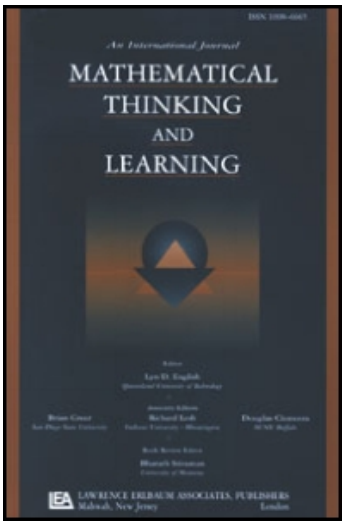

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Revoicing in a Multilingual Classroom

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The concept of *revoicing* has recently received a substantial amount of attention within the mathematics education community. One of the primary purposes of revoicing is to promote a deeper conceptual understanding of mathematics by positioning students in relation to one another, thereby facilitating student debate and mathematical argumentation. Our study reexamines revoicing in a multilingual high school algebra classroom; our findings challenge the assumption that revoicing is necessarily tightly connected with classroom argumentation. We demonstrate that a single discursive form, such as revoicing, can play a wide

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range of valuable functions within the classroom. More importantly, we investigate systematic differences in the ways that revoicing is used, by a particular teacher, across languages. Implications for policy and practice are discussed.

Sociocultural theories emphasize that learning is a process of changing one's participation in a particular community (Lave, 1996; Lave & Wenger, 1991; Rogoff, 1990; Wenger, 1998). This perspective on learning foregrounds classroom discourse. Revoicing is one classroom discourse concept that is addressed in the mathematics education research literature because of its value in initiating and sustaining mathematical discussions. First defined by O'Connor and Michaels (1993), (1996), revoicing is a special form of Goffman's[1] (1981) notion of reported speech. Revoicing occurs when one person re-utters another's contribution through the use of repetition, expansion, or rephrasing (Forman, Larreamendy-Joerns, Stein, & Brown, 1998; O'Connor & Michaels, 1993, 1996).

Forman et al. (1998) depicted revoicing as a strategy that can be used by teachers to promote academic debate by showing how students' ideas relate to the ideas of others. Forman et al. also highlighted the "propositional content of the message" (p. 530) and illustrated how teachers can expand students' utterances by rephrasing ideas in more formal, mathematical language, and discuss how this expansion may change student understandings. Thus, Forman et al.'s study (1998) demonstrates revoicing as a way that teachers can promote conceptual understanding by actively involving their students in mathematical discussions.

In this article, we elaborate on an aspect of revoicing that has not yet received substantial attention in mathematics education research. We are specifically interested in exploring, analyzing, and discussing the epistemic consequences of revoicing for students who are marginalized in the United States and who have been historically absent in mathematics education research. Although in the past decade there has been an increase in attention to "diverse" classrooms in mathematics education research in the United States, this research typically does not articulate or make explicit how the classroom's diversity—such as students' language abilities, their races, or their genders—might interact with the teaching and learning of mathematics. We believe that a classroom's discourse environment is a crucial component of its social organization and, therefore, has important implications in terms of equity. Our primary purpose of this article is to closely examine the specific discourse concept of revoicing in a context of a multilingual classroom.

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[1]Although attributed to Goffman, prior scholars in other disciplines had also been interested in similar phenomena such as Bakhtin's polyphony (1981) and Vygotsky's appropriation of other's voices (1978).

THEORETICAL FRAMEWORK

Many researchers argue that changing the epistemological stance of school mathematics requires a reconceptualization of the rights, roles, and responsibilities of students and teachers (Ball, 1993; Cobb & Yackel, 1996; Erickson & Shultz, 1997; Forman et al., 1998; Lampert, 1990; Lampert, Rittenhouse, & Crumbaugh, 1996; Rittenhouse, 1998). The general recommendation for this new social organization is that it should be centered on students as authors of mathematical ideas and as arbiters of what counts as truth or as an adequate strategy. In classrooms organized around discourse and scholarly debate, students learn the mathematical content as well as an appropriate disposition towards mathematical communication (Ball, 1993; Forman et al., 1998; Lampert, 1990; Lampert et al., 1996).

