MARTA CIVIL & NÚRIA PLANAS

4. WHOSE LANGUAGE IS IT?

Reflections on Mathematics Education and Language Diversity from Two Contexts

In the last decade we have intensified our work on mathematics education and language diversity in our two contexts of research: Tucson, AZ, and Barcelona, Catalonia. The two of us are interested in the role and use of languages in scenarios of mathematical teaching and learning. From the perspective of our investigations, this interest entails different interpretive methods and large collections of data. In this chapter, we focus on classroom data to draw on similarities and differences coming from the analysis of English and Spanish bilingual communities in Tucson, and Catalan and Spanish bilingual communities in Barcelona.

A vast body of literature in the area draws on the basic understanding of the relationship between attention to language diversity in multilingual classrooms and opportunities for mathematical learning. Many researchers have documented that for multilingual people the choice of which language to use is not arbitrary, but guided by social and political aspects that influence which language to use and how (e.g., Clarkson, 2009; Moschkovich, 2002; Setati, 2005). In multilingual classroom settings, there is a complex relationship between, on the one hand, the different value given to different languages, and on the other, the students' language choices in their mathematical practices. Following this assumption, it seems clear that the valorization of languages has a role in determining forms of communicating and knowing (in) mathematics. Thus, we consider the topic of this book, *Alternative Forms of Knowing (in) Mathematics,* from the perspective of how certain interpretations of language diversity intervene in the construction of processes of (having access to) knowing school mathematics.

We begin with a brief discussion of the language policies and dominant language ideologies in our contexts of research. We then develop two themes to better understand the phenomenon of students learning mathematics in a classroom with a language that is not their home language: (1) dynamics of power in the bilingual mathematics classroom, and (2) bilingual students' views of access to mathematics.

S. Mukhopadhyay & W.-M. Roth (eds.), Alternative Forms of Knowing (in) Mathematics, 71–89.

OUR CONTEXTS OF RESEARCH: ARIZONA AND CATALONIA

In 2000, Proposition 203 was passed in Arizona. This Proposition severely limited bilingual education and placed English Language Learners (ELLs) in Structured English Immersion (SEI) programs, where instruction was in English with minimal clarification in the students' home language if needed. In 2006, the Arizona legislature enacted HB 2064 by which ELLs were to receive four hours per day of English language instruction. This means that for at least four hours a day ELLs are kept apart from non-ELLs to receive instruction in reading, writing, grammar, vocabulary, not attached to specific content areas but geared only to developing their English language. In schools where there are large numbers of ELLs (which is the case where our research takes place), this results in the segregation of these students as they are often kept together for most of the school day (beyond the four-hour block). In July 2010, The Arizona Educational Equity Project under the auspices of The Civil Rights Project at University of California, Los Angeles, published nine papers that analyze the educational conditions of ELLs in Arizona with the implementation of the four-hour block separation. The authors of one of these papers write:

> In the case of English learners in Arizona, these students are typically *triply* segregated in the schools to which they are assigned: by ethnicity, by poverty, and by language. Linguistic segregation at the classroom level for much of the day intensifies all the negative impacts of school segregation. (Gándara & Orfield, 2010, p. 4)

These authors further ask, "is the four-hour Structured English Immersion block that is being implemented today in Arizona a return to the Mexican room?" (p. 9). The Mexican room refers to the segregations of Mexican American students in the 1940s, a segregation that resulted in their receiving a lower quality education. And in their conclusion, they write, "[the segregated four-hour block] is stigmatizing, marginalizing, and putting these students at high risk for school failure and drop-out" (p. 20). Language policies reflect the current political environment. In the case of Arizona, language policies that restrict the use of a language other than English in schools are closely associated with an anti-immigration movement in the State. One compelling analysis of Proposition 203 suggests that there:

> … is also collateral damage as the result of the political spectacle surrounding Proposition 203. The issue was promoted as pro-immigrant and supposedly only dealt with the narrow issue of the language of classroom instruction. However, it sparked widespread debate about immigration and immigrant communities as a whole, stirring up strong emotions about illegal immigrants and directed attacks on the Hispanic community in particular. (Wright, 2005, p. 690)

As educators, to ignore the political underpinnings of school language policies would be irresponsible. In this chapter, we explore this topic in two contexts with

language policies that privilege one language over any other in schools, but with different political and historical situations.[1]

We now turn to briefly explain the language situation of Catalan and Spanish in Catalonia, an autonomous region in North Eastern Spain. Similarly to what happens with English in Arizona, Catalan is the official language of teaching in Catalonia.[2] Several political scenarios, including the reaction to Franco's dictatorship period (1939–1975), led to Catalan becoming the official language in schools. Catalan was a forbidden language during the dictatorship. The only official language in all parts of Spain was Spanish, although during later stages of the Franco regime, certain uses of Catalan were "tolerated." This same language is now being politically affirmed as a consequence of processes of Catalan nation-building that focus on differences between Catalonia and the rest of Spain. At present, discourses that point to Spanish as the national common language for all people in the country are gaining force. However, the Catalan nationalist government is committed to the continuity of the current language policies in Catalonia, primarily due to the idea of a differential identity that they sustain.

