Proceedings of the Annual Meeting of the Georgia Association of Mathematics Teacher Educators

Volume 4 | Issue 1 Article 3

2010

Collaborating to Meet the Standards: Implications for Professional Development

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DOI
10.20429/gamte.2010.040103

Collaborating to Meet the Standards: Implications for Professional Development[1]

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Abstract

Researchers from the University of Georgia interviewed 27 Mathematics 1 teachers about their experiences during the first year of the high school implementation of the Georgia Performance Standards (GPS). We report our findings about teachers' experiences with Mathematics 1 professional development and describe features of professional development that teachers identified as most beneficial. Some teachers offered suggestions for professional development that differed from the professional development they had experienced. In addition, we found that many teachers used collaborative strategies to meet the demands of the new curriculum and the perceived inadequacies of resources and training. We discuss the various models of collaboration that teachers described and conclude with a discussion of the implications of our findings for future professional development that supports the GPS.

[1] The work reported here was supported by a grant from the National Science Foundation, (Grant No. 0227586). The results reported here are the authors' and do not necessarily represent the views of the NSF.

Collaborating to Meet the Standards: Implications for Professional Development[2]

"How do you teach in a way you've never even seen taught?" (Leandra[3], Interview)

The present study is part of a larger research project conducted during the summer and fall of 2009 with teachers implementing the new Georgia Performance Standards (GPS) high school course called Mathematics 1 (de Araujo, Jacobson, Singletary, Wilson, Marshall, & Lowe, in preparation). One intention of this reform was to provide a curriculum that is *mathematically integrated*, combining the strands of algebra, geometry, and statistics in each high school course, and *reform-oriented,* balancing the development of concepts, skills, and problem solving with the expectation that learning takes place in a student-centered classroom and in the context of realistic and relevant mathematical tasks (GADoE, n.d.; GADoE, 2007a; GADoE, 2007b).

Howson, Keitel, and Kilpatrick (1981) identified barriers to curriculum change, noting that, "attempts to change the subject matter, its organization, or its mode of presentation have to be accommodated to teachers' beliefs as to what good teaching is and what it is reasonable to expect of pupils" (p. 66). Discussing curriculum change at a large scale, Burkhart, Fraser, and Ridgway (1990) remarked, "unless goals underlying the innovation are shared by the people who are to implement it, success is unlikely" (p. 10). These observations motivated our interest in studying Mathematics 1 teachers' conceptions of integrated mathematics in the larger research project. However, the data collected to answer this question also illuminated the teachers' experiences of professional development before and during the first year of implementation. In this paper, we report teachers' descriptions of professional development and collaboration in the context of a radical curriculum change. We argue that the collaborative work teachers undertook compensated for the percieved inadequacy of professional development experiences designed to prepare them for teaching Mathematics 1. The present study may inform future professional development in Georgia and teachers' ongoing efforts to collaborate.

Literature Review

The Role of the Teacher in Curriculum Change

Research on mathematics curriculum suggests that large-scale changes are difficult to achieve (Burkhart et al., 1990; Howson et al., 1981). Ponte's (1994) work explained that teachers play a significant role during curriculum reform because their enactment of the curriculum influences how reforms are achieved. Burkhart et al. detailed several barriers to curriculum change and strongly recommended that curriculum developers attend to the "problems of implementation" (p.4). They noted that innovation might require teachers to face the possibility of failure and commit a large amount of time and effort for the implementation to be successful. Ball and Cohen (1999) found that teachers' practices did not directly change as a consequence of a curriculum reform. Rather, in order to have meaning, reforms must be related to the daily practice of teachers (Elmore, Peterson, & McCarthy, 1996).

Professional Development during Curriculum Change

Within the literature on professional development, there is an emerging consensus regarding what constitutes effective professional development (Garet, Porter, Desimone, Birman, & Yoon, 2001; Putnam & Borko, 1997; Sowder, 2007; Wilson & Berne, 1999). For example, Abdal-Haqq (1996, p. 1) developed a thorough list of characteristics that define effective professional development. Professional development:

1) Is ongoing.
2) Includes training, practice, and feedback; opportunities for individual reflection and group inquiry into practice; and coaching or other follow-up procedures.