The creation of new learning environments centered on discourse practices that are aligned with the discipline of mathematics (Ball, 1993; Lampert, 1990) requires new classroom norms. Cobb (1999) differentiates three levels of social organization that create structures to enable students to participate in ways that encourage conceptual understanding. At the broadest level, Cobb identifies classroom *norms* for participation. For example, a typical norm in one of his teaching experiments is for the students to publicly explain their answers and reasoning (e.g., Cobb, 1999). He goes on to note that particular disciplines have specialized discourse structures, or, in this case, *sociomathematical norms* for participation, that use concepts within the domain and are closely tied to understanding (Ibid; see also Kelly, Chen, & Crawford, 1998). Cobb differentiates sociomathematical norms from *mathematical practices*, or the specific ways in which tools and procedures are used to achieve mathematical goals.

These norms establish a set of labels and prototypical behaviors—what Gee (2000) calls a Discourse Identity—that helps students see themselves in relation to, and as part of, the discipline of mathematics or, at the very least, a particular mathematics classroom. A central construct in our analysis is *positioning* in particular, we analyze the teacher's positioning of students in relation to norms and discourse identities. The act of positioning, by oneself or by another refers to the act of making "claims to and identification with social categories" (Holland, Lachicotte, Skinner, & Cain, 1998, p. 127). Positioning occurs within the pre-established norms, narratives, power relationships, and divisions of labor that delimit the competencies and identities that students can adopt within the classroom (Davies and Harre, 2001; Ritchie, 2002).

The positions that people offer or adopt stand in relation to and in terms of the narratives, storylines, categories, and norms of the community (Davies and Harre, 2001). However, the term "'positioning'" is often used to denote the fact that one's role and identity is constructed and located in various discursive practices that people enact and can change based on one's own or other's

contributions (Davies and Harre, 2001). It, therefore, stands in contrast with the social psychological concept of "'role,'" which implies that people inhabit roles as if unthinkingly reading out a script. Although in this article we sometimes use the term role, we do so to note the culturally recognized parts that one can play in a classroom or community.

Because positions are built on locally relevant or historically constituted categories and norms, students, as newcomers, must first learn to recognize the distinctions that mark various positions. In the context of some action or utterance, when a teacher positions a student as a "mathematician," this might set the groundwork for the student to recognize this as a position and for the student to then be able to position himself or herself as a mathematician at the appropriate time for the appropriate reasons (Brown et al., 2005).

Of particular importance here is the idea of an epistemic device (Moore & Maton, 2001) as a way that a teacher can mark positions related to knowledge production and Cobb's (1999) three levels of norms—making them visible to the students in hopes of shaping students' emergent epistemologies of the discipline. Moore and Maton (2001) define an epistemic device as a means in which groups establish and negotiate the legitimacy of knowledge, how that legitimacy is determined, and who can make knowledge claims. Particular epistemic devices can emphasize power relationships within a community or can highlight the student's role in making knowledge claims. Revoicing, because it explicitly attributes authorship to the students, can be seen as an epistemic device that shares the intellectual authority with the students and helps establish their role as one of contributing to the construction of knowledge (Forman & Ansell, 2002).

Even though social organizations that promote students to debate what counts as legitimate knowledge are more democratic than the discourse of a traditional mathematics classroom, there are still asymmetrical power relations between teachers and students. Additionally, different power relationships can develop between the students themselves. Most students find and take up recognized positions within the classroom, such as the unmarked position of the "compliant student" or the marked position of the "disruptive" student or "class clown" (Davies & Hunt, 1994). A key feature of the type of discourse environment being advocated by reform mathematics is that the students' roles are defined by their initiating, articulating, defending, and elaborating intellectual positions, and revising those ideas as needed. To help establish what is, in many cases, a new and radically different type of classroom discourse, the teacher can use his or her asymmetrical power relationship in the classroom in at least two productive ways. First, the teacher can make the normative and productive roles visible and comprehensible to the students by marking them in the ongoing discussion. Second, during an interaction, the teacher can position students as having competently made a claim or as having contributed an important idea to the group (Brown, Reveles, & Kelly, 2005).