In a provocative text titled "We don't speak Catalan because we are marginalized" (Woolard, 2003), the author argues that there are some users of Catalan who are perceived to own this linguistic capital more than others due to both language and social origins:

> As the Catalan language has become more of a necessity for getting work done in formal institutions and public spheres and for high achievement in institutions like schools, it has also become a social resource more predictably acquired and used by middle-class Castilian speakers, whose interests are more often identified with these institutions. Now Catalan has higher class connotations not just because native Catalan speakers tend to be from the higher classes, but because middle and upper-middle class individuals from non-native ethnolinguistic backgrounds also tend to have good control of and make more extensive use of Catalan. (pp. 100–101)

In the Catalonian context, all students are somehow in paradoxical positions. Those who are Catalan-dominant speakers are also Spanish and Catalan bilingual, but at the same time are expected to behave as monolingual in their classrooms. On the other hand, many immigrant students from South America speak (a version of) Spanish, which makes them, in a way, language-privileged in comparison to immigrant students from South Asia. Nevertheless, at school they are also expected to use only one language, Catalan. Finally, those who are neither Spanish- nor Catalan-dominant speakers tend to first learn Spanish in their neighborhoods, and even in their families with their siblings, and then are expected to use Catalan when they enter school. It is clear that the two languages – Catalan and Spanish – are very visible in educational and institutional discourses, and they ideologically serve for much more than just talk (Adler, 2001).

The work in Tucson is part of the research agenda of the Center for the Mathematics Education of Latinos/as (CEMELA).[3] This Center aims to understand the interplay of mathematics education and the language, social, and political issues that affect Latino/a communities. CEMELA's theoretical framework is grounded on the view of cultural and language diversity as resources towards the learning of mathematics for all students. With respect to language we include two excerpts from CEMELA researchers that help illustrate our position:

> Education for subordinated groups can mean self-determination, and this is intertwined with empowerment, self-respect, respect for one's history and community. From this perspective, understanding development in mathematics is to understand the relationship of a constellation of sociocontextual factors. Within this constellation is the nature of language use, the resultant discourse community in mathematics classrooms, and students' participation in this discourse community, especially when there is more than one cultural language. (Khisty, 2006, p. 438)

> A crucial pitfall to avoid when examining language and mathematics learning for students who are bilingual, multilingual, or learning English is using deficit models of language minority learners and their communities … [A]ny time we use monolingual learners (or classrooms) as the norm, we are imposing a deficit model on bilingual learners. Bilinguals learning mathematics need to be described and understood on their own terms and not only by comparison to monolinguals. (Moschkovich, 2010, p. 11)

CEMELA's research as well as that of other researchers working with non-dominant students in mathematics education point to several sociopolitical issues intervening in the unequal distribution of access to mathematical knowledge. Partial explanations for this unequal distribution have to do with classroom practices that do not include diversity. But there are other structural conditions that need to be considered to understand the whole picture. A sociopolitical approach to the understanding of what happens in multilingual mathematics classrooms, and why, requires complementing discussions on topics of language proficiency, teaching strategies, learning difficulties, and inclusive curricula. Far from viewing language as a neutral object in the classroom, it is necessary to address questions concerning the several visible and invisible messages that are sent to learners (who are, in particular, language users) through the differing representations and valorizations of languages (and language uses).

It is a complex issue to know whether language uses cause valorizations or valorizations cause language uses. Both directions of influence are at the heart of sociopolitical debates concerning multilingual mathematics classrooms: Do students facilitate particular positions in the classroom by the mere fact of using *a* language in their talks with others at certain moments? Is it that talking with some of the other participants in the classroom leads to the use of a certain language together with the creation of particular positions? In our sociopolitical approach,

we do not pretend to situate the debate on what comes first or what is caused by what. We argue that language policies, multilingual classroom practices, and students' language uses are part of broader social and political debates that cannot be easily deconstructed. When viewing the teaching and learning of mathematics in multilingual classrooms, explanations cannot be reduced to individual and professional conditions of the teacher and the student. We need to include considerations from several other possible issues of influence, such as the situational circumstances that make one language more appropriate to use than another. We illustrate some of this complexity in this chapter.

DYNAMICS OF POWER IN THE BILINGUAL MATHEMATICS CLASSROOM

In this first section we discuss findings from our studies in Barcelona and Tucson with a focus on understanding some of the dynamics of power in the bilingual mathematics classroom. A search for dynamics in the classroom allows going beyond tensions between language groups and concentrating on how students from these groups effectively gain and share power. We assume that power is any expression of influence and control. It can be exercised by everybody, and not only by those who belong to the majority group. Under this assumption, our main question is how language minority students succeed in gaining power, resisting certain influences, and sharing language resources with other people in the class through mathematical interaction.

