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Parents as Learners of Mathematics

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This paper presents some of the groundwork for a project on parental involvement in mathematics, that is in its beginning stages. Much of this groundwork comes from an ongoing research project[1] that I presented at ALM-5 (Civil, 1998b). Our work is primarily with Mexican American working class parents. The key premise behind our approach is a rejection of a deficit model for the education of minority, working-class individuals. Instead, we seek to establish a two-way dialogue in which parents contribute their ideas about and uses of mathematics in their everyday life. Thus, in my work with parents I have found research on adult education, especially that grounded on critical pedagogy, particularly useful (Benn, 1997; Frankenstein, 1989; Frankenstein & Powell, 1994; Knijnik, 1996). One of the key premises in this research is to view parents as intellectual resources. In this paper, I will first discuss some of the theoretical framework that informs my work with parents. Then, I will turn to the specific "new" project, MAPPS (Mathematics and Parents' Partnerships in the Southwest)[2], focusing on the question of what kinds of mathematics experiences the participating parents should engage in.

Theoretical Framework

The ongoing project BRIDGE provides us with a research basis for our current work with parents, through three main avenues: ethnographic household interviews that allow us to learn about these families' lived experiences; occupational interviews to learn about the use of mathematics in their practice; mathematics workshops for a small group of Spanish-speaking mothers (Civil, 1998a, 1998b). Each of these avenues give us information on parents' everyday practices and experiences as well as on their values about their own mathematics and about their expectations for their children.

Our work with parents is informed by the literature on parental involvement, in particular that which critically examines issues of power and perceptions of parents—especially minority and working-class parents-- and presents alternative ways to think about parental involvement, ways that move away from stereotypes and deficit views and that give parents a voice in the process (Henry, 1996; Vincent, 1996). I am aware that, as Weissglass and Becerra (n.d.) write, "often classes or programs for parents are one-way transmissions of information and materials from school to the parents. Rarely do parents, particularly those from groups underrepresented in mathematics, have an opportunity for their beliefs, ideas, and concerns to be heard. (...) All parents need a safe place to share and explore their early experiences with schooling, their thoughts about their children's learning, and their attitudes toward mathematics" (p.2).

As Merttens (1993) points out about the approach to parents and teachers in project IMPACT, the emphasis is on teacher discourse, and "into the rationalizations and accounts

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which teachers provide for parents and the wider community. It requires that teachers move away from a deficit model of parenting, that they question prevailing assumptions about the necessary skills base for 'quality' support in the home" (p. 30). This deficit view on parenting is particularly pervasive when the parents are ethnic minority and working-class (Edwards, Pleasants, & Franklin, 1999; Vincent, 1996). The ethnographic work from project BRIDGE allows us to critically question this deficit view and common-held assumptions about what constitutes parental involvement and to move away from stereotyping parents based on the often simplistic characterization of a certain group (e.g., "Mexican-Americans") that looks at what can easily be seen, such as type of food, folklore, way to dress, and ignores more hidden aspects.

Research on adult mathematics education, in particular, that grounded on critical pedagogy informs much of my current thinking in this area. I am particularly attracted to the notion of ethnomathematics as discussed by Benn (1997), Frankenstein & Powell (1994) and by Knijnik (1996, 1997) in that they recognize the importance of different forms of mathematics, push us to reflect on what we count as mathematical knowledge, and suggest pedagogical approaches that can be very powerful as we engage in work with adults that have often been marginalized. The research by Coben (1998), Coben & Thumpston (1996) on common sense and invisible mathematics has also been very helpful as it resonates with our own experience in going over the narratives of the parents (household visits or occupational interviews) when they quickly dismiss any reference to mathematics in their practices (e.g., sewing, mechanic). This has clear implications for us as we try to develop learning experiences that build on these adults' uses and knowledge of mathematics: how can we do it if they do not recognize what they do as being mathematical? I think that exploring with the participants not only their mathematics, but also the reasons for the different values that are often associated with different forms of mathematics should be a priority in our work with adults. That they may not see mathematics in what they usually do is not surprising, since from school age children develop their views about what counts as mathematics. In project BRIDGE we have gathered information on what children view as mathematics in their everyday life, and most of the answers reflect a school mathematics orientation (i.e., counting, arithmetic operations). Harris (1997) describes the difficulties that children had in identifying the mathematics in the textile activities they had done. Harris points out the need to make the mathematics explicit in the practices and the need to be knowledgeable about these practices. She quotes Paechter: "begin with a craft you know and practice yourself… Teachers who jump on the bandwagon without understanding the processes involved, trivialise the work itself and hence the mathematics as well" (Harris, 1997, p. 137).

Mathematics for Parents: What should it look like?

