

Guest Editorial: Musings around Participation in the Mathematics Classroom

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Do you want to know something that Melanie and I have noticed? Okay, picture this: You ask a question, “Who thinks that division is the right thing for this problem?” Melanie and I, neither of us raise our hands. Nobody else raises his or her hands, except maybe Daniel, because he is an individualist. And then you say, “Who thinks it’s subtraction?” Melanie says, “Ah, I think it’s subtraction,” and raises her hand. Most of the—I think it’s the boys [Melanie pipes in, confirming, “Yeah, the boys”]—most of the boys raise their hands when Melanie raises her hand. Okay. And then you say, “Who thinks it’s addition?” and no one raises their hand. Then you say, “Who thinks it’s multiplication?” and I raise my hand, and then everybody who hasn’t raised their hand raises their hand, especially the girls, except for maybe Ann, who actually has a brain. (Civil, 2002b, p. 59)

The opening excerpt comes from a conversation I had many years ago with two fifth grade girls, Melanie and Rebecca. In this excerpt, Rebecca provides an accurate description of some of the participation patterns in their class. These students were quite aware of who were the “popular” students (largely through their success in sports) and the “smart” students (mostly because they were in the pull out Gifted and Talented program (GATE)). These two groups

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(sports and GATE) had high status but in different ways. Students who were both good at sports (primarily basketball and football for boys, softball for girls) and in GATE had the highest status. Rebecca, who had not been in this school for as long as other children, sensed that she was not as well received as others (e.g., Melanie) and that her “status” was limited to some academic instances and with some individuals only (Civil, 2002b; Civil & Planas, 2004). In Civil (2002b) I explore the question of how students’ status combined with their beliefs about what they counted as being mathematics affected the participation patterns in that fifth grade classroom. By status, I meant the students’ perceptions of their peers’ social position in the classroom. The themes of status and participation in this classroom (and in a different setting, in Barcelona, Spain) are further revisited in Civil and Planas (2004), where we discuss the effect on opportunities to learn for all students of organizational structures such as GATE programs or special classrooms for students who are not proficient in the language of learning and teaching (e.g., immigrant students). As we write, “when we tried to open up the patterns of participation in the classroom, the power and status structures were deeply engrained” (p. 8).

Issues around participation and status have been an interest of mine for many years now. As I reflected on the invitation to write an editorial on the general theme of equity in mathematics education, I decided to continue this line of thinking and focus on the concept of participation as the umbrella to raise some questions that address equity. Questions that have been in my mind for several years now include: Who gets to participate in the mathematics classroom? What does it mean to participate in the mathematics classroom? Whenever I walk into a classroom (and actually also in other social settings, such as meetings), I tend to pay attention to “who has a voice?” “whose voice is being heard?” Certainly this is not the only way to assess participation and this is an issue with which I am currently grappling. We need to redefine participation so that it is not just or mostly based on oral participation in a classroom discussion, for example. Nevertheless, I find it quite interesting to notice who gets to talk (how many of us have witnessed students (or peers) who are trying to say something but get

ignored?), and whose ideas are taken up. As fifth graders, Rebecca and Melanie were quite aware of whose voice counted and when. Similarly, in my work with Latina mothers, I have documented their desire to be heard as key partners in their children's mathematics education even though they may not speak English well or they may be bringing different ways to do mathematics. As one mother shared, reflecting on her experience participating in mathematics workshops for parents, "It is important that we as parents have these types of [mathematical] discussions. We also realize that though we may not have a certificate in hand, we are also teachers."

In what follows, I describe a four element-framework to address participation in the mathematics class, and in particular the participation of non-dominant students. I draw on data from my research to illustrate how these different elements affect participation. Certainly these four elements do not constitute an exhaustive list (see Aguirre et al. (2012); Aguirre & Zavala (2013), for examples of equity-centered tools for lesson analysis). My goal is that they serve as an opening to a wider discussion around the theme of equity, both in terms of research implications and practice, particularly in teacher education. Race, ethnicity, home language(s), and social class are at the center of this work. Specifically, all my examples come from Latina/o, working class communities. The four elements that I discuss next are: (a) Concept of status: e.g., "popular" children; role of GATE; what does it mean to be good at math? (b) Nature of the task: whose knowledge and experiences are represented / valued? (c) Approaches to doing mathematics: whose / what approaches are valued? and (d) Language(s) in the classroom: which language(s) and forms of communication get privileged?

