited in Tschannen-Moran & Hoy, 1998, p. 337).

Bryk and Schneider (2003) studied trust in schools through case studies and longitudinal statistical analyses of data from more than 400 elementary schools. They stated that when different people work together, the sense of vulnerability is due to the dependence that exists among people for the successful completion of the work. “Deliberate action taken by any party to reduce this sense of vulnerability in others—to make them feel safe and secure—builds trust across the community” (p. 41). Bryk and Schneider mentioned four aspects of collective work that are required for the development of trust: (a) respectful exchanges with people genuinely listening to each other; (b) personal regard and willingness to extend oneself beyond formal requirements; (c) competence in core role responsibility; and (d) an ethical commitment to the education and welfare of children.

Tschannen-Moran (2001) found a link between level of collaboration in a school and level of trust within that school. Teachers’ collaboration with and trust in the principal, their colleagues, and parents are positively correlated. Brewster and Railsback (2003) highlighted that while trust alone does not guarantee that a school is successful, schools with little or no trust have almost no chance of being successful.

In our work, we extend the discussion of trust within schools as organizations to the context of teachers’ learning communities. We believe that issues of vulnerability are particularly prominent in the work of building teachers’ learning communities.
Tschannen-Moran and Hoy (1998) claimed that at both parties empathize with the others’ desires. Situation; and the identity-based level exists when the parties get to know one another and feel able to predict how they will behave in a given relationship; the knowledge-based level emerges when parties do not trust the educators, the community has little chance of forming. Thus, in projects like SIPS, developing trust is at the core of the projects’ success. Notions of reliance (used in the Webster’s definition of trust) and vulnerability (considered by Tschannen-Moran & Hoy, 1998) are important for developing teachers’ trust in the mathematics educators. 

Bryk and Schneider (2003) explained that when a relationship begins, the parties involved may rely on the general reputation of the other or on commonalities of race, gender, age, religion, etc., to assess trustworthiness. Over time, however, willingness to trust is based on the perceptions each party holds of one another’s intentions, competence, and integrity. Lewicki and Bunker (1996) identified three levels of increasing trust that emerge at different stages in a relationship: provisional, knowledge-based, and identity-based. The provisional level rests on the assumption that both parties want to maintain a relationship; the knowledge-based level emerges when parties get to know one another and feel able to predict how they will behave in a given situation; and the identity-based level exists when both parties empathize with the others’ desires. Tschannen-Moran and Hoy (1998) claimed that at the last level, “each of the parties understands and appreciates the other’s desires to such an extent that each can effectively act in the other’s stead” (p. 337).

### 2.2. Connections between trust and care

The idea of being able to appreciate another person’s wishes and act accordingly is at the center of Noddings’ (1984, 2001, 2002) care theory. Caring is often used to designate a quality of a person. Noddings, however, uses it to characterize a relation between people. This relation requires the participation of a carer and a cared-for. In caring relations, a carer interacts with another person (cared-for) in such a way that the person’s needs are satisfied. Caring relations, however, are not solely determined by the actions of the carer. Without the cared-for’s response or reception of the care, the caring relation is not completed. In this sense caring relations are reciprocal, although in any given situation those who are primarily carers and those who are primarily cared-fors act differently in enacting caring relations.

Initiating and maintaining care involves a carer in two central ways: the carer practices engrossment and motivational displacement (Noddings, 1984, 2002). Engrossment means listening and closely attending to the cared-for’s needs, which in turn requires decentering from the carer’s own immediate concerns. In this situation, decentering does not imply forgetting the carer’s concerns but setting them temporarily to the side. For example, during a professional development session, a teacher-educator-as-carer might become engrossed with teachers’ concerns about getting all their students to memorize basic mathematics facts. Although the teacher-educator might have her own concerns about an emphasis on memorization or drill-and-practice to the exclusion of problem solving and strategic reasoning, the teacher-educator would set these concerns aside in order to listen to and understand teachers’ rationales, desires, and practices related to students learning basic facts.

This engrossment is a prelude to motivational displacement, in which the carer marshals her energy in service of the cared-for’s goals or projects, as if they were the carer’s own. However, motivational displacement does not preclude influencing those goals or projects in some way. For example, out of her engrossment with the teachers, the teacher-educator-as-carer might engage in activities that would allow teachers to work toward their desire to have all students memorize basic mathematics facts, while simultaneously expanding teachers’ awareness of the mathematics inherent in basic facts (i.e., commutativity, distributivity, etc.).
what knowing them signifies, and what practices might orchestrate student learning of them. In this way, the teacher educator may build on the ways teachers seem to be thinking while working with them to generate new ways to think. The teacher-educator-as-carer can then intentionally open opportunities for the teachers-as-cared-fors to develop new levels of understanding, challenging teachers’ assumptions about mathematics teaching and learning.