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[3] The participants' names used in this study are all pseudonyms.

3) Is school-based and embedded in teacher work.
4) Is collaborative, providing opportunities for teachers to interact with peers.
5) Focuses on student learning, which should, in part, guide assessment of its effectiveness.
6) Encourages and supports school-based and teacher initiatives.
7) Is rooted in the knowledge base for teaching.
8) Incorporates constructivist approaches to teaching and learning.
9) Recognizes teachers as professionals and adult learners.
10) Provides adequate time and follow-up support.
11) Is accessible and inclusive.

Similarly, Putnam and Borko (1997, p.1224) reviewed the various characteristics found in the literature on teacher learning and teacher education and developed the following four essential features characterizing effective professional development:

1) Teachers should be treated as active learners who construct their own understanding.
2) Teachers should be empowered and treated as professionals.
3) Teacher education must be situated in classroom practice.
4) Teacher educators should treat teachers as they expect teachers to treat students.

Garet et al. found that locating professional development within a teacher's day might allow for teachers' learning to connect to their classroom teaching and result in longer-lasting change. This review of defining characteristics suggests that professional development must be situated in the daily practice of teachers in order to be effective.

Although lists of effective characteristics of professional development are prevalent in the literature, all too often, the dominant method of professional development is the training model, which typically focuses solely on developing skills and demonstrating activities (Ball & Cohen, 1999; Garet et al., 2001; Little, 1993). Little's commentary on professional development asserted that the training model does not adequately address the demands current curriculum reforms make of teachers; "Professional development must be constructed in ways that deepen the discussion, open up the debates, and enrich the array of possibilities of action" (p.148). Ball and Cohen argued that most professional development sessions and workshops are "often intellectually superficial, disconnected from deep issues of curriculum and learning, fragmented, and noncumulative" (p.3). In order to move away from the traditional model and toward a more effective model of professional development, mathematics educators must consider alternative models.

Collaboration as a Method of Professional Development

Little (1993) suggested that there exists a problem of "fit" between the prevailing, traditional models of professional development and various educational reforms. One alternative model for professional development is collaboration among teachers through a professional learning community. Vescio, Ross, and Adams' (2008) review of the research on professional learning communities emphasized that teachers' experiences are best understood through reflection and dialogue with others. Collaboration can lead to the development of professional knowledge and increased student learning through extensive discussions of practice.

Literature on collaboration identifies essential characteristics of teachers' collaboration in professional learning communities. Louis, Kruse, and Marks (1996, p. 760) provided defining characteristics:

1. Shared values and norms
2. Collective focus on student learning
3. Collaboration
4. Deprivatized practice
5. Reflective dialogue

The central goal of teachers' collaboration is to promote student learning (DuFour, 2004; Vescio et al., 2008; White, Sztajn, Hackenberg, & Allexsaht-Snider, 2004). When facilitated appropriately, collaboration typically shifted teachers' thinking from with the activity of teaching to what students are learning (Vescio, Ross, & Adams, 2008).

Darling-Hammond and McLaughlin (1995) argued that reforms in education require teachers to critically reflect on their own practice if they are to teach in new ways. Wilson and Berne (1999) explained what is at stake; "New curricula, when filtered through and shaped by old beliefs, turn[s] into something ... traditional" (p 177). The literature on effective professional development and the research that suggests collaboration is an effective form of professional development both provide insight into the experiences of our participants and also may inform future teacher development efforts in Georgia.

Methodology

The purpose of the larger study was to understand teachers' conceptions of integrated mathematics curricula such as the GPS (for more examples, see Usiskin, 2003), and we began our research with the assumption that teachers' conceptions of integrated mathematics might not be explicitly or consciously held. Therefore, we elicited detailed descriptions of teachers' practice in order to infer teachers' conceptions of integration. Often, descriptions of practice also involved unsolicited descriptions of professional development and collaboration. Gleanings from these data constitute the empirical basis for the present study.