Data from Catalonia

To illustrate the case of Catalonia, we draw on observations of several mathematics lessons in a secondary classroom with Spanish and Catalan bilingual students – some had immigrant origins while some were immigrant themselves. There were eight students from South America who were Spanish-dominant bilingual, whereas the other 16 students from Catalonia – mostly from Barcelona – were Catalan-dominant bilingual, except for one, who was a second-generation immigrant from a Colombian family. The lessons were planned so that the students spent most of the time working in linguistically homogeneous small groups determined in terms of students' dominant language. There was also a whole-class discussion at the end of the session when the students got a chance to share their different approaches to the task. The classroom teacher, who was bilingual in Catalan and Spanish herself, encouraged students to use their first language by grouping them according to their dominant language. Our research focused on students who spoke Spanish at home. They all had similar working-class backgrounds. Most of their parents had not completed high school, had limited Catalan proficiency, and had immigrated to Catalonia for work reasons.

The data come from five videotaped 50-minute lessons that focused on geometrical transformations, mainly translation, rotation, homothecy, and symmetry. These concepts were part of a unit called "Our dynamic planet," which included a variety of mathematical activities that encouraged students to pose

questions and solve problems in real contexts. This unit had been designed the year before by a group of teachers in the school as part of the development of innovative teaching materials in support of the students' mathematical learning. In the third lesson, the teacher wanted the students to think about "How can you mathematically represent a tornado?" The following excerpt shows part of the interaction in one of the Spanish-dominant groups, with Máximo (a second-generation Colombian boy), Luna (a girl born in Peru), and Nicolás and Eliseo (two boys born in Colombia) (Planas & Setati, 2009):

Máximo: [Catalan] Hem de deicidir les fletxes que dibuixem i ja està (We need to decide the arrows that we draw and that's all.)
Eliseo: [Catalan] Primer pensem les fletxes, després les dibuixem i després en parlem. (First we think about the arrows, then we draw them and then we talk about it.)
Máximo: [Spanish] Esta idea de las flechas no es fácil. Tenemos que imaginar los diferentes movimientos que existen dentro del tornado. (This idea of the arrows is not easy. We have to imagine the different movements that exist within the tornado.)
Eliseo: [Spanish] Una flecha tiene que ser una línea recta para que el tornado baje. Tenemos la t para la translación. (An arrow needs to be a straight line for the tornado to go down. We have the t for the translation.)…
Luna: [Spanish] La pregunta pide representar un tornado, ¿no? (The question asks to represent a tornado, doesn't it?)
Nicolás: [Catalan] Sí, diu que s'ha de representar matemàticament un tornado. (Yes, it says that we need to mathematically represent a tornado.)
Luna: [Catalan] No és parlar d'un tornado, és representar-lo matemàticament. (It is not to talk about a tornado, it is to mathematically represent it.)
Eliseo: [Spanish] Nos puede ser útil representar un tornado antes de dibujarlo. (The drawing of a tornado can be useful before its representation.)
Nicolás: [Spanish] Está claro que con una sola flecha no basta, porque un tornado es más que una translación. (It may be useful to represent the tornado before drawing it.)
Eliseo: [Spanish] Hay que pensar en cómo dibujaríamos una espiral. Dibujaríamos curvas. (We need to think about how we would draw a spiral. We should draw curves.)

In looking at data from this group, it can be observed that the students use their two languages for different purposes. They use Catalan when getting familiar with new vocabulary, when situating the use of this vocabulary in the context of the given task, and when beginning to organize approaches to solving the task. However, they use Spanish, their dominant language and the language that they share with their peers, when arguing and counter-arguing with various degrees of specificity and developing more complex comprehension processes that are not centered on the repetition of the teacher's ideas. The use of the dominant language when elaborating on an argumentation has been observed among Latina/o students,

who use Spanish to justify an answer or elaborate on an explanation, and return to English to give priority to the acquisition of new vocabulary (Moschkovich, 2007).

From the perspective of power, the students in the group exercise considerable sense of agency. By the mere fact of alternating between their two languages in a classroom context (although Catalan is the official language), they are producing strategies of resistance. They develop autonomous actions based on their ability to change from one language to another in their interaction with one another. Power is often understood as a property of social structures and institutions; but it also has to do with particular actions that people, who participate in these structures, do to maintain active participation. Although data from these lessons show that the immigrant students from Latin America do not participate in whole class discussions as much as their Catalan-dominant peers, they have been agentive enough to alternatively use Spanish and Catalan in their small group.

The alternative use of Catalan and Spanish in peer interaction appears as a powerful feature of communication in the development of the mathematical task. All the students in that group are Spanish-dominant speakers. Thus, by switching between languages, they may not be signaling to any of the peers in the group, but, instead, may be unconsciously reacting to what they anticipate will happen in the whole class discussion with the teacher and other Catalan-dominant peers. It is our argument that the alternative use of languages leads students to better face the requirements of multilingual schools and classrooms. Conversely, avoiding the use of the home language or not getting really involved in improving the knowledge of the language of teaching is detrimental to learning. Particular ways of alternating languages can be advantageous from the perspective of language minority students' learning in linguistically homogeneous group work and at the same time can be detrimental from the perspective of these students' learning in whole-class discussion.

