

# THE CRITICAL ROLE OF INSTITUTIONAL CONTEXT IN TEACHER DEVELOPMENT

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*In this paper we document the importance of institutional context in both constraining and enabling the work of mathematics teachers. We build from our current and ongoing collaborative efforts with middle-grades mathematics teachers to provide an analytic approach and resulting analysis that clarifies the critical role of institutional context in teacher development. The analysis delineates the communities of practice whose enterprises are concerned with how mathematics is taught and learned in the district and the importance of their interconnections (cf. Wenger, 1998). Our approach can best be viewed as a tool designed to support transformative educational change as iterative processes of continual improvement in mathematics education.*

## INTRODUCTION

In our ongoing collaborative efforts with teachers, we have noted the importance of the institutional setting in both constraining and enabling the work of teachers and school leaders. As part of our research efforts, we have therefore developed an analytical approach for situating mathematics teachers' instructional practices in the context of the institutional settings of the schools and school districts within which they work (Cobb, McClain, et al., 2003). The approach treats instructional leadership and teaching as distributed activities (cf. Spillane, Halverson, et al., 2001) and involves delineating the communities of practice (cf. Wenger, 1998) within a school or school district whose enterprises are concerned with how mathematics is taught and learned. As will become apparent when we document the various communities of practice within the district and the interconnections between them, teachers and leaders constitute significant aspects of the environment for each other (cf. McDermott, 1976). The members of each community therefore afford and constrain the practices developed by members of other communities. It is in this sense that we will speak of the practices of each community being partially constituted by the institutional setting in which its members act and interact.

We illustrate the analytic approach by focusing on one urban school district in which we have collaborated with a group of middle-grades (students age 12-15) mathematics teachers for the past three and a half years<sup>1</sup>. Our goal in working with the teachers has been to support their eventual development of instructional practices in which they place students' reasoning at the center of their instructional decision making. In the envisioned forms of instructional practice to which the collaboration

aims, students' interpretations and solutions are viewed as resources on which the teachers can capitalize to achieve their instructional agenda. Instructional materials would then serve not as blueprints for instruction but as resources that teachers adapt to the context of their classroom as informed by conjectures about both students' reasoning and the means of supporting its development. Furthermore, implementation of text resources would become a process of conjecture-driven adaptation rather than one of fidelity of reproduction. However, the complex and demanding nature of instructional practices of this type indicate the importance of social resources such as those afforded by the development of a professional teaching community (Gamoran et al., 2003). When situated within such a community, the process of instructional improvement then becomes a collaborative, problem-solving activity in which teachers generate knowledge about both students' mathematical reasoning and the process of supporting its development (Franke et al., 2001). The development of the professional teaching community was therefore a concurrent goal of our research.

In the following sections of this paper, we begin by providing an overview of the setting. We then discuss the theoretical framework and methodology we use for analyzing a school or district as a configuration of communities of practice. Against this background, we present an analysis of both the relevant communities of practice and the interconnections between them. In doing so, we clarify the critical role of school and district leaders in mediating the state- and federally-mandated high-stakes accountability program and claim that these were not solo accomplishments, but were instead partially constituted by the institutional setting in which they were developed and refined.

## SETTING

The school district, which we call Washington Park, is located in a large city in the southwest United States and serves over 5,000 students, 42% of whom are minority students. There is high turnover in student enrollment. As an example, the student turnover rate during the 2001-2002 academic year at one of the three middle schools was 29% and the English Language Learner population doubled during a two-week period. A high-stakes accountability testing program was in place when we began collaborating with teachers in the district. In this program, students are tested in mathematics at each grade level on a nationally norm-referenced test. The results of these assessments are disseminated widely in the local media, and school and district leaders are held accountable for student performance. The district is of interest because school and district leaders have responded to the tests *not* by attempting to regulate teachers' instructional practices, but by giving teachers access to material resources and by supporting their development of social and personal resources. As an example, the district adopted a National Science Foundation [NSF] funded middle-grades textbook series and received a NSF implementation grant. In addition, the district routinely hired mathematics educators to conduct professional development sessions with the mathematics teachers.

## THEORETICAL FRAMEWORK

The theoretical approach that we have taken when conducting the analysis builds from the work of Wenger (1998) to involve identifying the communities of practice within the school and district whose missions or enterprises are concerned with the teaching and learning of mathematics. In doing so, we take Wenger's three interrelated dimensions that serve to characterize a community of practice as constructs for our analysis: 1) a joint enterprise, 2) mutual relationships, and 3) a well-honed repertoire of ways of reasoning with tools and artifacts. These constructs guided our analysis as we worked to identify the significant communities of practice. We then built from Wenger to characterize the interconnections between these communities by focusing on 1) boundary encounters, 2) brokers, and 3) boundary objects. The approach grew out of pragmatic concerns for clarifying the critical role that teachers and school leaders play in mediating high-stakes accountability testing since an emphasis on high-stakes tests often stands in direct conflict with instruction focused on students' deep understanding of significant mathematical concepts.