Epistemic devices, like revoicing, can be a major force in establishing the classroom norms that value particular cognitive competencies and identities, which, in turn, influence what students learn (Morais & Neves, 2001) and how they view the practice (Sandoval & Resiser, 2004). Revoicing also can be used to help students see when they or their peers have acted as competent members of the discourse community. When the teacher marks these successful cases of participation, they may be used as prospective models that students can aspire to and can use to shape their future interactions. As Forman and Ansell (2002) pointed out, neither intellectual engagement in the discussion nor understanding the mathematical content alone is sufficient. If students do not take up legitimate positions within the norms of the classroom, their contributions to the conversations are likely to be devalued, silenced, or erased (Forman & Ansell, 2002).

There is an obvious, but complicated, relationship between a classroom's social organization and by whom and how well this organization is appropriated. A comparative study by Boaler and Greeno (2000) demonstrated how the extent to which students identify, merely cooperate, or resist identifying with the discipline of mathematics can differ across classrooms. They compare two advanced placement calculus classrooms, a didactic classroom where students were positioned in a narrow range of primarily passive roles and a discussion-based classroom that valued active contributions to classroom conversation and collective understanding. The students in the discussion-based classroom viewed mathematics as a field in which they could discuss and explore ideas. In the didactic classroom, students reported that mathematics did not require any thought when compared to other subjects, and, as a result, even successful students explicitly rejected an affiliation with the discipline.

In our own work, our empirical data do not provide us with evidence that could support claims about the degree to which students appropriated positions, rules, or norms of the classroom as a part of their mathematical identities. Instead, we focus on how the teacher made the norms, roles, and discourse identities visible and accessible to the students. We rely on the evidence of existing research that suggests that social organizations that promote knowledge construction and academic debate are more attractive to students and lead them to create new and more positive mathematical identities (Boaler; 1997; Boaler & Greeno, 2000; Gresalfi & Cobb, 2006; Horn, 2006).

Because our research is set in a multilingual classroom, we must also consider the implications of classroom mathematical discourse for English-Language Learning (ELL) students. We adopt a position on mathematics discourse as applied to ELL students advanced by Moschkovich 2002, (2007), which she terms *participation in mathematical discourse*. This perspective is aligned with the more general aims of reform mathematics and avoids framing the issue in terms of the perceived deficiencies of ELL students. Moschkovich (2002)

described how participation can expand and complicate the explanations of how ELL students can or should learn mathematics, which assumes that knowing and doing mathematics are merely issues of vocabulary or semantics. Instead, the focus on participation in mathematical discourse requires an identification of the resources that ELL students bring to mathematical discussions and the ways we can build on these strengths to construct conceptual understanding of mathematical ideas (Gutierrez, 2002).

Mathematical discourse communities, however, typically require "English proficiency as a pre-condition for membership" (Secada, 1996, p.426). The required proficiency may not be limited to conversational English but may extend to Academic English Language (AEL) as well. Although there is ongoing debate over its exact definition, in this article, we focus on one aspect of AEL: the use of language in formal academic contexts to acquire new knowledge, describe abstractions, and/or communicate information to others (Chamot & O'Malley, 1994). This often includes knowing how to use the general and content-specific vocabulary of a discipline as well as the specialized grammatical structures used in classrooms and textbooks. Marking AEL is not meant to imply that it is more sophisticated or cognitively complex than social or everyday language. Certain classroom discourse patterns can be quite simple, such as the formulaic responses expected in the Initiate-Respond-Evaluate participation structure common in schools (Mehan, 1979). However, participants in classrooms—certainly teachers and, often, students—recognize AEL as its own language game, with consequences for how one's academic competence is perceived in school. Accordingly, it is important to examine the role and effects of revoicing for ELL students with Secada's (1996) caution in mind. Asymmetrical or superficial access to the classroom's discourse has serious implications for what students will come to learn from their own and others' participation. Our focus in this article is to further explore the impact of revoicing in a multilingual classroom by investigating seven days of classroom discourse to illuminate the tensions and contradictions within such a context.