Data from Arizona

During the academic year 2006–07, Marta conducted 26 classroom observations, with 13 of those being videotaped between October and April. Most of the 27 students had varying degrees of bilingualism (English-Spanish) with the exception of 2 students who were monolingual English speakers. Two other students were relatively recent arrivals from Mexico and were Spanish-dominant. The teacher was bilingual but the instruction followed the language policy and was all in English, except for occasional clarification in Spanish with these two students. The vignette we present focuses on the interactions between Dania (fully bilingual) and Carolina (Spanish-dominant, arrived to the US in fifth grade) and Albert and Adam (both English-dominant but with some knowledge of Spanish). The students are working in pairs, the two boys sitting near the two girls, but they are not in a group of four. They are working on a fraction problem that shows two sections of land partitioned into several plots of different sizes, each with a person's name as the owner. The students need to figure out what fraction of a section each person owns[4]. Dania and Carolina are speaking in Spanish all throughout the problem and

they are making good progress towards finding the fractions. Adam comes over from time to time to check with Dania. In the excerpt below, Adam has 1/8 + 1/16 for one of the plots, while Dania has 3/16. Marta asks them if they have the same answer.

Marta: You have, you have one eighth and one sixteenth over there.
Adam: Yeah, because this is just one, one little square, and the other square.
Marta: Yeah, but she has three sixteenths and you have one eight and one sixteenth.
Adam: How did you get three sixteenths?
Dania: Porque. (*Because*) ¡Ay! (Makes a gesture of frustration) OK.
Carolina: Explícale. Explícale... porque a mí no me entiende. [*Explain it to him… because he doesn't understand me*.]
Dania: Adam! Look, it's because this... If you put this part...
Carolina: Explícale en una [hoja] limpia. Explícale en una limpia. (*Explain it to him on a new one [on a clean diagram]. Explain it to him in a new one*.)
Dania: (Starts drawing lines on a new diagram) No. Aquí está. ¿verdad? (*No. Here it is, right?*)
Adam: Come on, come on...
Dania: Wait!
Adam: Come on, come on, come on, come on, come on... What are you doing with that square? I'm talking about that square.
Dania: No. I know! I know what I'm doing.
Adam: Alright, alright, alright, alright. (Pause)

It is hard to capture in a few lines of transcript the non-verbal expressions – their gestures and the overall dynamics of this exchange. Dania and Adam have been going back and forth arguing about the different fractions. By the time Adam asks Dania about the three sixteenths, Dania is somewhat exasperated with Adam and his questions because she feels he does not understand her. Although Carolina does not use any English at all in her communication, she is part of the exchange. She tells Dania to explain it to him because he does not understand her (Carolina); she suggests that Dania use a new diagram and hands her one. She appears to be a full participant of this small group interaction, even though the communication is in English. The excerpt that follows further supports Carolina's full participation. The students continue discussing back and forth but they do not seem to resolve the dilemma of 3/16 vs. the 1/8 + 1/16 since they are mostly bickering. Adam goes back to his seat and a few seconds later he says that yes, the answer is 3/16. Marta asks him how he knows that.

1 Adam: I just.... I knew it was going to be three sixteenths.
2 Marta: What do you mean? How did you know that? What if they're not right? How do you know it?
3 Dania: Yeah!
4 Albert: How do you know, Adam? Huh? How do you know?
5 Adam: Yeah, because I added (mumbles – inaudible).
6 Marta: Well, I'll ask you the same question, Mr. Albert. How do you know that one eight and one sixteenth is, is three sixteenths?

7 Carolina: Porque, porque... (*Because, because…*)
8 Marta: A ver, un octavo más un dieciseisavo. (*Let's see, one eighth plus one sixteenth.*)
9 Carolina: Porque un octavo son dos dieciséis, más otro, es tres dieciséis. (*Because one eighth is two sixteen, plus another one, it's three sixteen.*)
10 Dania: So, un dieciséis más dos dieciséis es tres dieciséis. (*So, one sixteen plus two sixteen is three sixteen.*)

In line 6 Marta is trying to get Albert involved since he usually does not participate in mathematical discussions, but Carolina starts answering (line 7). Marta then repeats part of the question in Spanish, which may have indicated to her to go ahead and continue her explanation of why 1/8 + 1/16 is 3/16. She does this confidently.[5] She has been working on this problem with Dania and they both have a good understanding of how the section is partitioned and what to do to find the corresponding fraction for each plot. There are several factors that support Carolina's participation. The school is in a primarily Latino/a community with a strong affiliation to Spanish language. The neighborhood has stores with signs in Spanish and is essentially a bilingual neighborhood. Most students are bilingual or have some understanding of Spanish, as many have a relative (usually a grandparent or a parent) who is Spanish-dominant. Thus, despite the restrictive language policy, Spanish is very present during the school day. Furthermore, Carolina has a strong mathematics background from her school in Mexico. During an interview, speaking Spanish, she says:

> Well, I remember that in Mexico what, some of the things that we are barely learning here, I was taught over there in fourth grade. Like, the fractions, the, the, what do you call them? The fractions of figures, I was taught that in fourth grade, third and fourth, that I do remember, I even have books from Mexico. … Things that we are barely being taught here in sixth grade, were taught to me in third and fourth over there. … In fifth grade they were teaching us, and I knew it already, I knew everything already because they had already taught me that in fourth grade [in Mexico].

