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TEACHERS OF LATINO STUDENTS REFLECT ON THE IMPLEMENTATION OF A MATHEMATICAL TASK

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Teachers in two multi-grade study groups in elementary schools with large populations of Latino students reflect on the implementation of an open-ended mathematical task. In this research, interviews and study group discussions provide the teachers' reflections on the implementation of the task and on their practices in general that create learning environments for their Latino students. Multiple categories representing the teacher reflections were developed and our focus is on those practices that teachers consider effective and specific factors that impact practice. The design of this study proved to be especially useful in promoting teacher reflective conversation.

INTRODUCTION

The purpose of the paper is to present findings across two elementary teacher study groups affiliated with research conducted by the Center for Mathematics Education of Latinos/as (CEMELA)¹. The Center investigates the connections between mathematics, language and culture. Therefore, for this study we are interested in the reflections of teachers who work predominantly with Latino students in the context of the classroom implementation of a mathematical task. Especially, we explore teachers' reflections in about issues of language and culture in relation to students' mathematical understanding. The task of choice was an open-ended geometry problem written for fourth grade students, selected from the National Assessment of Educational Progress (NAEP). In providing this task and giving teachers opportunities to reflect on its implementation, we asked: What do teachers of Latino students reflect on as they discuss their mathematics instruction? This study contributes to the emerging literature on mathematics professional development for teachers of Latino students.

THEORETICAL FRAMEWORK

Research indicates that reflection about practice should be a central component of teacher professional development (Freese, 1999; Manouchehri, 2002), and that teachers benefit from experiences that foster collective construction of knowledge about subject matter, students and pedagogy (Ball & Cohen, 1999). Reflection opens teachers' possibilities to revisit teaching and make meaning of the different

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dimensions of practice, creating opportunities for change by providing opportunities to examine thoughts and actions. Schön (1983) explains that practitioners make meaning of their experiences and actions by building understanding of the assumptions embedded in their practices, making them explicit, critically analyzing them, and later integrating them into new actions. In the context of our Teacher Study Groups (TSGs), reflection on practice becomes central to teachers' learning process and it is the focus of our study.

RELATED LITERATURE

Two bodies of literature inform this study. First, we draw from research that highlights the potential of learning communities in which teachers reflect on their classroom practices and carefully consider the context in which their students' mathematical explorations take place and the resulting student work (Ball & Cohen, 1999; Franke & Kazemi, 2001; Kazemi & Franke, 2004). TSGs, as learning communities, create the context for teachers to reflect and collaborate on constructing mathematical understanding of their teaching practices and students' mathematical learning (Crespo & Featherstone, 2006). It is within the context of reflection within teacher study groups, that this research is framed.

Second, our study is informed by research supporting instructional practices where students have opportunities to communicate and consolidate their understandings of mathematics. The expectation is that students will analyze, make conjectures, evaluate the mathematical strategies presented by others, and use mathematical language to express their ideas (NCTM, 2000). Khisty's (1997) research furthers our understanding on teaching practices that support Latino students and second language learners in the mathematics classroom, by suggesting teachers understand multiple factors that influence group interactions such as "teacher discourse and learning environments that promote student talk." (p. 295)

METHODS

Participants

Two multi-grade, elementary TSGs at two universities in two different states in the Southwest of the United States engaged teachers in reflection of their own mathematical knowledge and practice as it relates to Latino students. Teacher study group 1 (TSG1) involved 8 K-5 (5 to 10 year-olds) teachers, from three different schools. Their classroom experience ranged from 5 to 20 years. The group integrated 2 male and 6 female teachers, where 5 of the teachers were Latino/as and the rest were Caucasian. All but two of them taught in schools serving predominantly Latino students in low socio-economic communities with a high percentage of English language learners (ELLs). Teacher study group 2 (TSG2) involved 9 teachers of grades 3-6 and 1 gifted and talented (GATE) teacher from three different schools. These teachers included 7 Latino and 3 Caucasian females and ranged from 3 to 27 years of classroom experience. The schools had, on average, a 90% Latino student population, with 31% of the students classified as ELLs.