METHODOLOGY

Case Background

This article reports on research using case study methodology (Stake, 1995). This particular case originates from a data corpus gathered in a larger study of an urban secondary-school mathematics department in a mid-sized city in the midwestern United States. The school has a large Latino population (58.8%), with 65% of its students eligible for free lunch (Roy, Bohl, & Rousseau, 1998). The larger study focused on four bilingual mathematics teachers, who spent up to two years in a professional-development study group with four university

researchers, working toward the creation and sustenance of classrooms that promoted student mathematical understanding. The larger data corpus included researcher visits to the teachers' classrooms, videotapes of classroom observations, researcher interviews with the teachers, student work, and professional development sessions.

The four teachers taught students in that school's entry-level mathematics classes. They reported that they used methods of self-selection as well as teacher nomination to designate mathematics classes for ELL students, with the goal of providing more language support in the beginning of the school year. Our analysis involves one of these teachers, Mr. Garcia, a bilingual Latino male in his second year of teaching. Mr. Garcia's classroom began as a bilingual classroom; all students were native Spanish speakers and classified by the school as ELL students. In the second semester, four African American students who did not speak Spanish were added to this particular class. These African American students did not speak Spanish; however, our data include their use of African American Vernacular English. This is significant because African American Vernacular English is often stigmatized and therefore marks membership or competence differently than might other dialects of English. Although our analysis is limited to the national languages of Spanish and English, we recognize this particular complexity.

The students in this second semester class were 11th and 12th grade students who all needed to pass the course to meet high school graduation requirements. Some had taken the course before and not passed. As a summative assessment, students were to present individual mathematics portfolios to demonstrate their successful completion of various goals. Much of the teacher's efforts, in these sets of lessons and more generally, were oriented toward producing artifacts that could be included in students' portfolios so students could meet graduation requirements.

We select this particular case because it provides a rich set of data on the teaching of algebra in a multilingual classroom. Furthermore, it creates a natural comparison between the discourse practices of a Spanish/English bilingual classroom and a multilingual classroom. The data for analysis include videotapes of seven sessions from the two semesters of Mr. Garcia's Algebra I class. Three of the seven videotapes are from the first semester of the course (hereafter referred to as the bilingual class), and the remaining four are from the second semester (hereafter referred to as the multilingual class). The curriculum is drawn from "Connected Mathematics Program," an National Science Foundation–funded reform curriculum developed for middle-school students. Classroom interactions were organized around small-group investigations and whole-class discussions based on the students small-group work.

Throughout the various stages of our analysis, we focus on one research question: Does the teacher use revoicing in this multilingual classroom? If so, what does it look like? When, where, and with which students does it occur?

Our ultimate goal in asking and answering these questions is to develop theory and extend the field's understanding of the equity implications of revoicing, as an example of a classroom discourse concept, in a multilingual classroom.

Coding Scheme

Our initial step was to examine the ways in which the teacher's strategic use of the students' talk served as a meta-message that related the students' talk to the teacher's intentions for the classroom's values, norms, roles, and identities. As described earlier, we use the term "positioning" to describe one potential function of revoicing, by which a reutterance or reported speech has the strategic effect of explicitly placing the original speaker in relation to other people, the task, or the original speaker's interpretation of his or her own utterance. We see this function of revoicing as particularly significant and accordingly, our analysis focuses on only those revoicing episodes that involve explicit verbal, gestural, and other non-verbal positioning moves by the teacher that could be located in the transcript or the video. We term this type of revoicing as *revoicing to position*.