Receiving care can involve the cared-for in several ways; perhaps the most valuable action is the cared-for’s continuing engagement in her or his (always changing) goals and projects. According to Noddings (2002), this kind of response is what the carer most needs to continue caring. Often the carer’s engrossment and motivational displacement leads to the cared-for feeling attended to and believing that her work and ideas are valued in some way. Feeling cared for, however, is not based solely on consistently feeling listened to or supported. Being cared for involves developing competence—growing, learning—and thus might regularly involve some discomfort. In this sense caring includes attention to both affective and intellectual realms.

When the cared-for comes to believe that the carer has the cared-for’s best interests in mind, he or she is likely to engage in the carer’s suggestions and ideas. Given that this kind of response allows the carer to continue caring, one might say that the cared-for cares back for the carer by responding with such engagement. Thus, in a caring relation, while the carer experiences engrossment and motivational displacement, the cared-for displays engagement, both with the activities set by the carer and with the cared-for’s own projects and ideas. For example, in a professional development setting, a university-based educator-as-carer might ask teachers to design a lesson on counting (for a given grade level) and then engage them in analyzing what different student activity in the lesson may indicate about students’ conceptions of number. A teacher-as-cared-for might find analyzing students’ counting activity in this way to be particularly interesting or useful—perhaps something she or he had not thought about before. If the teacher wrote a series of lessons about counting and began to collect examples of her students’ thinking and what she or he was learning about them, the teacher would be receiving the university educator’s care and caring back. In such cases, both the carer and the cared-for would exhibit care for each other as they engaged in a reciprocal relation.

We contend that when carer and cared-for operate within such a relationship, they develop identity-based trust; they rely on each other, diminishing their sense of vulnerability. In analyzing our work with the teachers in Project SIPS, we understood that in the process of building teachers’ trust in the university-based mathematics educators, teachers and mathematics educators developed caring relations, with the mathematics educators as carers and the teachers as cared-fors.

3. Method

In the following section we describe the organization of Project SIPS and the activities conducted during its first year. We chose to examine the first year of the project because by the end of that year, teachers at Adams Elementary took a blind vote and decided to continue working to build and maintain the community initiated through Project SIPS. Moreover, teachers invited the mathematics educators into their classrooms to work more directly with them during the second year of SIPS. These two events served as evidence that, in its first year of implementation, SIPS had successfully established trust between school-based and university-based educators. After describing the first year of SIPS, we present the data sources and analysis that comprised the research components of the project.

Other measures of the success of Project SIPS can be seen in the increase in the percentage of the school’s students who met or exceeded grade-level expectations in a standardized, criterion-based, mandatory state test (45% in 2002, 61% in 2003, 65% in 2004) and in students’ increased participation during mathematics classes (Sztajin, Allexsaht-Snider, White, & Hackenberg, 2004). These changes, however, are not the focus of this paper. Rather, in this research report we focus on one aspect of the project, namely building trust to support the development of a mathematics education community at the school.

3.1. Adams Elementary

Project SIPS began in February 2001, supported by an Eisenhower Higher Education Grant at Adams Elementary school. Adams is an urban elementary school in the Southeast United States, where 90% of the children qualify for free or reduced lunch (and are considered children of high
Project SIPS involved 27 teachers at Adams Elementary School during its first year: the 18 regular classroom teachers plus nine resource teachers including Title I, Special Education, or English for Speakers of Other Languages (ESOL) teachers. Eighteen of the teachers were White, six were African American and three were Latina. These 27 teachers attended at least 30 hours of SIPS meetings over the year and received three staff development units for participation in the project. Other members of the school community such as the art, music, and physical education teachers; school staff personnel; administrators; paraprofessionals; and student teachers also attended a few SIPS meetings during the year.

An initial background questionnaire administered to the teachers at the beginning of SIPS highlighted the limited attention teachers at Adams had given to mathematics. Twenty-two teachers of the 27 teachers (82%) returned the background questionnaire. Twenty of them responded that, in the previous 5 years, they had not completed any in-service activity where the current research on children’s learning of mathematics was discussed. One teacher indicated that she had participated in a 1-day workshop about mathematics teaching, and another teacher had taken a graduate class in mathematics as part of her master’s program and participated in one mathematics-related in-service initiative.

The university-based mathematics educators involved in Project SIPS had previously worked with a couple of teachers from the school and had supervised student teachers placed at Adams. When mathematics educators and teachers met to discuss the idea of a professional development project for the whole school, provisional trust, at best, existed among them. At that meeting, teachers asserted they were interested in a professional development initiative that was a sustained commitment over a time period of at least 1 year to help increase their students’ performance in mathematics. SIPS was a timely project for the school, and teachers were interested in participating.