Two-Stage Design

We employed a two-stage design to capture a variety of teachers' conceptions of integrated mathematics curricula. In the first stage of our design, focus group data yielded detailed descriptions of participants' experiences implementing Mathematics 1. We followed the focus groups with a second stage involving in-depth interviews in order to refine our emergent understandings of teachers' conceptions of integration and to explore other themes related to teachers' experiences in the first year of implementation.

We recruited Mathematics 1 teachers for focus groups at regional curriculum training sessions and with referrals from university faculty and doctoral students. We conducted six focus groups comprised of 4 to 6 participants each. The 27 teachers in this study represented 16 secondary schools in 9 school districts in northeastern Georgia. Of our participants, 9 were male; 7 had 3 or fewer years of teaching experience, 10 had between 4 and 10 years of experience, and 10 had more than 10 years of experience. Nine of our participants taught at Title 1 schools.

Each focus group responded to questions about participants' experiences teaching the new curriculum. We video-recorded the focus groups from two angles to capture each participant's facial expressions, gestures, and speech. Taking each group as a unit of analysis, we developed analytic charts listing each focus group episode (defined topically or by turn-taking) along with themes in that episode (Saldaña, 2009). Themes were developed using open coding (Charmaz, 2006) and identified throughout the focus group data set. During our analysis we discovered tangential themes that did not address the initial research questions but were important to the context of the research. These tangential themes informed our understanding of teachers' experiences with the new curriculum and informed the questions we used during in-depth, individual interviews.

We used maximum variation sampling for the second stage of inquiry, interviewing 9 of the initial participants who had the widest views on integrated mathematics curriculum (Patton, 2002). These interviews may have allowed participants more freedom to share individual opinions and more opportunity to describe their practice than the focus group interviews. We chose in-depth, semi-structured interviews to foster consistency across interviews and yet allow for the social construction of meanings between the researcher and the interview subject (Patton, 2002; Seidman, 2006; Charmaz, 1990). The first four interview questions were directly relevant to our research question while the remaining two explored tangential themes such as collaboration and professional development.

Findings

When teachers discussed their experiences with Mathematics 1 professional development, some offered suggestions for professional development that differed from what they experienced. In addition, we found that many teachers felt their training and preparation for Mathematics 1 was inadequate. These teachers used collaborative strategies to engage the demands of the new curriculum over the long term and worked with peers to create solutions for the day-to-day challenges they faced. We discuss the various models of collaboration that teachers described and highlight the ways these collaborative arrangements helped teachers address the challenges of implementing the new curriculum.

Experiences with Professional Development

Teachers described their experiences with regional workshops they attended in preparation to implement Mathematics 1 in their classrooms. These summer workshops allowed participants to become familiar with the new curriculum materials and resources. Allison emphasized the focus on resources, "We had a three-day workshop over the summer, and they showed us the book we were using and the resources we would be given to go with the course" (Focus Group). The discussion of resources often included a specific focus on the task-based nature of the new curriculum. Brook said, "they gave us [an] example of [task] work, of what good work looked like, and what the task should look like when they were completed" (Focus Group). Although participants appreciated the ways in which these workshops provided an introduction to the new mathematics curriculum, they emphasized their need for more sustained training focused on specific content topics in order to support "this big transition" (Leandra, Interview).

Our participants also described professional development that took place on a smaller scale. For example, Lindsay described a professional development experience where "the county pulled people together to work on lesson plans and interpret the standards" (Focus Group). One participant went to a professional development focused on teaching statistics in an integrated mathematics curriculum. In this session, the facilitator presented a sample lesson and demonstrated how the statistics in this particular lesson could be integrated with other strands of mathematics. He expressed a desire for additional experiences with a specific focus (Drew, Focus Group). Other suggestions are described in the following section.