Carolina's participation, however, is limited. Although many students in her class did understand Spanish and could speak it, only a few had an academic command of Spanish strong enough to carry on mathematical conversations. Dania was one such student and Carolina tended to sit with her. But another constraint to Carolina's full participation is at the level of whole class discussion. Her teacher in 5th grade as well as the one in sixth grade were bilingual, but they both had to make an conscious effort to remember to encourage Carolina's participation in Spanish. Carolina's fifth-grade teacher felt that she did not always give the student the attention she needed because she was the only one who did not speak English in the classroom. This teacher also shared her frustration at not being able to fully use her expertise as a bilingual teacher given the current language policy in schools. Similarly the sixth grade teacher also shared with us her views on the language policy:

> Well, I am really against them throwing kids into English classrooms when their language is, when their first language is Spanish. I'm really (with emphasis), really against that. I have never liked this law that came out where you know we're forcing these kids and throwing them into, into an English classroom. I can just feel for them, you know that they're just not understanding anything that is going on. I used to teach bilingually myself … and to me I feel like it was working because I was using both languages throughout the day and it really, it really, I thought was very beneficial. Now I am not supposed to use Spanish because I am an SEI teacher; I am not supposed to use it but it, it makes me angry and I still use it.

Several teachers at this school (and others in our research) had taught bilingual classrooms prior to the passing of Proposition 203 in 2000 and were now required to leave this approach behind. Although Spanish was heard in the small group discussions and in social talk in the school, it was not the language of whole-class communication. Students like Carolina were able to participate in many aspects of the mathematics classroom but for her to participate in the whole-class discussion she had to be singled out by the teacher explicitly switching to Spanish and inviting her to participate. In our observations, we did not witness any instances of Spanish-dominant students, in classrooms where they were in a minority, speaking up in Spanish in front of the whole class, unless the teacher had directed the question to them. Although we have reason to believe that this singling out was probably well received in this school due to the strong affiliation to Spanish and the overall bilingual environment, still we wonder about how students in this age group perceive being treated differently from their peers through a language switch. We turn our attention to students' views on language in our next section.

BILINGUAL STUDENTS' VIEWS OF ACCESS TO MATHEMATICS

In this second section with empirical data, we discuss findings from our studies in Barcelona and Tucson with a focus on understanding how access to mathematics is perceived by bilingual students. The exploration of access to school knowledge implies multiple and often simultaneous social, cultural, political, and technical dimensions such as teachers' strategies or the support from the institutions (Tate & Rousseau, 2002). In this chapter we pay special attention to the dimension given by students' views. We assume that accessing knowledge requires knowledge: students' access to school mathematics requires knowledge on the part of students regarding what school mathematics is about. The students' views can themselves contribute to create obstacles to knowledge or, instead, enable access.

Data from Catalonia

Inspired by the research conducted with multilingual students in South Africa (e.g., Setati, Chitera, & Essien, 2009), Núria examined students' responses to a writing prompt "What language do you use in your mathematics classroom when working

in a small group? What makes you choose the language?" In Barcelona, all ten students who responded to the writing prompt were working-class teenagers – about 13 years old – with good knowledge of both Catalan and Spanish (the two official languages in Catalonia). Six of the students were either born in Latin America or come from Latin American families. The other four students had Catalan as their home language and had always attended Catalonian schools. It was expected that the students addressed their processes of negotiation as a part of their own language identities in their bilingual mathematics classroom. The students could write either formally or informally, and either in Catalan or in Spanish. Despite the offered choice of languages, all students wrote in Catalan. This was probably because both the classroom dominant language and the writing prompt were in Catalan and Núria tended to speak in Catalan as well.

Addressing their language choice during group work, most of the ten students wrote about the complexity of their language repertoires and their flexibility with the two languages. Despite the monolingual language policy in the Catalonian schools, students pointed to the effective existence of two languages in their classroom. In their use of Catalan and Spanish, it is not that the students did not know a specific word, or could not say a sentence in one of the languages and were then forced to switch the language; nor is it that the switching is attributed to external impositions, at least according to their views as expressed in the writings. Changing language is shown rather as a consequence of interest in including all speakers. For example, Paola and Victor clearly indicate that in their narrative below:

> I can speak [both] Catalan and Spanish. I use Catalan when writing and reading, and Spanish when discussing with my peers. (Paola)

> I use Catalan but groups are not always the same. Sometimes in my group I have peers who prefer to speak Spanish and so do I. (Victor)

Paola and Victor's use of Spanish represents a form of recognition of the Spanish-dominant language identity of some of their peers, but when changing language, they also signal their own position as individuals who are allowed and willing to speak more than one language. Carla, for instance, refers to the facilitation of talk in small bilingual groups as a pragmatic reason for changing language:

> I choose the language depending on the group each time. If it is a group with all Catalan speakers, I always speak Catalan. If the group has other students, the conversation is easier if we use Spanish. (Carla)

Carla and Paola give another pragmatic reason for language change in relation to language choice in group work and whole class discussion. They reflect on their experiences in two different social contexts of the classroom – small group and whole class discussion – that relate it to the notion of hybridity.