Methodologically, we used what Spillane (2000) refers to as a snowballing strategy and Talbert and McLaughlin (1999) term a bottom-up strategy to delineate the communities of practice within the Washington Park district whose missions or enterprises are concerned with the teaching and learning of mathematics. The first step in this process involved conducting audio-recorded semi-structured interviews with the collaborating teachers to identify people within the district who influenced their classroom instructional practices in some significant way. The issues addressed in these interviews included the professional development activities in which the teachers have participated, their understanding of the district's policies for mathematics instruction, the people to whom they are accountable, the influence of high-stakes test scores on their instructional practices, their informal professional networks, and the official sources of assistance on which they can draw. In order to corroborate these interview data, we also administered a survey that addressed these same issues to all middle-grades mathematics teachers in the Washington Park district. The second step in this bottom-up or snowballing process involved interviewing the people identified in the teacher interviews and surveys in order to understand both their agendas as they relate to mathematics instruction and the means by which they attempt to achieve those agendas. We then continued this process as we identified additional people in this second round of interviews who actively attempt to influence how mathematics is taught in the district. This comprehensive data corpus allowed for the longitudinal analysis of the emergence of the communities of practice by testing and refining conjectures against the data in a systematic manner as described by Cobb and Whitenack (1996) which is consistent with Glaser and Strauss' (1967) constant comparative method.

## RESULTS OF ANALYSIS

### Communities of Practice

As we analyzed these data, the communities of practice that we identified, in addition to the *professional teaching community* that emerged from our collaboration, were the district-wide *mathematics leadership community* and the *school leadership community* in each of the three schools in which the teachers work. The core members of the *mathematics leadership community* were three *mathematics teacher leaders* [MTL's] based in each of the three middle schools who receive 50% release time from teaching to lead the district's instructional improvement effort in mathematics. A number of teachers were also members of this community but had more peripheral roles. The MTL's were, for their part, full members of the professional teaching community and participated in all sessions.

In addition to the semi-structured interviews conducted with the core members (e.g. the three MTL's), the data generated to document the activities of the mathematics leadership community include a series of follow-up interviews, scheduled monthly meetings, frequent informal discussions, and an ongoing email exchange with the MTL's as well as observations of professional development sessions that the MTL's conducted in the district. These data consistently indicate that the MTL's viewed themselves as members of a broader community of mathematics education reformers and had a relatively deep understanding of and a commitment to the general intent of reform proposals for mathematics teaching and learning. The data also consistently indicate that the joint enterprise of this community was to improve the mathematics understanding of all students by assisting teachers in developing a relatively deep understanding of both the mathematical ideas addressed in the reform textbook series and the ways in which students' reasoning might evolve as they complete instructional activities. The MTL's assumed that fidelity to the curriculum correlated strongly with high test scores.

The *school leadership community* in each of the three middle schools consisted of the principal and the assistant principal. In addition, the mathematics teacher leader and one or more teachers in each school were peripheral members. We have relied on semi-structured interviews conducted with the school leaders to document the activities of these communities, and have triangulated these interviews with the collaborating teachers' descriptions of the settings of their work. These data document that the joint enterprise of each of the school leadership communities was to support mathematics teachers' efforts to improve the quality of mathematics teaching and learning in the district while remaining vigilant about student test scores on high-stakes tests. The interviews indicate that the school leaders, like the MTL's, viewed fidelity to the curriculum as evidence of effective instructional practice. They pursued their agenda for mathematics teaching and learning by providing resources, arranging

schedules to facilitate collaboration, and modifying observation forms so that they supported reflection rather than assessment.

### **Interconnections between Communities of Practice**

To this point, we have documented that the practices of the professional teaching community, mathematics leadership community, and school leadership communities were in broad alignment. However, we have not explained either how this alignment was sustained or how the practices of the mathematics leaders and school leaders related to and influenced teachers' instructional practices. To address these issues, we have to take the analysis one step further by delineating the interconnections between the various communities that we have identified. In doing so, we distinguish between three types of interconnections: 1) boundary encounters, 2) brokers, and 3) boundary objects.