During the school year 2006-07, TSG1 met twice a month for 2 hours each session. This study group explored a framework to rethink the integration of problem solving into their mathematics curriculum. Teachers engaged in exploring mathematical problems, analyzed samples of students' work produced during classroom implementation of different problem solving activities, and discussed related literature provided by TSG facilitators or participating teachers. During the same time frame, TSG2 met a total of nine times each semester with each meeting lasting approximately one and a half hours. The participants of this study group explored mathematical tasks as learners, reflected on their practice and engaged in analyses of student work as it related to mathematics content.

Design

Researchers jointly designed a professional development experience that would invite teachers in both TSGs to reflect on the adaptation and implementation of a "rich mathematical task" (Crespo & Featherstone, 2006, p. 99). The task selected was a geometry measurement problem from the fourth grade 1996 NAEP. Several reasons explain the selection of this NAEP task. First, even though Latino students are outperformed by white students on the measurement strand of the NAEP (Lubienski, 2003), studies show that Latino students can participate meaningfully through their mathematical discourse (Anhalt, Fernandes, & Civil, 2007). In addition, this particular 'comparison of areas' task would allow students to use a variety of strategies to solve the problem, and teachers to think about (a) the mathematical concepts students need to understand, (b) issues of language involved in comprehending tasks, and (c) materials/tools that support students' understanding.

Our design has elements in common with the SATRR model (Crespo & Featherstone, 2006) in which teachers engage in collective inquiry. First, teachers explored the task as mathematical learners and then discussed possible challenges students might encounter regarding language and mathematical understanding. Next, teachers at each site implemented the task in their classrooms, adapting it to fit the needs of their specific students. Finally, teachers reflected on the task implementation and focused on the students' language and mathematical understandings. An important expectation guiding this design was that teachers would be prompted to reflect on how they adapt instruction and make decisions on the appropriate instructional approach considering different aspects of students' needs.

Data Collection and Analysis

Data collection included videotaped study group sessions at each site (pre and post classroom implementation), videotaped selected classroom sessions during task implementation (three sessions at each site), and follow-up semi-structured interviews with the teachers whose task implementation was videotaped (three interviews at each site). The interviews were designed to provide teachers with the opportunity to reflect back on different aspects of the task implementation, especially (a) the task introduction, (b) the materials provided to students to work on the task,

and (c) the different strategies students used to work on the task and some of the challenges they confronted. To achieve this purpose, each videotaped classroom session was watched several times, and relevant scenes were selected to highlight the different aspects of the task implementation. Each teacher interview involved a similar set of questions, some of which were illustrated by selected video scenes shown during the interview process as a means to prompt reflection on the different aspects of the task implementation.

Initially, the two research teams individually openly coded (Strauss & Corbin, 1998) the transcripts of the follow-up interviews and the study group session after the task implementation, looking for themes in the teachers' reflections. Teams of researchers, collectively and individually, repeatedly refined the emerging codes. With the help of TAMS Analyzer, a computer-based qualitative research tool, the following seven categories were developed: (a) Teachers' expectations, (b) Factors that impact practice, (c) Practices considered effective, (d) Issues raised about students or practice, (e) Knowledge of students, (f) Recognition teachers have about their practice, and (g) Teachers' notions about teaching and learning.

RESULTS

In analyzing teachers' reflections and subsequently organizing them into categories, two themes emerged from the data. Teachers reflect mainly on: (a) the multiple practices they consider effective in teaching and supporting their students to achieve mathematical understanding, and (b) the factors impacting their work in the classroom. It is important to notice that the categories are not exclusive and they inform each other. For instance, what teachers consider an effective practice strongly relates to their knowledge of the students, their expectations, and their notions about teaching and what ELL students need to learn.

Reflections on Practices that Foster Mathematical Understanding

Teachers from both TSG1 and TSG2 reflected on what practices were more typical and important in their instruction and that seemed to be more effective to promote Latino students' mathematical understanding. Among these practices, teachers identified: using appropriate mathematical vocabulary, the importance of creating learning situations that foster peer interaction, supporting students to become active thinkers and independent decision makers, providing varied materials and resources to solve problems, and supporting student learning through the review of concepts, the validation of their responses and strategies, and using students' native language when needed. Teachers' words clearly illustrate the significance of the most relevant practices identified at both TSGs:

1. About the importance of developing students' academic language and using appropriate mathematical vocabulary, Ms. Alvarez (TSG2) explained:

I think about the language. As I'm saying things I'm trying to think of the correct language. And to make sure that I'm using the mathematical terms . . . so I go slow

because I'm always trying to think of how to say it correctly and using the vocabulary, so that they in turn will use it also.