> I like speaking [both] Catalan and Spanish but I prefer Catalan for final discussions. This is not a problem because we all know Catalan. … Every month at the assemblies with other classes I prefer Catalan too. (Carla)

> I like sharing a group with my friends from Colombia, and I also like speaking Catalan. When we work in small groups, I use Catalan. Sometimes it is difficult because I have been speaking Spanish when working with my peers, but I like making the effort. (Paola)

The students' flexibility in their use of two languages points to significant agency: Catalan- and Spanish-dominant speakers are willing to linguistically accommodate each other. They believe that it is important to do so because issues of communication are at stake (e.g. "I like making the effort," or "I have peers who prefer to speak Spanish and so do I"). From the perspectives of these students, bilingualism appears as an accepted fact of life in the classroom. The pragmatic reasons indicated by the students point to an interpretation of their languages as tools for social interaction and communication.

Both Catalan- and Spanish-dominant speakers show distinct degrees of agency as they attempt to describe their language identities that are far more complex than those politically ascribed to them. They use their knowledge of two languages as a resource that opens up various options, some of which are characterized in terms of responsibility (e.g. "the conversation is easier if we use Spanish"). Diana and Norma, the two students from Latin America, wrote about the special nature of learning mathematics as a relevant outcome for their language practices. For them, some limits to the use of their own two languages come from the perceived higher value of learning mathematics in Catalan. This language was seen to constitute a more privileged resource to learn technical mathematical vocabulary and grammar:

> I prefer to speak Spanish at home, but in the mathematics class, I cannot get distracted with the language because there are some words that need to be learned and they are in Catalan. (Diana)

> Books are written in Catalan and sometimes we need to read a few pages before starting the task. We concentrate on the mathematics more if we all speak the same language when talking about the book. (Norma)

It is interesting to notice how students produce their language identities and, at the same time, consider the social and political negotiations that are needed to gain legitimacy as learners of mathematics. For example, to "make herself understandable," Diana emphasizes the fact that she speaks Spanish at home, and then she mentions the needs to learn technical words in Catalan. Because (language) identities are negotiated in relation to others, Diana's responses may be informative of personal and social limits posed to her language experience. More generally, the students address forms of resistance that work to maintain the use of their two languages together with their access to school mathematics. Their discursive attempts are orientated to not damaging their opportunities for learning mathematics.

Although the analysis of video data points to the existence of less "positive" oral discourses in the class with these same students (some of the Catalan-dominant students mark subtle language boundaries during their work with

Spanish-dominant peers, and vice versa), it is still relevant to pay attention to how they raise their voices for flexible bilingual practices in group work.

Data from Arizona

In the context of Arizona, we have data from individual interviews with 45 students at three different schools and 4 focus groups, with 4 students each, at one of these schools. All students were between 9 and 13 years of age. Through the interviews and focus groups we sought to learn about the students' activities outside school, language use, general perceptions about the school and specifically the mathematics class (in particular with the students who had had some schooling in Mexico). In this section we use excerpts from the interviews and focus groups to illustrate some of the students' comments on language use.

All students mentioned that they had some knowledge of Spanish, with many of them speaking it regularly with family members, usually their parents or grandparents. When asked what language they used in the mathematics classroom, students generally answered "English." There were some exceptions to this with students who were in the segregated section, which we will discuss later. Although English was clearly seen as the language of instruction, when probed, many students said that they used Spanish in their small-group discussions or that they used either language depending on who was in the group.

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Interviewer: When do you use English in the mathematics class?
Dania: When the teacher asks us if we can explain how we solved
       the problem.
Interviewer: And that is always in English?
Dania: Yes.
Interviewer: And when you work in groups?
Dania: It depends, if everybody in the group speaks Spanish and
       English.
Interviewer: If you could choose, would you have your classes in
       English, Spanish, or both?
Dania: Both, because sometimes they tell me words that I don't
       understand in English and sometimes when they tell me in
       Spanish, I understand. So, sometimes I don't quite
       understand things in English.
[. . .]
Dania: If I have to explain something to the teacher, I'd rather
       use English because she hardly understands, well she
       speaks it and understands it, but she hardly understands
       Spanish.
Interviewer: Would you prefer to explain in English or in
       Spanish, if you could choose?
Dania: In Spanish.
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Dania was one of the few students, we noticed, who had a good command of both academic English and Spanish. She was a good resource for students like Carolina who, as a recent arrival, was Spanish-dominant, as the excerpt from a focus group shows:

Marta: At home do you speak Spanish, English or both?
[Juanita, Alice, and Melinda answer "both"]
Carolina: Since I speak Spanish more, Spanish… I only say a couple of words [in English] when I get a little crazy
Marta: Carolina, are you understanding your classes in English well now?
Carolina: Yeah, I don't ask the teacher to translate. Only when they are words that I've never heard, that I don't know yet, that's when I ask her.
Juanita: But she doesn't want to read.
Carolina: But I do read, right Melinda? (Melinda nods her head)
Juanita: She does read, but she's, she doesn't want to.
Carolina: I read with Melinda yesterday.
Melinda: She was reading with me yesterday.
Carolina: I'm embarrassed sometimes because I don't pronounce some words well.
Juanita: But if you don't practice you aren't going to learn.
Melinda: That's what I did. I would take books home.
Carolina: Well I'm embarrassed that they are going to make fun of me because I don't know how to pronounce them.