3.2. First Year of SIPS

From the beginning of Project SIPS, a fundamental assumption of the university-based mathematics educators was that teachers would try to implement what they saw as the best possible teaching. A second assumption was that, in order to offer all children a mathematics education that is aligned with current societal demands, teachers at Adams Elementary needed to experience new ideas for teaching mathematics. Teachers needed to deepen their content knowledge of the subject, examine their attitude towards mathematics, and expand their pedagogical resources. Mathematics educators also believed that teachers knew their students and classrooms better than mathematics educators did, and that both school-based and university-based educators had important contributions to bring to the development of a mathematics education community of learners at the school. Therefore, Project SIPS was designed to provide teachers with professional development activities to increase their mathematical content and pedagogical knowledge, while building a mathematics education community among the school staff and the mathematics educators.

Mathematics educators began Project SIPS with two working definitions of community. One definition was developed during a doctoral seminar on school-based professional development. It read: “A professional community of mathematics educators is a group focused on students’ mathematical learning that collaborates in an atmosphere of professional trust to achieve shared goals through shared planning, deprivatization of practice, and reflective dialogue.” Deprivatization of practice referred to teachers opening up their instructional practices to feedback and ideas from other community members as well as giving feedback to their peers. Deprivatization increases teachers’ commitment to “practicing their craft in public ways” (Louis, Kruse, & Marks, 1996, p. 183). The second definition of community was generated at Adams Elementary during one of the earliest SIPS meetings. Teachers defined a mathematics education community as “a group of people (students, teachers, and parents) supporting each other in discovering number relationships by sharing resources, ideas, and activities.” For teachers, sharing
resources was a key element of this community. These two definitions set the tone for some of the activities included in Project SIPS. The first highlighted the importance mathematics educators gave to issues of trust and deprivatization of practice as the project started. The second pointed to the importance teachers gave to support and resources.

Table 1 summarizes the main activities conducted during the first year of the project. Table 2 presents four additional activities implemented in the first year of SIPS. Even though these activities had not originally been part of the project’s plan, they turned out to be important for the trust building process.

The worksessions and the monthly mathematics faculty meetings formed the core of the project. SIPS worksessions took place at the school, during school hours. Teachers worked with the mathematics educators within four working groups: pre-K and K; first and second; third and fourth; and fifth grade. Each group met for a half-day activity every other month. Substitute teachers were hired by the project to allow for teacher participation. This worksession model was designed because teachers were more willing to participate in professional development activities during school hours and preferred activities tailored to the specific mathematical needs of their students. Also, the mathematics educators wanted all teachers to participate and attend the meetings, and working outside school hours would not guarantee 100% participation.

During the half-day worksessions, teachers were introduced to activities and ideas for teaching mathematics, explored their knowledge of and teaching strategies for the session’s mathematical topic, and planned lessons to implement in their classrooms. The worksessions addressed topics selected by teachers at each grade level as critical to the grade level. For example, second grade teachers wanted help with subtraction and place value, whereas fourth and fifth grade teachers selected fractions and decimals as important topics to be addressed by SIPS. For each session, the mathematics educators prepared a packet of materials on the topic under consideration. These packets included local curriculum standards, ideas for classroom activities, and articles for further reading. Part of each worksession followed a workshop format where teachers explored mathematics activities proposed by the mathematics educators (some of them from the packets), examined students’ knowledge using videotapes of children solving problems, and discussed examples of children’s work. Another part of the worksession was used for teachers to prepare classroom activities together. Teachers were asked to think about how they could adapt for their students the ideas discussed in the workshop part of the meeting.

Each month, one of the weekly school faculty meetings was a SIPS meeting—the monthly mathematics faculty meeting. These after-school meetings were attended by the whole school staff and, whenever possible, by school administrators. SIPS monthly mathematics faculty meetings were devoted to building and maintaining a mathematics education community across the school. During these meetings, teachers had the opportunity to share with their colleagues what they were doing in mathematics. Teachers presented activities planned during worksessions, shared how the activities were implemented, and discussed their students’

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Project SIPS year one main activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>Main activity</td>
</tr>
<tr>
<td>February 2001</td>
<td>Adams Elementary formed a Mathematics Leadership Team (MLT) of classroom teachers who facilitated communication between mathematics educators and teachers.</td>
</tr>
<tr>
<td>April 2001</td>
<td>The MLT conducted a mathematics needs assessment in which teachers indicated content topics in which they needed help.</td>
</tr>
<tr>
<td>May 2001</td>
<td>MLT members, school administrators, mathematics educators, and a mathematician (project consultant) identified topics to be covered in staff development activities.</td>
</tr>
<tr>
<td>Throughout the school year</td>
<td>Teachers participated in half-day, grade-specific professional development worksessions during school hours every other month.</td>
</tr>
<tr>
<td>Throughout the school year</td>
<td>Teachers participated in monthly mathematics faculty meetings.</td>
</tr>
<tr>
<td>May 2002</td>
<td>The MLT conducted a summative project evaluation.</td>
</tr>
<tr>
<td>June 2002</td>
<td>Teachers participated in a project evaluation day.</td>
</tr>
</tbody>
</table>
participation and reactions. Teachers also solved mathematics problems during these meetings, working together to increase their mathematical knowledge and to experience some of the ideas the mathematics educators proposed for them to use in their classrooms. Finally, the monthly meetings were also used for “business purposes” and collective decision-making, allowing the whole community to plan together as the project unfolded.