Concept of Status

In a sense the concept of status is present in the other three elements that I will be discussing next. Let me come back to the fifth grade classroom where I first started looking into issues of status (Civil, 2002b; Civil & Planas, 2004). Out of the 29 students in that class, a majority (19) were Latina/o, mostly of Mexican origin. There were 5 white students of European

origin (or “Anglo”, a term often used in the Southwest of the U.S.); there were 4 African American students and 1 Native American student. There were 7 students in GATE, 4 of whom were Anglo.

Students are quite aware of where they stand in the classroom hierarchy, and these fifth graders were no exception. The opening excerpt with Rebecca and Melanie, who were both Anglo and in GATE, illustrates students’ awareness of status issues in the classroom. This is what Rebecca said about GATE: “GATE tends to be upper class white people, I’ve noticed, it’s kind of a corrupt system.” In Civil and Planas (2004) we describe the case of Andrew, a Latino student who showed great insights in his mathematical thinking but who could also be quite disruptive. The teacher attributed this to his being very intelligent and bored in class. Yet, he had not qualified for GATE. On one of the occasions where the seven GATE students were leaving the classroom to go to their GATE activities, Andrew raised a poignant and unsettling question, “If GATE is to make us more intelligent, how come I don’t get to be in GATE so that I can get smart?”

Status was clearly at play in this classroom. We documented several episodes, some related to status in terms of popularity (as in being good at sports) and others related to pullout programs such as GATE and special education that marked students as being “smart” or “not so smart” (see Civil & Planas, 2004, for more details). This classroom, as many others, could have benefitted from an approach such as Complex Instruction (CI), which I briefly describe next.

In the recent years I have started to explore some of the ideas behind Complex Instruction (CI) as they apply to mathematics education, largely thanks to Jilk (2007) and more recently, Featherstone, Crespo, Jilk, Parks, Oslund, and Wood, (2011) (see also, Boaler & Staples, 2008). Complex Instruction is based on the work of Cohen and colleagues (Cohen & Lotan, 1997; Cohen, Lotan, Scarloss, & Arellano, 1999). One of the key concepts in CI is that of status. Cohen (1994) defines status ordering as “an agreed-upon social ranking where everyone feels it is better to have a high rank within the status order than a low rank. Group members who have a high rank are seen as more competent” (p. 27). Cohen et al. elaborate on the

connection between status, participation, and learning and call for the need to intervene to address status problems: “unless the teacher intervenes to equalize rates of participation, ‘the rich get richer,’ and the gap in academic achievement widens” (p. 84).

Another key concept in CI is that of multiple-ability tasks, which relates to the second and third elements in my proposed framework for understanding participation, the nature of the task and the approaches to doing a task. As Cohen et al. (1999), write:

Multiple-ability tasks are a necessary condition for teachers to be able to convince their students that there are different ways to be “smart.” Students who do not excel at paper-pencil tasks often do excel when academic content is presented in different ways. Tasks that require multiple abilities give teachers the opportunity to give credit to such students for their academic and intellectual accomplishments. (p. 83)

Hence, addressing status and providing multiple-ability tasks are at the heart of CI. As Jilk (2007) writes:

At the core of CI is an awareness of the structural inequities that are generated both in the larger society and within schools and classroom, which often translate into an assumed hierarchy of competence. Complex Instruction aims to eradicate these hierarchies within classrooms and to promote equal-status interactions amongst students, creating opportunities for all students to engage with and learn from rigorous mathematical tasks within a cooperative learning environment. (pp. 8-9)

My entry into CI was through the work with a Teacher Study Group (TSG) in CEMELA (Center for the Mathematics Education of Latinos/as), where we explored issues of status, assigning competence, what it means to be good at mathematics, and using tasks that call for multiple abilities. The seven teachers in the TSG worked in schools with a student population that was about 95% Latina/o, with over 85%

free and reduced lunch and over 50% English Language Learners (ELLs) in the elementary school and 25% ELL in the middle school. In one of the TSG sessions, teachers discussed their status chart, which was a tool to help them focus on a few students in their classroom and make notes in terms of academic and social status.