We realize that students are often positioned in implicit ways, such as being met by silence from the teacher or having one's utterance be directly repeated by the teacher. One can argue that when a student calls out an answer but is not acknowledged (either verbally or non-verbally) by the teacher, he or she is being implicitly positioned by the teacher as having violated the norm to raise one's hand or, even, as having given the wrong answer. Although it is possible to recover the effects of a speech act from a video record, it is much harder to recover a participant's intent from the absence of an action. Therefore, we further limit our analysis to episodes of revoicing that include explicit, verbal, or non-verbal positioning of the students.

We began with the video and transcript of one of the seven lessons in the data corpus. Each researcher created an individual list of instances of revoicing in the lesson. We compared all the lists, and in any cases of disagreement, the research team reviewed the classroom video and transcript together and worked under a consensus process. Timestamps were noted, chunks of transcript were excerpted, and we marked the spoken languages and classroom configuration. We then extracted the *revoicing to position* episodes, only those revoicing episodes that involve explicit verbal, gestural, and other non-verbal positioning moves by the teacher that could be located in the transcript or the video. This process was extended to include all seven lessons in the data corpus. We asked eight questions about each *revoicing to position* episode (see Table 1). The first six questions address the function of an episode by examining the nature of the teacher's positioning of the student. The final two questions address the episode's classroom configuration and the languages spoken.

TABLE 1
Revoicing-to-position Analytic Questions

Eight questions used to examine revoicing episodes
1. Is the reported speech being juxtaposed against another student or group?
2. Is the reported speech being evaluated for its mathematical validity—that is, is it positioned against a mathematical norm?
3. Is the reported speech being challenged or expanded—that is, positioned against a social norm,
4. Is the reported speech being placed in the context of previous or next steps—that is, positioned in relation to the task structure?
5. Is the reported speech being placed in the context of the teacher's (or the class') goals—that is, positioned in relation to the goal structure?
6. What identifiable roles for participation are being created—that is, is there also a positioning of the student as a role model for others?
7. Does the episode occur in (a) a public, whole class discussion; (b) in local, small group interaction; or (c) a combination of local and public settings?
8. Does the episode take place in English, Spanish, or a combination of both languages?

FINDINGS

We present our findings in three ways. We begin with an extended, six-minute episode from the class that includes active participation from both Latino and African American students. Our intention in providing this longer example is to provide a detailed example that illustrates what it means to participate in this classroom's discourse. This episode includes some examples of *revoicing to position* examples to give the reader a sense of how revoicing fits in with other classroom discourse practices. Next we present quantitative data about the frequency of *revoicing to position* episodes, their functions in the classroom discourse, the locus of *revoicing to position* episodes, and the language used. We compare each distribution before and after the change in class composition to test if the classroom discourse environment had significantly changed with respect to revoicing. Finally, we return to a qualitative analysis, but this time we focus on several revoicing episodes in relative isolation to further contextualize and explore the questions raised by our quantitative findings.

The Classroom Discourse Environment: An Illustrative Case

The following sequence contains many of the typical and consequential characteristics of this classroom's discourse environment. In the following extended excerpt (Excerpts 1–6), the teacher directs students to evaluate two lines that have been drawn to fit a data set. The data were produced by testing the breaking weight, in pennies, of paper bridges of different thicknesses (see Figure 1).