### 3.3. Data sources

A plethora of data was collected during the first year of SIPS, including videotapes of all monthly faculty meetings; teachers’ written reflections; mathematics educators’ field notes; reports of the members of the Mathematics Leadership Team (MLT) evaluation reports; the graduate assistant’s log of activities; and evaluation interviews. Although various sets of data corroborate the results we report, this paper focuses on the interview data.

At the end of the project’s first year, an external project evaluator interviewed all teachers who had participated in the project. The interviews were conducted with focus groups of three or four teachers, organized by grade level (seven groups), with the addition of some Title I, special education, and ESOL teachers. These semi-structured interviews lasted approximately 45 min and were audio-taped and transcribed (see Appendix A for the interview protocol). They were designed to serve as a space for group discussion, encouraging “participants to talk to one another, asking questions, exchanging anecdotes, and commenting on each others’ experiences and points of view” (Kitzinger & Barbour, 1999, p. 4). Mathematics educators asked the project evaluator to conduct these interviews because they wanted to ensure that teachers had the opportunity to speak openly about any concerns or recommendations for the project. The project evaluator gave the mathematics educators transcripts of all interviews and an evaluation report.

### 3.4. Data analysis

SIPS, as a research project, had the overall goal of understanding “the complex world of lived experience from the point of view of those who lived it” (Schwandt, 1994, p. 118). Understanding this world means interpreting it, and in its research approach, SIPS sought to “elucidate the process of meaning construction and clarify what and how meanings are embodied in the language and actions of social actors” (p. 118). From this perspective, it was our goal to consider teachers’ perceptions about the development of a mathematics education community of learners through Project SIPS, focusing on factors that, for the teachers, were important for building trust. That is, we aimed to identify factors that the teachers mentioned as decreasing their vulnerability, increasing their reliance on community members, enhancing their engagement with project activities, and fostering collaboration with the university-based mathematics teacher educators.

Some of the factors and characteristics that follow, highlighted by the teachers as important for building trust, are aspects of SIPS that were purposefully included in the project with the goal of building a community by making teachers feel welcome. Some of them derived from our initial assumptions and from our knowledge about

---

2Two of the interviews had to be conducted by the project graduate assistant due to scheduling conflicts.
teachers’ lives and teacher learning; others were included in the project with the goal of fulfilling the needs teachers voiced as the project evolved. However, from the set of assumptions and activities that we, the mathematics educators, used to build community, we did not know which ones teachers would perceive as important to them in their process of developing trust.

This report uses participants’ language as its main data source, analyzing teachers’ discussions during the focus groups interviews. Through content analysis of the interview transcripts, we searched for patterns in the teachers’ conversations about SIPS and for recurring words and themes that expressed teachers’ trust in the mathematics educators and in the project. Although the word trust was never used in any of the interviews, we searched for evidence that teachers saw themselves as relying on the mathematics educators’ character, ability, and knowledge. We also searched for factors that, from the teachers’ perspective, helped them develop confidence and engagement with the project, its leaders, the activities carried out, and the community they were developing. We looked for factors that made teachers feel valued, less vulnerable, and more willing to collaborate with mathematics educators in activities carried out within the community.

As we examined the interviews, we coded all instances in which teachers indicated trust in the project, using the initial emerging categories of mathematics educators’ actions and the project’s characteristics (which were later refined, as presented in the next section). We also examined the transcripts in search of indicators that might be interpreted as examples of teachers’ lack of confidence in the leadership, goals, or activities associated with Project SIPS. After completing this initial coding, we looked within interviews and between the seven interviews to bring up issues that were important to most teachers, trying to represent an overall view of the participants. We used triangulation (Lincoln & Guba, 1985) across several sets of data (e.g., researchers’ fieldnotes and records from monthly faculty meetings) to corroborate our findings from the interviews. The project evaluator’s report was used to contrast and augment the claims about teachers’ perceptions, so the project evaluator played an important role in enhancing the trustworthiness of the findings by continuously challenging assertions from the analysis.

4. Findings: factors that support building trust

Three main aspects of Project SIPS emerged from the interviews with teachers as factors that helped build trust during the development of a mathematics education community. We labeled these factors as: (a) the professionalism of the mathematics educators; (b) the organization of the project; and (c) the establishment of school-university relations. These factors are organized into specific characteristics that the teachers mentioned as important to them and to their participation in the community. In our discussion we use quotes from the teachers as evidence of the importance of the factors and characteristics for teachers’ development of trust in the mathematics educators and in Project SIPS.