Carolina is not alone expressing her concern for not being able to pronounce English well. Several other older students in the group (those in grades 6 through 8) brought up the same concern. In the case of Carolina, although she was the only Spanish-dominant student at the time in her classroom, the school's atmosphere overall was very welcoming to students who were English language learners; most students had either experienced it themselves, or had family members who had struggled with the pronunciation in English when they first started to speak it. Yet, this does not mean that Carolina was comfortable speaking in English as the excerpt above shows.

We now turn to a different environment, a middle school that responded to the 2006 law requiring a 4-hour block of English instruction by implementing a segregation model. In this model, all ELLs attended most of their classes with other ELLs in a section of the school that we will refer to as Section A. This arrangement that segregates students based on language proficiency highlights the complexity of language identity. In the mathematics class, these students were able to use Spanish regularly because the teacher was Spanish-dominant too. This gave us access to very rich mathematical discussions as the students used Spanish to explain their reasoning. However, these students were aware of the segregation and several of them wish that there was more emphasis on English:

Marta: What would you like the teacher to know about you that you think would help you to a better classroom experience in math?
Simón: That she wouldn't, that she would put more effort in speaking English because everything she explains, almost everything she explains is mostly in Spanish.
Marta: And you would prefer that it was in English?
Simón: Yes, to learn more.

It is worth noting that the teacher used English in much of her instruction, but she used Spanish to clarify. There was, however, a lot of Spanish being used in the class since students spoke in Spanish most of the time in their groups and even in their presentations to the whole class. In Section A, there was stigma associated with being in that section and that getting out of that section would signify an upward move. However, moving out of Section A was not unproblematic, as students were then in a more English-dominant environment but issues related to their comfort with the English language came up. This was the case for Larissa, who, while in Section A, had expressed not liking Spanish thus resenting that in Section A there was too much Spanish used. Yet, in her first year out of Section A, as an eighth grader, she said:

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Larissa: I don't like speaking English all that much.
Marta: How come?
Larissa: I don't know
Marta: Hmm, it's funny because last year you told me when I
       interviewed you that you only wanted to speak in English.
Larissa: It's because I wanted to practice it.
Marta: So now, it's like you like speaking both but it's almost
       like you prefer speaking Spanish a little more.
Larissa: No, it's not that I prefer…
Marta: No?
Larissa: it's that I almost don't like [it]
Marta: You don't like what?
Larissa: English
[...]
Marta: What is it that you don't like about English?
Larissa: That I'm still not learning it well, that's how I see
       it. ... So, there are times that I stay quiet because I
       feel embarrassed if I don't pronounce something well.
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Similarly, Carlos, also when he was in eighth grade, out of Section A, said:

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Marta: Is there something that has been hard for you this year?
Carlos: Communicating with people.
Marta: What do you mean?
Carlos: Well, like sometimes I don't like to speak in English,
       and so that's why
Marta: And why do you think you don't like speaking in English?
Carlos: Because, it's just that I don't like to talk, or I think
       that sometimes, I think that I'm going to say it wrong.
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While being in Section A, ELLs were perhaps more sheltered. Thus, from a point of view of the mathematics classroom, we could witness their participation in discussions. Yet the students' desire was to move out of that Section as an indication of progress. However, once outside Section A, their opportunities for participation may have been compromised in part by their being self-conscious about their command of English. This perception was shared by Matilde, the mathematics teacher for students in Section A:

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Matilde: I work only with ELL students ... Our kids feel afraid
       to be in the regular classroom because they feel the other
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kids have the power. So, even if I have a very brilliant kid, he goes to a nor- class, a regular classroom, and he is going to be one X student [meaning anonymous]. Because he is not going to be that brilliant because they're going to ask them questions in English so they don't know how to explain themselves and they're going to be quiet. So they're going to be relegated to the back of the class. So they are afraid to go to a regular class.