For the new project MAPPS we are expected to develop five modules of mathematics for parents--geometry; numbers; fractions; algebra; probability. Given my knowledge of the project staff, I can expect the following pedagogical approach to the mathematics activities for the parents: open-ended tasks, hands-on explorations, work in small groups, lots of dialogue among the participants, emphasis on developing mathematical meaning for themselves. Some of them would characterize their approach as "constructivist," maybe even "social-constructivist." But what about the content? Our audience is Parents as Adult Learners of Mathematics. Thus, I am torn between putting the emphasis on Adults or on Parents. I elaborate on this dilemma (for me) next.

Adult Learners

As Adult learners of mathematics, my interest in socio-cultural approaches to mathematics education becomes salient. Thus, developing learning environments that build

on these adults' experiences and knowledge of mathematics in their everyday life and practices would be at the heart of my approach. Our work in project BRIDGE has documented a range of practices that these adults have expertise on: construction, mechanic, sewing, and carpentry, among others. These particular practices are mathematically rich, yet one problem may be the lack of familiarity among us, as the project staff, with these practices. How can be bring the socio-cultural practices (some of which may not be as "clear" as the ones just mentioned) to the mathematics workshops? For example, in a recent discussion with the project staff on what to do in these Math for Parents courses, we brought up the issue of trying to build on the parents' knowledge of mathematics. To illustrate what this may mean, we explained the case of a construction worker who told the interviewer that to make sure that the foundation for a house is a rectangle, they sometimes use the "rule of 12" to check that the angles are 90º. This means that they use a string marked with 12 equidistant segments and they make a "3, 4, 5" right triangle to make sure that the corners are right angles. As we shared this experience, one of the project members expressed surprise at the method used and then raised the question as to whether we wanted to reinforce these methods from the past or help the parents understand the mathematics that their children are learning, "the mathematics of the new millennium," as he said. This is actually a key question because, to me, it addresses not only an issue of content (what to teach) but also an issue of intention (why are we teaching what we teach), and it relates directly to our perceptions of who our audience is. I am influenced by my ongoing work with minority, working-class students and mothers, and by the research literature that has helped me develop an awareness of how their knowledge of mathematics is often not recognized, considered marginal and of less value (Fasheh, 1991; Frankenstein & Powell, 1994; Harris, 1997). This, coupled with the negative, deficit way in which minority, working-class parents are often portrayed (Vincent, 1996) concerns me as we think about the mathematics experiences that we want to develop in this program.

So, what am I proposing? I completely agree with Knijnik (1997), in that my goal is not to glorify popular knowledge. So, no, I do not want to uncover the mathematics in sewing, construction, carpentry, cooking and then engage all of us in learning about these forms of mathematics. Also, I am aware of Benn's (1997) pointed question "is the use of contexts derived from women's traditional domains, say the home, reproductive or legitimising and hence emancipatory?" (p. 178). We need to keep this question in mind as, in our work, it applies not only to women's traditional domains but also to a larger array of activities that minority, working-class adults engage in as part of their everyday life. What I have in mind comes closer to what Knijnik does in her example of the popular methods to measure the area of land. For example, an interview with a carpenter revealed that he had at least three methods to determine whether a shape is a square: using a carpenter's square; measuring the diagonals; using a plumb line. When further probed, he did not know why checking whether the diagonals were the same length would work, he just knew it did (let's keep in mind, as Dowling (1991) hints at, that there are probably many things that we know that they work but do not know how or why). What I would like to see happening in these mathematics workshops for parents as Adult Learners is that knowledge such as the one by this carpenter is brought to the foreground and forms the basis of subsequent mathematical explorations. The "rule of 12" that I mentioned earlier, could become part of an exploration around the theorem of Pythagoras, something with which other members in the group are likely to have had experience, such as a seamstress who in explaining how to make a certain type of sleeve, drew a right triangle and measured the three sides. Yes, I do want these adult learners to engage in "academic" mathematics, and in doing this I am addressing their need as parents (as I will explain next), but that is not the main reason. Academic mathematics is still, for many people, the only acceptable form of mathematics, and I want these adults I work with, who have often been left out of the picture, to have access to this form of knowledge. But it is not just me wanting this: I have been piloting some of these ideas with a group of Spanish-speaking, working-class mothers, and they have made it very clear to

me: they want to learn academic mathematics (cf. Benn, 1997) (I will come back to this at the end of this paper).