2. In relation to developing students' mathematical vocabulary and the need of using their native language as a way to support students' learning, Ms. Salas (TSG1) commented:

A lot of the kids in here would need [Spanish] and it would help them. And because you just can't give it to them all in English because then it would hinder their learning. This way you explain both English and Spanish and "I can do that, I understand what she is talking about now..."

3. Teachers underscored the importance of creating learning situations that would encourage students to interact and learn from each other. They drew on the belief that students benefit from collaborative work within problem solving contexts. Mr. Sloan, (TSG1) explained:

If the environment is set up correctly, the children will learn just as much or more from each other than they will from your instruction, ... in something like this, I remember there were a couple of places where kids were doing as well or better a job than I would be doing explaining to another child how they got the answer.

4. Related to valuing student interactions, teacher's emphasis is on promoting learning situations that would support students to be active thinkers and to develop and apply higher thinking skills that they could transfer to other situations in which they are required to problem solve. Ms. Alvarez (TSG2) explained her expectations:

I want them to be able to think on their own. I've always told them, when you are solving a problem try and, I try and teach them different ways, different strategies, to solve something. And I want them to be able to reason and think, okay here I have a problem, what can I do to figure this out?

Reflections on Factors that Influence Practice

Data indicated that among the most influential factors on what teachers teach, what they do in the classroom, and what they consider relevant for students learning are (a) the adopted reform curriculum; (b) their knowledge of students in terms of dispositions for learning, language, prior knowledge, and mathematical understanding; (c) their previous personal and professional experiences as learners and teachers of mathematics; (d) their expectations or what they value for students to learn and understand; (e) the TSG professional development experience.

It is important to notice that both groups of teachers identified the adopted reform curriculum as their referent to decide what to teach. However, other factors seemed to have significant influence in their practice. These teachers reflected on the importance to have high expectations and to build knowledge about their students, especially to be able to understand what students are able to accomplish, what their struggles are, and what they know that might help them to be successful with problem-solving.

Mr. Sloan (TSG1) thinks that teachers

should never go into something with a... predetermined notion of whether or not the kids will be able to solve the problem. My attitude is... anything I give them they should be able to do it, and if they can't do it immediately then maybe you just need to . . . give them a few more tools, a little more background knowledge. But I think way too often we kind of have preconceived notions of what they're capable of and so they'll live up to those expectations. So if they are low expectations, they live up to them.

Teachers' personal, educational, cultural and linguistic experiences, as well as their experiences in the classroom, seemed to affect the way they perceived effective teaching and the conditions that foster students' learning. Ms. Alvarez's (TSG2) memories illustrate this point:

You know we didn't grow up that way. Where we had ... to memorize everything, and some things I'm learning along with them. I told them, you know I memorized, like when we were working with fractions, especially with division I told them, you know all I memorized, was you turn them and you multiply. And I go "I didn't understand why. And now you guys are lucky because you are understanding 'why,'" and I learned along with them.

Professional development was a relevant factor affecting the way teachers interpreted students' work and the instructional decisions they made to provide for students' learning needs. Teachers raised questions, expressed doubts, and understandings they have gained through the TSG process. For instance, Ms. Segovia (TSG1) and Ms. Castillo (TSG2) revisit their practices based on their insights of students' understandings:

You see what they did and what they didn't get and it shows you how you taught it or what you didn't teach, ... for some reason they just didn't understand it the way you taught it. Or maybe something in your thinking, [you need to ask yourself], what am I not doing? Do I need to go back and review myself to see what's missing? (Ms. Segovia)

I've learned ... that the kids don't have to have the one way to solve things. I used to just think it was just one way of solving. Because that's the way I learned you know. And now to find all these different ways of solving one problem, I think it's just amazing (Ms. Castillo).

DISCUSSION

This exploratory study contributes to the growing literature on mathematics professional development for teachers of Latino students. Teaching mathematics to Latino students is a complex endeavor and teachers need meaningful professional development activities that open the space for in depth reflection on their practice, the content they teach, and its impact on students' mathematical understanding (Crespo & Featherstone, 2006; Téllez, 2004).