4.1. Professionalism of the mathematics educators

In evaluating SIPS, all interviewed groups commented on aspects of what the mathematics educators did and said that helped teachers feel valued and comfortable within the project. Teachers highlighted the availability of the mathematics educators as well as their attitudes toward the teachers and the school. As one teacher explained, “I think the instructors’ attitude had a lot to do as to how willing we were to do anything.” Teachers talked about the flexibility of the mathematics educators, and the respect the mathematics educators had for teachers’ knowledge, experiences, and questions. Teachers also commented about the mathematics educators’ knowledge of classrooms and school realities. Combined, we labeled these characteristics the professionalism of the mathematics educators. This professionalism facilitated teachers’ integration in the community, their communication with the mathematics educators, and their confidence that the mathematics educators had something to contribute to the community and to teachers’ professional growth.

Flexibility. During the first year of SIPS, meetings got canceled, rescheduled, and changed due to other school demands on teachers. Mathematics educators were repeatedly asked to revise their plans or to come back another day.

[The mathematics educators] were here every single time. And sometimes at the last minute, they’d be here, set up, ready to go, and that meeting would be canceled on them. So, that
happened a couple of times, and that’s kind of frustrating, although they didn’t seem to be frustrated by it. They were very flexible.

Teachers talked about the mathematics educators being “generous with their time,” and doing “everything in their power to work with us.” From the teachers’ perspective, the mathematics educators understood the constraints of school life.

For the teachers, flexibility referred not only to time management but also to the content and focus of the meetings. Teachers felt mathematics educators were willing to adjust meeting agendas to devote time to immediate issues teachers wanted to discuss. SIPS meetings, one teacher explained, “were flexible so that the objective could be centrally focused as needed.” However, teachers also felt the mathematics educators had a plan and they would bring meetings back to the topic under consideration. So teachers talked about the mathematics educators being “flexible but with a purpose.” One teacher explained:

The fact that they were organized, you know, some things I don’t like to be organized to the tee, but you know me, I really like organization and it bothers me that I think that people are just planning as they go. And they [the mathematics educators] seemed to be very organized. Very flexible, but they’d still go back to the purpose.

Respect for teachers’ knowledge and experience. Teachers saw mathematics educators’ flexibility as an indication that they valued teachers’ knowledge, experiences, and time. Mathematics educators modeled discussions in which everybody was heard and different opinions (or solutions to mathematical problems) were valued. Teachers were asked to share their knowledge and they took this request as an indication that their ideas were respected. As one teacher put it, “they would elicit from staff [teachers] too. Like they would say, ‘Well, this is what I did, what did you do?’ and then get the staff to kind of take over. So they did good process.” Teachers also felt that, because the mathematics educators got to know them and their experiences, time was not wasted. “They didn’t waste your time going over the basics, to sit there and listen to a lecture that you already knew about.” Most important, from the teachers’ perspectives, the mathematics educators were willing to work on issues that the teachers deemed important, not only valuing their knowledge of their students, curricu-

lum, and school, but also making project activities more interesting and pertinent to them. A teacher stated,

I think that is what made it so successful, because they did not come in and [say] “we are going to help you with these.” They came in and said, “What do you need help with?” And I mean, that made a difference, like [my colleague] said, with those coming in, how we approached it and how successful the program was.

The establishment of a relationship between university-based and school-based educators where both sides were viewed as knowledgeable and contributors to the learning process helped open communication between all SIPS educators. Teachers and mathematics educators exchanged many e-mails and phone calls. In the interviews, teachers from all grades talked about being able to ask questions of the mathematics educators and feeling that their questions were honored. Teachers also commented on how available the mathematics educators were to help them in any way they wanted, which increased teachers’ impression that the mathematics educators respected them. Teachers mentioned that the mathematics educators were “very open to us,” “great about responding if you call or e-mail them,” and teachers “felt free” to ask questions and bring their issues to the table.

Knowledge about classroom and school realities. “You know when they know their stuff when they can behave in that open-ended way,” one teacher said when discussing how knowledgeable she thought mathematics educators were about mathematics in schools and classrooms. Teachers expected mathematics educators to know mathematics in the context of schools and “real” mathematics classrooms. In general, teachers’ notions that mathematics educators “knew something” were related to the classroom activities and strategies suggested in the workshops, which teachers saw as “working” in their classrooms. Many teachers also commented on noticing the mathematics educators’ awareness of teachers’ routines and school life. “You get a sense that they have worked with children extensively and been in the classroom themselves,” one teacher said. This comment was echoed in different interviews.