We close this discussion on Section A with Cecilia, who, as an eighth grader, was in Section A for some of her classes but in a different Section for others:

Cecilia: [answering about what language she uses in the mathematics class] But like, more Spanish. I understand more in, in Spanish with her [the teacher].
Marta: You understand more in Spanish ... You understand her more when she speaks in Spanish?
Cecilia: Yes.
Marta: OK. So, what do you usually, when you ask a question to her, what do you usually ...?
Cecilia: In Spanish.
Marta: And then does she answer in Spanish?
Cecilia: Yes, or sometimes English.
Marta: When you do mathematics, in class, when you work in the groups ... what language do you like to speak in?
Cecilia: In Spanish.
[...]
Cecilia: I like Section A because everybody is Mexican like me and we talk, and yeah, I like it.
Marta: You like being in Section A?
Cecilia: No, I, I like the people in Section A, the persons in ...
Marta: Got you! The students?
Cecilia: Yeah.
Marta: The students in Section A. Got you. But if you could choose, where would you be?
Cecilia: In Section B [a different set of classrooms for non-ELLs].
Marta: In Section B. If now you were to start eighth grade, if this was August instead of April ...
Cecilia: Section B.
Marta: In Section B. OK. And why? Why do you think that, that Section B ...
Cecilia: I would learn more.
Marta: And why do you think you'd learn more in Section B?
Cecilia: Like I said, ... all the people speak English and ... I have to speak English too.
Marta: OK, so in Section B you think that you would be using your English more.
Cecilia: Yeah.
Marta: And in Section A ...
Cecilia: In Spanish.

As we can see in these short excerpts, students whose first language is not the language of instruction face several dilemmas as they try to negotiate their identities as students who also know more than one language. They want to fit in

as speakers of the official language of instruction, but they also experience the difficulties often associated with speaking a second language; they are in an environment where they can use their first language quite often socially and academically (at least in group work). We end this section with excerpts from interviews with two of the youngest students (9-year-olds). We chose these excerpts to illustrate the adult influence on language identity formation:

Penny: When in Mexico my dad says "No hables inglés, hablas español." ("*Don't speak English, speak Spanish*")
Marta: OK, why do you think he says that?
Penny: My tío (*uncle*) also says that.
Marta: OK. Why do you think they say that?
Penny: Because you are at a specific place to talk one language, like in school. If you have a friend that talks Spanish you should talk Spanish to them but in school you talk English and, and … and at your house some people talk English or Spanish
Marta: Ok is that what your parents tell you that or your dad tells you that?
Penny: Mostly my tío. He tells my cousins and me. He says don't talk English at this house.

Interviewer: What languages do you speak at home?
Denise: Spanish with my mom and English with my dad.
Interviewer: What languages do you usually speak with your friends?
Denise: English.
Interviewer: Do you like to speak Spanish or English more?
Denise: I like to speak English more.
Interviewer: Why?
Denise: Because when I was little, like in preschool, I knew everything in Spanish, but I forgot because my teachers told me to speak English only.

Teachers like Denise's who told her "to speak English only" and the politicians who push for laws that eliminate bilingual education seem unaware that "programs fostering bilingualism among children in immigrant families could provide a valuable competitive edge as the US seeks to position itself in the increasingly competitive global economy" (Hernandez, Denton, & Macartney, 2010, p. 11).

FINAL REMARKS

There is no doubt that language ideologies have an impact on the students' daily lives at multilingual schools and, in particular, on their mathematical learning. Learning is often judged from the way it is communicated, and communication has a lot to do with language(s). Such ideologies are instilled so deep inside a society that students sometimes anticipate what will be the effects of certain uses of language(s), and thus rearrange their own opportunities of communication. We have argued that research carried out on this topic has clearly stated this sociopolitical dimension of learning mathematics in multilingual classrooms. However, in this chapter we have commented on how bilingual students partially

overcome sociopolitical constraints to go on with their mathematical learning in classrooms in which the language of teaching is not their home language. Using a range of examples from Barcelona and Tucson, we explored some of the ways in which language awareness influences these students' practices and views without critically interrupting their expectations of participation and access. To a large extent, our own studies from the last decade show that learning opportunities have a lot to do with social differences, which at the same time become mediated by structures of agency.

The study of bilingual and multilingual learners of mathematics, however, still deserves more emphasis as a crucial part of mathematics education research. With the consideration of social and political issues of influence in the mathematics classroom, the understanding of language competence and language use appears much more complex: it can happen that certain positions concerning language are already set before students begin the school year. If this is the case, we need to look for social relationships among groups together with the way particular positions are (re)built by the children themselves within the mathematics classroom. From this perspective, it is meaningful to explore how students behave through, and react to, mathematical conversations in the classroom.

NOTES

[1] We have discussed elsewhere some of the effects of these restrictive language policies on Latino/a parents' participation in schools and on students' learning of mathematics (Acosta-Iriqui, Civil, Díez-Palomar, Marshall, & Quintos, 2011; Civil, 2011, 2012; Civil & Menéndez, 2011; Civil & Planas, 2010).

[2] We have also discussed elsewhere some similarities and differences in the two contexts (Civil & Planas, 2004; Civil, Planas & Quintos, in press; Planas & Civil, 2010).

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[4] Lappan, G., Fey, J., Fitzgerald, W., Friel, S., & Phillips, E. (2006). Connected Mathematics 2 – Grade Six. Boston, MA: Pearson Prentice Hall.

[5] In line 9 Carolina does not say "sixteenths" in Spanish when referring to 2/16, but instead she says "sixteen" and Dania also uses "sixteen" instead of "sixteenth" (line 10). Whereas the two terms sound quite close in English, that is not the case in Spanish.

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