Parents as Learners

As Parents learning mathematics, the focus becomes their children. In fact, I became particularly interested in developing the project that we are now beginning when I attended a School District Parent Council, in which the mathematics program was being discussed. I joined the group of parents of High School students and heard their concerns. The new mathematics program in the district takes an integrated approach, thus moving away from the traditional Algebra, Geometry, Trigonometry, etc. course sequencing. The mathematics their children were doing was very different from what any of them had experienced in their schooling. The parents at that meeting were not against this form of mathematics; rather, they expressed an interest in learning more about it. Similarly, as part of project BRIDGE, two of the participating teachers started a mother-daughter math club. At our last meeting of the year and in order to prepare for the next series, the teachers asked the adult participants for suggestions on what they would like to see happening in the club. After a few minutes of silence, a mother spoke up: she wanted to learn more about the mathematics that her child was doing at school, for example, she said, all these different forms to do multiplication (the adopted curriculum puts a lot of emphasis on alternative algorithms for arithmetic operations--which is something that is quite different from what many adults experienced when going to school, in that only one way was usually taught). As soon as she spoke up, several other adults in the group echoed the same interest: they want to learn what their children are learning. Some even told the teacher that they were willing to come to their children's classroom and learn it.

This interest in what their children are learning may entail putting our agenda aside. For example, in the mother-daughter math club, the teachers had been emphasizing areas in which girls are likely to have fewer experiences (e.g., spatial visualization tasks). The mothers (and the daughters) enjoyed the tasks but, judging by this last day conversation and other comments in which they wondered why they were doing this, two issues come to mind. On one hand, we probably did not make it explicit enough to the participants why they were working on these activities (e.g., the connection to research on gender and mathematics). On the other hand, I think that several of these mothers participated in this club because they wanted to support their daughters in their learning of mathematics and were therefore expecting a clearer connection to what their children were doing in school. This same connection may be expected from us as we engage in mathematics courses for parents in our new project. There is a myriad of engaging, "fun," hands-on, reform based math activities that one can do and we all probably have our favorite list. But are they going to connect to what their children are learning in school?

Conclusion

It seems that there at least two approaches to Parents as Adult Learners of Mathematics: one places the emphasis on Adult Learners; the other emphasizes Parents as Learners. The first approach involves engaging in an authentic conversation with the parents in the course to uncover their uses and knowledge of mathematics and then make connections to academic mathematics. It envisions the "classroom" as a community of practice in which we all have something to learn and something to teach. I wonder if we could develop a learning environment that has parents participating in socio-cultural activities that are both personally meaningful to them and "recognized as 'real' by the mathematical community of our days" (van Oers, 1996, p. 106). Given the time constraints, we may not have so much of a chance to actually delve into their children's mathematics. The second approach is in many ways easier for us (the facilitators, the instructors) to carry out. It fits more our experience in school and university teaching. I am just concerned that we forget that these

parents are (can be? may want to be?) learners for themselves too, not just for their children. Is this a valid concern?

The two approaches are not necessarily exclusive in my mind. In fact, I think that in my work with the group of women I have been trying to combine both in that my focus is on them as adult learners of mathematics, but I make connections to the way some of the topics are presented in school mathematics. I presented some of this work at ALM last year (Civil, 1998). Here, I will just comment briefly on our most recent work with this group of Spanish-speaking women, most of whom went to school in Mexico through at least 2 years of high school, often followed by some schooling in accounting. For the first workshop of this year, I brought some excerpts from the NCTM standards in Spanish (NCTM, 1989). My goal was to engage them in a conversation about mathematics education reform to help them become more aware of the current rhetoric. Among other things, I wanted to point out discrepancies such as why is it that in primarily Hispanic middle schools (students ages 11-13, grades 6-8), there are very few students taking advanced mathematics courses (such as algebra in 8th grade) and in those advanced classes, the ethnic breakdown does not reflect that of the school?

These women were interested in what I was sharing with them, but their interest really perked up when I gave them a mathematics problem to explore. My point is that although I had envisioned having a conversation with them about mathematics education for the workshops this year, they really wanted to learn mathematics and they told that to the facilitator. More explicitly, they wanted to learn algebra. Thus, for the next few workshops we explored exploring algebra. Starting with the very typical problem of "how many handshakes in a room with 20 people?", I encouraged them to come up with their own methods (even though after they read the problem, they asked for the formula). Then, using their ideas as a springboard, I brought in what, in my view, would be a coherent approach to the teaching of algebra—combining tables of data, graphs, verbal expression, and yes, the "algebraic" expression. The participants kept making comparisons with their experience in Mexico as students and comments along the lines of "how come we were not taught this way when we were in school?" They also made connections to what their children were bringing home. And I used this as an opportunity to engage in a conversation about what mathematics education should look like. I am learning how to listen to their needs. Yes, they want to know how to help their children succeed in school; yes, they want to know about mathematics education. But, most of all they want to be learners of mathematics themselves.

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