The set-up at the elementary school was such that some of the teachers shared students, largely due to the recently State-imposed language policy that segregated ELLs for part of the day so that they would focus on learning English (for more on the impact of language policy in Arizona, see for example, Gándara & Orfield, 2012; Rios-Aguilar, González Canché, & Sabetghadam, 2012). As teachers were talking about the students, one of the teachers noted that, “it’s interesting to see how the status of the student changes depending upon the structure of the academic level, as well as the structure of the social level.” This brought up an important discussion around a dynamic view of status. Teachers analyzed possible reasons for these changes in status and the issue of separation by levels of English proficiency surfaced. For example, in the case of one student under discussion it seemed that he was more engaged and behaved better in the writing and vocabulary class where he was grouped with other ELL students at his level (which was the basic level of English). As the teacher for this class said, “the reason why I think he is not a behavior problem is because he is not frustrated in my class, he’s not academically frustrated, and he’s engaged and he’s motivated.” This could be seen as a “positive” feature, that is, segregating the students by level of English proficiency seemed to “work” for this child in that he behaved better and was more engaged in that class (which also had fewer students) than in the other heterogeneous (by level of English) classes. Yet, I argue that segregation by language level is a problematic approach. I come back to this point in the language section in this article.

As we think of what it means to participate in the mathematics classroom, the concept of status is a prominent element. The next three elements in the framework (task, approach, and language) also play a key role in understanding participation and as I will show, are closely connected to the

concept of status. I briefly describe the three elements in the next sections.

Nature of the Task

As we think of which tasks we use in the mathematics classroom, the question I raise in this section is, whose knowledge and experiences are represented and valued in those tasks? One approach is to develop tasks that reflect students' experiences and knowledge building on the Funds of Knowledge approach (González, Moll, & Amanti, 2005). I have written extensively on this approach elsewhere and I refer the reader to these pieces for more information (e.g., Civil, 2002a; 2007; Civil & Kahn, 2001). I am aware of how time and resource intensive developing such type of tasks can be. My argument here is that even when the tasks themselves do not build on the students' backgrounds and knowledge, we can and we should encourage students to bring in their knowledge and experiences when interpreting and solving the task. One example of what I mean is given by the well-known, classic bus pass problem:

It costs \$1.50 each way to ride the bus between home and work. A weekly pass is \$16. Which is the better deal, paying the daily fare or buying the weekly pass? (Tate, 2005, p. 36)

The expected "correct" answer was the daily fare, based on the assumption that a person would need only two such tickets per day (one to go to work and one to come back) and only for five days a week (so, $\$3 \times 5$ which gives \$15 vs. the \$16 for the weekly pass). But as Tate (2005) discusses, this approach did not represent the lived experiences of students in an urban middle school, who argued that a weekly pass was a better deal (working more than five days a week; more than two trips per day; could be used by more than one person). Whose knowledge and experiences are represented and valued in this task? While the "expected" solution did not reflect the students' knowledge and experiences (and hence in a testing situation the students' answer would be counted as wrong), one could imagine classroom scenarios where their knowledge and

experiences would be valued and in fact the variety of interpretations would add to the richness of an otherwise rather typical word problem.

In Planas and Civil (2009) we discuss an activity with immigrant students in Barcelona, Spain around the design of a flat. The task was to work in small groups to represent their ideal flat. Mathematically the task called for the use of scale drawings and the concept of proportionality. To promote the group discussion students were given the blueprint of an actual flat and cards showing advantages and disadvantages of that flat. These advantages and disadvantages reflected a middle class orientation towards what an ideal flat may look like, as the teachers pointed out. For example, while having two bathrooms was listed as an advantage, some students wondered about this because in their experience the number of bathrooms was related to the number of families sharing the flat. Encouraging the students to discuss and change the cards, as they designed their flat, allowed for their engagement with the task, as well as their being able to bring in their knowledge and experiences. Furthermore, the teacher himself also started questioning his own perceptions of what an ideal flat is, as he listened to and learned from the students' experiences.