Like sometimes when I was in college, professors would teach you things that sound really cute but in all reality, they don’t apply to the real classroom. And I think the things they came in,
that kind of conveyed that, to me, was like, they were aware of that. Just because it is cute it’s not going to work. And they were, they had a lot of things that, everything they brought to us pretty much worked.

Another teacher summarized the groups’ ideas:

I just think all the university people involved were really aware of the realities of classroom experience, which I think is helpful. They were much more aware of what time constraints there might be and also did a good job of trying to make things that they brought to us be useful. And I appreciated that.

4.2. The organization of the project

Besides characteristics of the mathematics educators as professionals, project characteristics related to the organization of SIPS were highly valued by the teachers. Two of these characteristics—providing teachers with time and resources and giving teachers practical ideas to take to their classroom—helped teachers appreciate the project, further developing the trust they placed in SIPS initiatives.

Provided teachers with time and resources. Time and resources are two commodities Adams teachers highly valued. As part of SIPS, teachers had access to time and resources. In particular, teachers had time to plan activities together, to share what they were doing, and to talk about teaching children mathematics.

In our small groups, when it was just kindergarten, first, and second, there were some neat things that other teachers were doing that I had never seen before. And I’ve taught for 20 years, you know, it was like, that’s, that’s I think the biggest thing in teaching, that teachers need to share. And [SIPS] gave us that time to sit down, and you know, say “Now, what are you doing in your class?”

Teachers appreciated “having just time to think,” and “time to work with and get to know a new teacher.” Sharing times during worksessions and faculty meetings were important to teachers because they could focus on mathematics during these SIPS activities without distraction from the many other demands schools place on teachers’ time. Teachers commented that SIPS “gave us time that we don’t normally have during the day to really plan with each other and then it set aside time just for math, where we might not have that time.”

Working together through SIPS, mathematics educators and school administrators started a mathematics resource center in the school’s media center. Mathematics resources were bought, giving teachers access to new teaching materials and ideas. In particular, the school purchased children’s literature books that could be used in mathematics lessons, and the mathematics educators wrote a small grant to buy bi-lingual big books (in English and Spanish) to be used for mathematics teaching. Together with time, these resources represented an important asset of the project. They made SIPS meaningful to teachers’ lives and helped teachers appreciate the project. One teacher’s comment summarizes these ideas.

They worked with more materials. So I’ve checked [them] out, used [them]. And I had never really thought that much about, you know, you kind of get, get going on your own thing and forget about what’s out there. So I feel like it was a pretty good thing. Because I saw a whole lot of new things that I went and instantly checked out.

Giving teachers practical ideas to take to their classroom. Useful classroom ideas were very important to SIPS teachers. In relation to developing trust, these ideas helped not only the development of teachers’ trust in the mathematics educators and their knowledge, but also the development of trust in the way the project was organized. Teachers perceived SIPS ideas for the classroom as an asset to the project because “they worked,” “children enjoyed [them],” and “children participated.” Even if concepts such as what “works” in the classroom had at times different meanings for school-based teachers and for university-based mathematics educators, from the teachers’ perspective, workability, as well as student enjoyment and participation, were important aspects of the ideas SIPS generated.

Teachers also enjoyed the packets mathematics educators prepared for the SIPS worksessions. These materials were perceived as an important part of the worksessions, something teachers could take with them. All groups talked about these packets during the interviews, and the selected quote below summarizes how much teachers valued the packets.
I really liked them. The packets they put together for us, for the day session. [They] related to QCCs, a lot of the activities that we went over and discussed were in there. There were research and articles to kind of back up what we had talked about that day, and they made us think and carry [it] a little further. A lot of the materials that you would need in order to make some of the things that we talked about, they put the copies in there so that we could learn those things and re-create those things with the students.

4.3. Establishment of school-university relations

The 100th day of school, the math night, the work teachers did with pre-service elementary teachers (undergraduate students at the university), and the on-site work of the graduate assistant were not part of the initial plans for SIPS. They were initiated by the teachers and negotiated as the project unfolded. They were highly valued by the teachers as SIPS activities. All teachers talked about these events in the first-year evaluation interviews and considered them important parts of building the project’s mathematics education community. For the teachers, these events helped establish a relation between the school and the university. This relation integrated school and university activities, either because the mathematics educators participated in something that was originally organized by the school, because university students worked directly with the school teachers and children, or because university-based mathematics educators were willing to be at the school to help teachers.

For the teachers, the integration of these two different spheres of action (school and university) was important. Teachers felt that they learned from their work with the undergraduate and the graduate university students and vice versa. Teachers also felt that the participation of the mathematics educators in the Math Night made it really a community event. Teachers appreciated working together to make the 100th day of school a big mathematics day for all the children. Finally, teachers who took advantage of the support available to them through the presence of the graduate assistant at the school saw that as a valuable resource. The following quotes represent comments made about each of these events.