Suggestions for Professional Development

Many of the participants' suggestions for professional development seemed to reflect the demands of the Mathematics 1 curriculum. Participants were not accustomed to teaching a reform-oriented integrated mathematics curriculum that explicitly called for student-centered approaches and emphasized content connections. This unfamiliarity was expressed in Leandra's question, "How do you teach in a way you've never even seen taught?" (Interview). Many participants expressed a desire for additional training to learn how to teach in a student-centered classroom as well as training to learn how to teach students with a task-based curriculum. Jeremy said that he wanted to "just observe good teachers…I haven't seen many good examples of teachers that are good at doing task-based teaching" (Focus Group). Participants also wanted to observe teachers that were "successful at integrating [mathematics] to give us examples" (Vivica, Focus Group).

These participants' comments about professional development suggest that the implementation of Mathematics 1 was perceived as more momentous than a change in curricular resources. For many participants, it also necessitated a shift in their pedagogical approach. Leandra explained her colleagues' dilemma:

> They're trying to take something with a whole new philosophy and then integrate it into their own teaching philosophy; ... you're teaching with something that wasn't intended to be taught traditionally, ... and you're frustrated. (Interview)

Many participants shared in this frustration and described how they worked with peers to overcome the difficulties they experienced.

One thing that we're trying to do with all this new GPS stuff is we've got a lot of learning

> communities going on where we didn't have those learning communities before ... Let's not reinvent it. Let's see what they're doing [in another county]. ... And you can [also] do that within your school. (Lacey, Interview)

Lacey was not the only participant who described the ongoing professional development that teachers were able to provide each other through collaboration. The data we report strongly suggests that collaborating with peers came to be understood as a valuable resource for the teachers implementing the new curriculum.

Experiences of Collaboration

Collaboration was a frequent topic of discussion in focus groups and interviews. Although we did not ask focus groups directly about collaboration, the topic came up in all six, and this led us to ask about collaboration in the follow-up interviews. Many of the teachers who participated in the study reported experiencing some new form of collaboration with colleagues in response to the demands of the Mathematics 1 curriculum, but the goals for collaboration, the activities collaboration entailed, and the support for collaboration including the investment of time and resources varied widely among the different school contexts. One focus group participant remarked,

> The collaboration—statewide, locally, regionally—everybody's like 'Math 1 is crazy, let's get together.' Everybody's getting together and sharing ideas and there is all this information online....It's really cool to see how big that push is for collaboration statewide (Drew).

Much of the collaboration described by participants in this study was undertaken at teachers' own initiative. Without exception, collaboration was described in a positive light, often as a useful and even necessary commitment given the demands of implementing Mathematics 1.

The collaborative groups that the interview participants described varied widely in composition, from "just the teachers involved in Math 1" (Colleen, Focus Group) to "three schools in our county that are working very closely together" (Vanessa, Interview). Other groups involved the entire mathematics department at a school, the 8th and 9th grade teachers in a district, or "all the Math 1 teachers, math coaches, and department heads" in a region (Lacey, Interview). The groups also varied in the amount of time they met and the support that administration afforded for the collaborative meetings. One group of 8th and 9th grade teachers met just three times during the semester. Another group met two mornings per week for an hour, one group met "frantically" during lunch, and a fourth group met weekly on Sunday afternoons. Some teachers described the collaboration as mandatory, "a forced collaboration, if you will" (Jasmine, Focus Group). Others were offered a stipend by the county (Colleen, Focus Group). One striking observation common to teachers' descriptions of collaboration was its perceived utility and importance; it "made a big difference," was "really great," "very nice," and "a huge part of any success that we experienced" (Colleen, Leandra, Jeff, & Ryan, Focus Groups).