The first type of interconnection arises when teachers' or leaders' routine participation in the practices of their community involves *boundary encounters* in which they engage with members of another community. As an illustration, analysis of data indicates that boundary encounters occurred in the Washington Park district when both mathematics leaders and school leaders conducted classroom observations. Additional boundary encounters included grade-level meetings that the MTL's conducted with teachers, and regularly scheduled meetings between the school leaders and the mathematics teacher leader in each school. The mathematics teacher leader's institutionalized role as authority with expertise in the teaching and learning of mathematics was readily apparent in these meetings.

The second type of interconnection that we documented concerns the activities of *brokers* who were at least peripheral members of two or more communities of practice. Brokers can bridge between the activities of different communities by facilitating the translation, coordination, and alignment of perspectives and meanings (Wenger, 1998). Their role can therefore be important in developing alignment between the enterprises of different communities of practice. In the Washington Park district, the MTL's were the most visible brokers. As we have noted, they were not only members of the mathematics leadership community, but were also core members of the professional teaching community and peripheral members of the school leadership community. In this pivotal role as brokers between their own and the other communities, the MTL's had at least partial access to the practices of both the professional teaching community and the school leadership community. This in turn enabled them to provide the school leaders and teachers with access to the practices of each other's communities.

The third type of interconnection between the communities of practice involves the use of a common, boundary object by members of two or more communities as a routine part of their activities. Analysis of data clarifies that in the Washington Park

district, boundary objects include the curriculum materials, the State Standards, and reports of students' test scores. As Wenger (1998) notes, boundary objects are based on what he terms reification<sup>2</sup> rather than participation. Wenger defines reification as "the process of giving form to our experience by producing objects that congeal this experience into 'thingness'" (p. 58). He argues that in creating reifications, "we project our meanings into the world and then we perceive them as existing in the world, as having a reality of their own" (p. 58). However, as he goes on to emphasize, reifications cannot capture the richness of lived experience precisely because they are frozen into a concrete form such as a text. As a consequence, although a reifying object is a relatively transparent carrier of meaning for members of the community in which it was created, there is the very real possibility that these objects will be used differently and come to have different meanings when they are incorporated into the practices of other communities. Even when this occurs, common boundary objects that are used differently in different communities can nonetheless enable the members of these communities to coordinate their activities. Consequently, as Star and Griesemer (1989) demonstrate, successful coordination does not require that members of different communities achieve consensus. Boundary objects do not therefore carry meanings across boundaries but instead constitute focal points around which interconnections between communities emerge.

## DISCUSSION

The analysis we have presented demonstrates that the critical role of individual school leaders were not solo accomplishments but were instead partially constituted by the institutional setting in which they worked. We have also seen that in meeting regularly with mathematics teacher leaders in their school, they had the opportunity to negotiate their interpretations of the reform instructional materials with a person who was constituted in the district as a content expert. These and other aspects of the institutional setting in which the school leaders worked both afforded and constrained their development of leadership practices that involved supporting teachers' learning by giving them access to resources and by engaging in the discourse of *educational reform* rather than of *high-stakes testing* when they interacted with them (cf. Confrey, Bell, & Carrejo, 2001). In a very real sense, what it meant to be a school leader in the Washington Park district was partially constituted by the institutional setting in which they developed and refined their practices. Consistent with the distributed perspective on mathematics teaching, the analytical approach also characterizes individual teachers' instructional practices as situated and as partially constituted by the institutional setting in which they work. The analysis is therefore significant because it provides a case where high-stakes accountability testing did *not* delimit opportunities for teachers to develop instructional practices that focus on significant mathematical ideas and that aim to support students' development of relatively sophisticated mathematical understandings.

A number of investigations document that teachers' instructional practices are profoundly influenced by the institutional constraints that they attempt to satisfy, the formal and informal sources of assistance on which they draw, and the materials and resources that they use in their classroom practice (Ball, 1996; Brown, Stein, & Forman, 1996; Feiman-Nemser & Remillard, 1996; Nelson, 1999; Senger, 1999; Stein & Brown, 1997). The findings of these studies indicate the need to take account of the institutional setting in which teachers develop and refine their instructional practices. It is only when we do so that we can adequately explain both our success in supporting the teachers' development of increasingly sophisticated instructional practices and the district's success as assessed by student performance on high-stakes tests.

The potential value of such an approach is that it can support teacher development efforts by enabling researchers and teacher educators to monitor the institutional settings of the sites in which they are working on an ongoing basis. In this regard, the analytic approach can best be viewed as a tool that is designed to support transformative educational change as iterative processes of continual improvement in mathematics education. Analyses of the topology of communities of practice and their interconnections can provide guidance for reform efforts that aim to transform rather than merely augment currently institutionalized instructional and leadership practices.

### Notes

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2. Reification as Wenger (1998) defines it should not be confused with Sfard's (1994) use of this same term.

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