I think, you know, when we planned the activities for the 100th day of school, and when [we] planned some of the activities for the math night, there was a more community kind of sharing.

It was wonderful when they had some of their students come out and teach [chorus of agreement] small lessons to our students, and the children loved it, and it gave the students at the university good experience to be able to sit down and feel what it was really like when you’ve got living children in front of you.

Well I specifically just arranged with [the graduate assistant] for her to come in and work with four little boys in my classroom who were just struggling. […] And she’s had some interesting thoughts, she was talking about counting backwards, and so I’ve done a lot more counting backwards in my classroom with my children to assist them in kind of solidifying the idea of numerals.

5. Discussion

Overall, the teachers reported that the way Project SIPS was carried out was important to its effectiveness in developing trust and building a mathematics education community of learners within the school. Teachers’ comments led us to conclude that certain aspects of the project made teachers feel less vulnerable and therefore more willing to collaborate and participate in activities within the community. We claim that through flexibility, respect for teachers’ knowledge and experience, knowledge about classroom and school realities, provision of time and resources, suggestions of practical ideas to take to the classrooms, and integration of school and university contexts, Project SIPS created an atmosphere that made teachers feel safe and secure, allowing trust to develop within the SIPS community.

The characteristics of SIPS that teachers highlighted in the focus groups interviews are important trust-building aspects for professional development initiatives. They allow trust among members of the community to go from provisional to identity-based, from being based on the reputation of teachers and mathematics educators to being based on an understanding and appreciation of each other’s interests and needs.

Working to fulfill teachers’ needs while attending to our assumptions and beliefs brought up many

3The state’s Quality Core Curriculum.
dilemmas for us. Wilson and Berne (1999) write about the challenge in “bridging the chasm between what one’s clients—the teachers—want and expect and one’s own goal,” a dilemma Richardson (1992) called the “agenda-setting dilemma.” For example, SIPS was built around the premises that offering teachers resources was important for the community to develop and for mathematics instruction to change at Adams Elementary. This was stated in teachers’ definition of community and proved to be important for the teachers as the community unfolded. However, we soon learned that providing resources to teacher did not guarantee that teachers would use them as we had envisioned. So, on one hand, in order to become a community, we had to learn to accept teachers’ use of resources. On the other hand, in order to also respect the project goal of improving mathematics instruction, we had to question teachers’ use of these resources. Paying attention to how teachers were using their resources offered opportunities to challenge some of the teachers’ assumptions about learning and teaching mathematics.

5.1. Using care theory to conceptualize trust building factors

During SIPS, mathematics educators acted primarily as carers. From the very beginning of the project, they demonstrated engrossment in the teachers’ needs and in teachers’ activities in the school by meeting with and listening to the teachers. SIPS was based on teachers’ interests, and teachers had a central role in determining how the project ran and how the community developed. By respecting teachers’ knowledge and by taking classrooms and school realities into account, mathematics educators practiced decentering. They exhibited motivational displacement when they took the teachers’ ideas as a basis for activities during worksessions, when they procured materials and supplies requested by teachers, and when they acted flexibly by adapting to teachers’ schedules and needs throughout the year. In integrating university- and school-based activities by, for example, using parts of SIPS worksessions to plan for math night and creating an on-site position for the graduate assistant, mathematics educators-as-carers demonstrated to teachers-as-cared-fors that their experiences were connected.

The teachers at the school were primarily cared-for in that they received the mathematics educators’ care and responded with engagement and enthusiasm—and occasional groaning, for example, over working hard on mathematics problems during faculty meetings. Teachers’ evaluation interviews indicated that they felt listened to and perceived that the work of SIPS was based on teachers’ needs. They also indicated that mathematics educators were bringing in new and different ideas to improve mathematics instruction at the school. When trying new classroom ideas that “worked,” teachers felt competent; they believed they were learning. Because teachers came to believe that the mathematics educators had their interests in mind, they responded by supporting the project, by demonstrating interest in the ideas mathematics educators were bringing to the community, by trying activities, and by showing motivation in teaching mathematics. The teachers cared back for the mathematics educators in a way that allowed the relations (and the project) to continue.

In practicing motivational displacement, mathematics educators also experienced discomfort. Because mathematics educators cared, they had to learn to participate in a mathematics education community in which change was not necessarily always the norm. For teachers to feel heard and respected, the mathematics educators aligned their work with teachers’ goals. For example, entire worksessions of Project SIPS were used to discuss basic facts and standard algorithms for the basic operations, topics deemed fundamental by the teachers. Although the mathematics educators agreed that these topics were important, they considered a focus on other topics, such as place value, to be a higher priority. In the long run, aligning the work of the mathematics educators with the teachers’ goals (not necessarily the mathematics educators’ goals or agenda) proved valuable because, as teachers indicated, it allowed teachers to notice that mathematics educators had teachers’ interests in mind, supporting the development of trust. In the short run, however, letting go of their goals was not always an easy task for the mathematics educators. Although they believed it important to let go of their own ideas at certain times, it was hard to judge when to do so and when to express their points of view.