One of the key motivations for the teachers in this TSG in Barcelona was that they wanted to increase their immigrant students' participation in the mathematics classroom. They saw the nature of the task as critical towards their participation. As we write, "by providing a task such as the one of the ideal flat where students can challenge each other and the teacher, we open the channels of participation in the mathematics classroom" (Planas & Civil, 2009, p. 403). However, teachers were also concerned about the difference between participation and mathematical participation, as this teacher indicates, "It's hard to find a balance between activities that contribute toward the learning of mathematics and those that promote participation. This means looking for a way to participate that is not counter productive to the mathematical conversations" (p. 400).

This is an important point. We want students to participate in the mathematical discourse and not just to participate in the general conversation. That is, as we think of mathematical

tasks, even those that may be typical looking, what can be done to encourage students to make these tasks their own by bringing in their knowledge and experiences and use these to participate in the mathematical conversation about the task? Closely connected to the nature of the task and the call for bringing in and valuing students' experiences and knowledge, is the need to consider the different approaches that students may bring towards doing mathematics.

Approaches to doing Mathematics

The question here is, whose and what approaches to doing mathematics are valued? Consider the following exchange between two Mexican mothers as they talk about their elementary school age children's mathematics experience in school in the U.S.:

Lucinda: Well, what I say is, for example my daughter tells me "come to learn how they teach here, come see that I am right," when we are upset at each other here around the table, and sometimes she is the one who makes me upset, because I want to explain things to her as I know them, and I tell her, "m'hija, the way I explain it to you, I know it's much better for you," but she sticks to her [way].

Gabriela: But for one thing, here we are in the U.S. and here is where they are going to grow up, they are going to study here, and I wanted to do the same thing as you, but then I say, but why, if they are teaching him things from here, and he is going to stay here, and so, one wants to teach them more so that they know more, but what they are teaching them is because they are going to stay here, and they are going to follow what they teach them here. (Civil & Planas, 2010, p. 138)

In the case of Lucinda, who had been a teacher in Mexico but was currently working as a custodian at a local school, she wanted her daughter to gain a deeper understanding of how things worked in mathematics, as she further explains:

Over there [in Mexico] they go in depth for everything, and here no, here they only tell you how and how and that's it, and I tell her "m'hija, what I am telling you is that it comes from the roots, from below," [and my daughter says] "ah no mommy, I don't have to learn the roots."

Gabriela, on the other hand, acknowledges that while at the beginning she tried to show her son how she had learned in Mexico, she has now accepted that they are not in Mexico anymore and she does not want to interfere with his current learning process. As we discuss in Civil and Planas (2010), one could argue that this reflects typical interactions between parents and children, where the children want to or feel the need to do things "the school way" and the parents want to show them the way they learned. However, I claim that this exchange underscores issues related to whose knowledge is valued and that this concept is particularly important to address when working with non-dominant students. When students bring in different ways to do mathematics, how do teachers (and other students) view these different ways? Do they become learning opportunities to explore mathematics further? How are they valued? (see Abreu, 1995, for the notion of valorization of knowledge). What may be the implications for students' participation in the mathematics classroom if, when they show an approach they may have learned from their parents, or from school in a different country, the teacher says something like, "Yes, but that's in mama's home. Let's do it the way that we do it in the school." Or "This is nice but they need to learn to do things the U.S. way" (Civil & Planas, 2010, pp. 136-137)? As I have argued elsewhere (Civil, 2012a;b; Civil & Planas, 2010), whether parents, teachers, students, or researchers, we all bring valorization of knowledge to our views of what counts as "proper" or "better" approaches to doing mathematics.