Teachers had many different reasons for collaborating; among these were sharing the workload and facilitating professional learning. Mathematics 1 strained departments' time resources because the new curriculum required teachers to develop new lesson plans; to research and consolidate instructional materials from the state, from Regional Education Service Agencies, from textbooks, and from online supplements; and most significantly to design or adapt tasks that were aligned with the new curriculum and appropriate for their students. Collaboration allowed teachers to share the large increase in workload. At one school, for example, different teachers planned lessons for different days of the week (Vanessa, Interview). Many groups modified tasks to make them shorter, more appropriate for English language learners, more engaging by adding pictures or changing the context, or rewrote the task questions to meet specific instructional goals.

Many teachers reported the importance of collaboration for learning the content knowledge to teach Mathematics 1, especially Geometry and Statistics for teachers who had primarily been teaching Algebra under the old curriculum. One teacher had this advice, "Dig up an old friend or old professional that knows the material and go talk with them" (Mitch, Focus Group). Collaborative groups also shared teaching strategies, discussed how to teach tasks effectively, and reviewed student work on assessments as feedback for their instruction. Allison gave examples of departmental discussion when collaboration

focused on a common assessment, "'Everyone in a whole class missed number 2, so we did something wrong.' A lot of our collaboration turned into, 'Where can we remediate?'" (Focus Group). Brian described similar interactions, "We could go talk to others, 'What did you all do to handle this?'" (Focus Group).

Although we did not ask about participants' past experiences with collaboration, some teachers said that the collaboration they had experienced before Mathematics 1 had rarely been helpful. For example, Vanessa said, "You get too many teachers in a room, and you're not productive" (Focus Group). However, the overwhelming demands of the new curriculum seem to have convinced many that avoiding collaboration is folly; "If you went in and tried to teach Math 1 all by yourself, you would probably sink and fail" (Mitch, Focus Group). Lacey said, "I don't think you had that open line of communication between educators that you do now because of the GPS" (Interview). Intended or not, many of our participants believed that the curriculum change has caused a shift in professional expectations for mathematics teachers in Georgia and this has provided a new purpose for collaboration.

Discussion

Results from our study corroborate findings from the literature on curriculum change that identify the important role of teachers and the challenges they face. These results also provide evidence that teachers who implement curriculum reform require professional development that is "more fully compatible with the complex demands of reform and the equally complex contexts of teaching" (Little, 1993, p.129). Effective models of professional development should have relevance to the needs of teachers and focus on students' learning. More could be done, perhaps, to meet Drew's expectation for sustained professional development that engaged the details of practice and focused on particular lessons.

The implementation of Mathematics 1 required a departure from participants' former teaching practice, and many teachers evidently undertook a reformulation of their own beliefs about teaching and learning in order to have success with the new curriculum. Some of our participants described the challenges they and their colleagues faced. For example, Leandra discussed her colleagues' difficulty aligning their teaching philosophy with the new curriculum (quoted in Suggestions for Professional Development). Our research suggests it may be effective for teacher education in Georgia to better equip inservice and preservice teachers with the skills and models useful for engaging in effective, long-term collaborative work in their practice. An absence of common scheduling or adequate time for collaborative work may be a barrier, but our research provides examples of creative solutions that demonstrate this barrier is not insurmountable.

Our research was descriptive, and thus we cannot answer several pressing questions raised by this study. Future research might clarify the relative efficacy of the various models of collaboration our participants' discussed. In addition, further research might provide a better understanding of why the context of this curriculum change seems to have given some teachers more compelling reasons to collaborate and more worthwhile experiences with collaboration than in the past and would likely help teacher educators support future collaborative work.

To encourage the critical reflection advocated by Darling-Hammond and McLaughlin (1995), models of professional development must allow teachers to rethink their practice as both teachers and learners. Many participants in our study reported experiencing support from a community of colleagues and considered this support essential to their implementation of Mathematics 1. It seems likely that teachers will need more opportunities to grow than brief trainings can provide in order to become proficient with the GPS. Future professional development efforts might well consider how to establish and sustain long-term, collaborative groups in departments and districts to support teachers who are learning a new way to teach with a new curriculum.

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