When letting go of their goals on certain occasions, the mathematics educators did not abandon their ideas. For example, mathematics educators-as-carers challenged teachers-as-cared-fors to solve mathematics problems during faculty meetings that were
often a source of both discomfort and excitement for the teachers. By trying to notice and balance teachers’ discomfort and excitement, mathematics educators worked toward the competence-increasing aspects of enacting care.

As mathematics educators engaged in caring relations, they had to work on their listening skills, paying attention to what teachers had to say, to where teachers were in their professional lives, and to how teachers wanted to work together. Mathematics educators learned to listen to teachers as they shared classroom ideas that were not aligned with current standards for teaching mathematics, still offering support and resources. Mathematics educators learned to try to push teachers forward in their thinking about children’s mathematical knowledge without going so far that teachers would disregard what was being said. In summary, mathematics educators were faced with many dilemmas and had to face the challenge of learning when to push and when to let go, when to express their ideas and when to listen quietly, when to be active as reform-agents and when to step back as status-quo observers.

6. Concluding remarks

In its first year, Project SIPS worked to develop a mathematics education community at Adams Elementary School and to build trust among community members—particularly among school-based teachers and university-based mathematics educators. From the teachers’ point of view, three characteristics of the project helped in the trust building process: the professionalism of the mathematics educators, the organization of the project, and the establishment of school-university relations. In particular, teachers appreciated the flexibility, values, and knowledge of the mathematics educators; the resources and ideas the project provided; and the integration between school and university contexts.

Highlighting the aspects of SIPS that built trust in the evolving community is an important result of the project. These aspects can be taken into consideration in other professional development initiatives that aim at working with teachers’ learning communities in schools. The aspects of SIPS discussed in this paper can help educators who are interested in working with communities of teachers and who understand the importance of beginning such work by building trust.

However, the implementation of some of these aspects of SIPS in professional development initiatives can bring dilemmas for mathematics educators as they organize their project to fulfill teachers’ needs. These dilemmas can be analyzed within the context of caring relations. In SIPS, teachers highlighted the motivational displacement of the mathematics educators as an important trust-building aspect of the project. As mathematics educators worked towards fulfilling teachers’ needs and understanding teachers’ interests, they were flexible, respectful, knowledgeable, and resourceful; they brought the school and the university together. We believe that the development of caring relations sustained SIPS and is one way to “track” the development of trust in school-based communities.

In addition, we contend that caring relations can have other significant implications for professional development endeavors in mathematics education. First, as in SIPS, caring relations may facilitate discussion about community development by offering a language in which to frame key issues—such as trust and reciprocity—in collaborative learning efforts. Second, practical and theoretical aspects of caring relations may ease mathematics educators’ discomfort in setting their reform ideas to the side at times during professional development projects because the maintenance of caring relations requires this kind of decentering. And third, explicitly enacting caring relations in professional development projects between university-based mathematics educators and school-based teachers may provide an important model for how other groups in the school might interact with regard to mathematics education.

As we continue to investigate school-based programs of professional development in mathematics education, there is a need to critically examine the ways in which caring and trust are built among participants as a foundation for community development and community learning. Since community building has been identified as an important element in successful professional development, it is clear that we need a more carefully-nuanced understanding of the ways communities are built and maintained. Thus the research within the SIPS mathematics professional development project points to important aspects of trust and caring relations to be further investigated in understanding the development of teachers’ learning communities.
Appendix A. Interview questions for teachers at the end of the first year of SIPS

1. What did you see as the goals and purposes of Project SIPS when it first began?
2. Have you seen the goals and purposes of Project SIPS evolve during the year? If so, how have they evolved?
3. Originally, for the organizers of the project, a key goal of Project SIPS was to build a school-based community for sharing and learning about mathematics education. Do you think that at your school you have been developing that kind of community? Can you think of any examples of how this might be happening?
4. Another goal of the organizers was for collaboration to emerge between university mathematics educators and teachers at Adams Elementary. Have you seen that collaboration between teachers and mathematics educators happen? What aspects of the collaboration have you felt worked well? Which aspects might have been more challenging or problematic?
5. What, if anything, do you feel that you have gained or learned through participation in Project SIPS?
6. Have you taken anything from Project SIPS into your classrooms? If so, how did it work?
7. Do you see any ways in which students’ mathematics learning at Adams Elementary has been influenced by teachers’ participation in Project SIPS? If so, what evidence do you have of this influence on the students?
8. Do you have any other reflections about your experience with Project SIPS or suggestions for next year?

References