In her study of non-immigrant students' perceptions of mathematical learning in classrooms with immigrant students in Barcelona, Planas (2007) captures the tensions that the "local" students experience when working with immigrant students. These tensions point to different valorizations of

knowledge. Here are two quotes from non-immigrant students as they talk about the mathematics that their immigrant peers bring to the classroom:

- Laia: Funny things happen with them. You cannot anticipate what they will do or say! Last week Afzal solved an equation by drawing a kind of diagram. It was interesting, though I missed some details because I was still finishing the task... I often wonder if he feels out of place with our maths... we cannot learn everything, our maths are already too much!
- Gabriela: Their comments help us to make sense of the situations before starting to solve the problems, but, anyway, we cannot always start making sense of it like they do. Our maths are what they are. And theirs... they are fine, but sometimes they just don't fit in. (Planas, 2007, p. 9)

While these examples are located in an immigrant / non-immigrant context, I argue that if we are serious about participation in the mathematics classroom, we need to address valorization of knowledge for all students. That is, this is not an issue “just” about immigrant students who may bring in different schooling experiences. As we write in Quintos, Bratton, and Civil (2005), “the knowledge that working class and minoritized parents possess is not given the same value as that which middle class parents possess” (p. 1184).

Although in the above research we were focusing on parents' knowledge, one only needs to observe classrooms to see that not all students' contributions are given the same value. The question we need to ask is the one I posed at the beginning of this section, whose and what approaches to doing mathematics are valued? As Quintos et al. write:

When it comes to mathematics there is a common notion that there is a “right way” of doing things which is often associated with the textbook's/ the teacher's/ “expected” algorithm/method. Alternative approaches are often not

treated equally. Approaches are given a specific value based on the social power of those who hold them. (p. 1189)

Race, ethnicity, gender, social class, immigration status, language are some of the factors that are likely to influence how contributions are valued and thus who gets to participate in the mathematical discussions and how. In this next section, I turn my attention to language.

Language(s) in the Classroom

This section is concerned mostly with students whose home language is different from the language of teaching and learning, English language learners (ELLs) in the U.S. context. Rather than using the term ELL, I will use the term bilingual (and I will point out that the term multilingual may even be a better descriptor in some cases), to emphasize the additive and resource aspect of knowing more than one language. By using the term ELL, the focus is on the fact that these students do not know English well enough; the term bilingual emphasizes that they know two languages, with possibly different levels of proficiency in each language.

While most of my comments in this section draw on my work with bilingual (English/Spanish) students, I want to expand the discussion of language(s) in the classroom to the idea of forms of communication. What counts as participation in the mathematics classroom? Whose contributions are taken up and developed and whose are ignored? What is the basis for these decisions? These questions affect not only bilingual students but also students whose approach to participation may be different from what is expected in the classroom. For example, if most of the communication is expected to be in oral form, this may silence students who are not comfortable speaking up or who have a hard time producing oral explanations. In Fernandes, Civil, and Kahn (2014), we argue for the need to broaden mathematical communication. While in that work we are focusing on bilingual students, the argument we make extends to other students:

The pedagogical practice of broadening mathematical communication suggests that teachers should attend to students' ways of communication that go beyond the usual oral and written expressions to include gestures, drawings, and manipulation of concrete materials. By broadening mathematical communication, teachers can engage ELLs, along with other students, in grappling with challenging mathematical ideas. (p. 79)

Another aspect to consider when looking at communication in the mathematics classroom is the potential difference in interaction styles. Some of these differences may be culturally based. Hunter and Anthony (2011) address this in their work with Pasifika students in New Zealand. Pasifika learners' core values include respect particularly towards adults, collectivism, and communalism. As the authors write:

These core values... may not initially be aligned with having students feel comfortable participating in problem-based mathematical activity and inquiry.... The students considered the teacher to be their elder and therefore their knowledge unquestionable. Likewise, the students viewed arguing with, or asking teachers questions, to be disrespectful because it was their responsibility to listen closely and learn from the teacher. (p. 103).

The authors describe their use of a communication and participation framework (Hunter, 2007) to support teachers as they developed an inquiry-based approach to mathematics teaching and learning with Pasifika students.