Particularly relevant from our study is that teachers reflected on language specifically referring to teachers' use and students' development of appropriate mathematical vocabulary. Teachers referred to their decisions as educators to make this aspect of

language in their classroom highly visible. Additionally, teachers reflected on their practice of using Spanish to support students' mathematical understanding. Teachers at both sites explain how the use and incorporation of Spanish into their mathematics teaching supports students' comprehension of mathematical concepts (Khisty, 1997). However, it is significant to note that, although the purpose of the TSG implementation task was for teachers to discuss elements of culture and issues of language regarding students' mathematical understanding, there were very few instances in which teachers referred to the impact of students' language and culture as an integral part of the teaching and learning process. We find this intriguing and deserving of further exploration.

Teachers underscored the importance of creating learning situations that promoted Latino students to become active, independent thinkers who would apply higher thinking skills that would transfer to other situations. In these discussions they talked about students choosing materials on their own to support their problem solving efforts, the importance of fostering multiple opportunities for working with peers, and the role of students talking with each other. Implementing the NAEP tasks involved a process of decision making about what materials to make available or not during the process of solving the task. In general teachers seemed to support the idea of making available different types of materials and allowing children to decide what to use (graph paper, scissors, white boards, four shapes or two shapes). However, some teachers did not articulate why this practice would support students' problem solving and how their own instructional decisions provided that support.

Finally, data offered valuable evidence on the importance of professional development that fosters ongoing opportunities for teachers to reflect on a concrete task and its impact on students' mathematical understanding. In coherence with research in the field (Crespo, 2006; Franke & Kazemi, 2001), teachers valued the opportunities to examine student work generated through a common task. It was important for teachers to reflect on the outcomes of a NAEP task because it afforded teachers the occasion to think about what their students were able to accomplish with the adequate support (Anhalt et al., 2007).

References

- Anhalt, C., Fernandes, A., & Civil, M. (2007). Exploring Latino Students; Understanding of Measurement on NAEP Items. In T. Lamberg & L.R. Wiest (Eds.), *Proceedings of the Twenty Ninth Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Stateline (Lake Tahoe), NV: University of Nevada, Reno.
- Ball, D. L. & Cohen, D.K. (1999). Developing practice, developing practitioners: Toward a practice-based theory of professional education. In G. Sykes & L. Darling-Hammond (Eds.), *Handbook of Policy and Practice*. (pp. 3-32). San Francisco: Jossey Bass.
- Crespo, S. & Featherstone, H. (2006). Teacher learning in mathematics teacher groups: One math problem at a time. *AMTE Monograph, 3. The Work of Mathematics Teacher Educators*. 97-115.

- Franke, M. L. & Kazemi, E. (2001). Teaching as learning within a community of practice: Characterizing generative growth. In T. Wood, B. Nelson, & J. Warfield (Eds.), *Beyond Classical Pedagogy in Elementary Mathematics: The Nature of Facilitative Teaching* (pp. 47-74). Mahwah, NJ: Lawrence Erlbaum Associates.
- Freese, A. R. (1999). The role of reflection on preservice teachers' development in the context of a professional development school. *Teaching and Teacher Education, 15*, 895-909.
- Kazemi, E. & Franke, M.L. (2004). Teacher learning in mathematics: Using student work to promote collective inquiry. *Journal of Mathematics Teacher Education, 7*, 203-235.
- Khisty, L. L. (1997). Making mathematics accessible to Latino students. Rethinking instructional practice. In *NCTM Yearbook: Multicultural and Gender Equity in the Mathematics Classroom: The Gift of Diversity* (pp. 92-101). Reston, VA: NCTM.
- Lubienski, S. T. (2003). Is our teaching measuring? Race-, SES-, and gender-related gaps in measurement achievement, *Learning and Teaching Measurement 2003 Yearbook I* (pp. 282-292). Reston, VA: NCTM.
- Manouchehri, A. (2002). Developing teaching knowledge through peer discourse. *Teaching and Teacher Education, 18*, 715-737.
- National Council of Teachers of Mathematics. (2000). *Principles and Standards for School Mathematics*. Reston, VA: NCTM.
- Schön, D. A. (1983). *The Reflective Practitioner: How Professionals Think in Action*. New York: Basic Books.
- Strauss, A. & Corbin, J. (1998). *Basics of Qualitative Research. Techniques and Procedures for Developing Grounded Theory* (2nd ed.). Thousand Oaks, Ca: Sage.
- Téllez, K. (2004). Preparing teachers for Latino children and youth: Policies and practices. *The High School Journal, 88*(2), 43-54.