Thus, as we think of the participation of non-dominant students in the mathematics classroom, questions to consider are: Which language(s) are privileged? Which forms of communication are privileged? In the rest of this section I raise a few issues around language policy and its implications for mathematics teaching and learning. I have alluded earlier to the language policy in Arizona, which has resulted in the segregation of students identified as "ELLs." I have written elsewhere on the differences in participation in mathematical discussions when students were encouraged to use their home

language (Civil, 2011). As I write in Civil (2012b), referring to my work with a small group of middle school students who were in a segregated environment:

I argue that we would have missed much of the richness of these students' thinking in mathematics if we had limited their communication to English only. So, in a sense, being in this segregated environment allowed us to increase their opportunity to learn by developing an environment in which we encouraged them to talk and communicate about mathematics in either language. (p. 51)

Certainly, I am not advocating for segregation by language. My point was that by not allowing them to use their first language, we were missing the richness of their mathematical thinking. In this segregated environment we were able to let the first language support students' communication. However, what I also found out was that students were, of course, aware of this segregation by language and they were eager to be moved out of the special classrooms (what I have called Section A in my writing) and into the classrooms with non-ELL students:

Most of them expressed a desire to move out of Section A, and some believed that they were not learning as much English as they would if they were with the non-ELL students. Thus, in retrospect, it is not entirely clear that these students were necessarily comfortable with the idea of using Spanish in the mathematics classroom, since that may have contributed to their perception that they were not advancing enough in their English. (Civil, 2011, p. 88)

The point I want to make here is that we cannot ignore the complexity of language ideology (Planas & Civil, 2013). A language policy that privileges English and furthermore makes other home languages feel inferior and devalued has clear affective implications for students.

As Stritikus and García (2005), write in reference to the Arizona Proposition that severely restricted bilingual education, "the normative assumptions underlying Proposition

203 position the language and culture of students who are diverse in a subordinate and inferior role to English” (p. 734). Thus, encouraging students to use their home language in these circumstances is quite complex as students seemed to associate the “regular” classroom as being more advanced than in segregated classroom, and thus wanted to have more practice with English to be able to get out of Section A (Civil, 2011; Civil & Menéndez, 2011).

I close this section with some considerations around dual language classrooms. Valdés (1997) writes about the potential for dual-language programs to intensify power issues in the classroom. That was certainly my perception in my recent work in a dual language setting where the mostly white, non Latina/o students whose home language was English tended to come from middle to upper class families and the Latina/o students whose home language is Spanish largely came from low-income families. The Latina/o children participated less even in the grades where mathematics was taught solely in Spanish. The non Latina/o English speaking children tended to dominate the small group discussions and the participation in whole class discussion. As Valdés writes, “bilingualism can be both an advantage and a disadvantage, depending on the student’s position in the hierarchy of power” (p. 420). To me this is a clear case of status issues. When this difference in participation patterns was brought up for discussion with the teachers who were in a mathematics TSG, one of them said:

More participation of Anglo kids, probably due to language and the fact that many of them come from highly educated families, but also, from a white kid perspective you are encouraged to ask questions, be cute and obnoxious. And I don’t know if this is true in Latino families.

It is interesting to note that one of the Latina mothers who had conducted a classroom observation and had noted this difference in participation patterns said, “If you notice, Americans have a high level of communication with their children, they let them do things that we, Hispanic, don’t.... Our children are very inhibited, it’s like they don’t have this experience, they haven’t done much....” These comments

should certainly be examined with a critical eye as they point to a deficit view on the experiences that Latina/o children bring to the classroom when compared to the experiences of their non-Latina/o peers. But also, both the teacher's and the mother's observations point to potential differences in interaction styles that, as I have referred to earlier, should be considered when addressing the participation of non-dominant students in the mathematics classroom. Are we encouraging ways to participate that are more supportive of some students than others?

In Closing

In this article I focus on the concept of participation as a way to engage in discussions around equity in mathematics education. By considering questions such as: Who gets to participate in the mathematical discussions? Whose experiences are reflected in the tasks? Whose approaches get valued? And which languages and forms of communication get privileged? I present a four-element framework that guides my thinking about the broad theme of equity in mathematics classrooms. The four elements—status, task, approach, and communication—serve as constant reminders to pay attention to voice, where voice goes beyond speech and oral expression, and refers to the idea that students (and their parents) count and that their ideas, knowledge, and experiences count. As this quote from a Latina mother reflects, “Se me fue quitando el miedo y aprendí de que tu voz cuenta, aunque no hables el mismo idioma, cuenta.” [The fear just slowly went away and I learned that your voice counts, even if you don't speak the same language, it counts.]

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