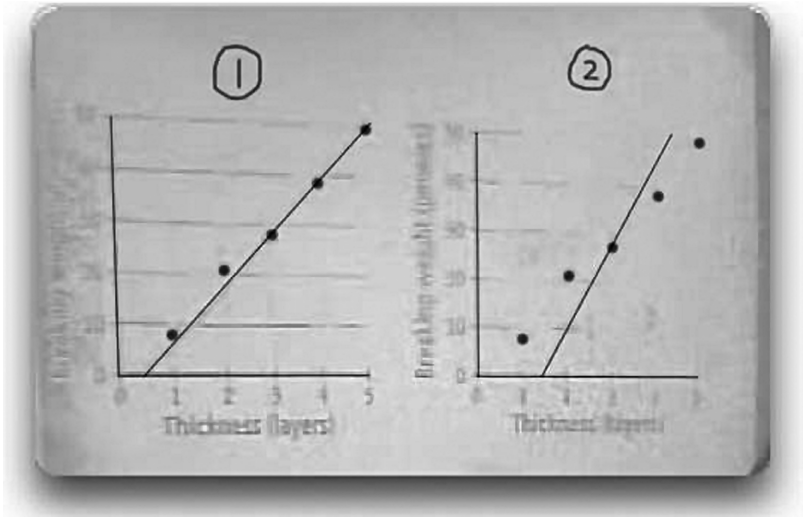

FIGURE 1 The two "best-fit" lines displayed on the overhead projector

Mr. Garcia displays two copies of a single data set, one with a line that seems to fit the data well, and the other with a line that does not approximate the data well. Based on transpires in the lesson, we interpret this task as a prompt toward the evaluation of the fit of a linear model using residuals; that is, by finding the difference between the actual *y*-value and the predicted *y*-value for each given *x*-value. Mr. Garcia begins this part of the discussion by saying:

> It is unlikely that your data will fit in your pattern exactly. Below are two students' attempts to draw lines to model their group's data.... Take a look at the graph on the right. This graph, let's call it Graph Two, as opposed to Graph One. What I want you to do is compare two values. What's the Y value for that data point?

Mr. Garcia quickly follows this direction with a series of six questions (Excerpt 1) that correspond with the Initiate-Respond-Evaluate (IRE) sequence that is typical in many classrooms (Lemke, 1990; Mehan, 1979). When the teacher receives an incorrect but close answer to the first question, he offers an amendment. In response to his next question, when more than one student calls out an answer, Mr Garcia repeats only the correct answer and translates in English. The teacher gets a right answer to the third question and his elaboration implicitly evaluates it as correct. On the fourth, fifth, and sixth questions, he gets right answers and implicitly evaluates them by repeating them. Although these student contributions are rebroadcast to the whole class and receive implicit

evaluation by virtue of being rebroadcast, these were not coded as *revoicing to position* episodes because of the lack of explicit attribution to student authorship.

Line Number	Speaker	Utterance	Analytic Notes
1	Teacher	What's the *Y* value for that data point?	Beginning of first IRE sequence
2	Student 1	20	
3	Teacher	How about 20? Maybe a little bit more than 20? Maybe 21. Okay?	
4	Student 2	24 point 5.	
5	Teacher	And what's the X value?	Beginning of second IRE sequence
6	Student 3	Ten.	
7	Student 4	Dos. (Two.)	
8	Teacher	Two. So we're looking at 2, 21. Is that the true experimented value, or is that the approximation using the line?	Beginning of third IRE sequence
9	Student 4	It's true.	
10	Teacher	That's the true experimented value by this group. That's what they really got when they dropped pennies on two layers of paper. Now, this point down here, what are the coordinates of that?	Beginning of fourth IRE sequence
11	Student 5	Two, ten.	
12	Teacher	Two and … what was it?	
13	Student 5	Ten.	
14	Teacher	Ten. That point corresponds to what?	Beginning of fifth IRE sequence
15	Student 6	The predicted.	
16	Teacher	The predicted value. Go ahead. Finish your sentence? What? Oh, okay. Prediction.How did they make that prediction? Just by guessing?	Beginning of sixth IRE sequence
17	Student 6	No, just using the line.	
18	Teacher	Using the line. So this is the actual.	

EXCERPT 1 Classroom dialog *without* revoicing to position.

Immediately following this excerpt of classroom talk, Sharon, an African American female student, identifies a problem with one of the two presented lines (see below, Excerpt 2). First, Sharon notices that the line does not go

through the origin. As discussed later, the students and the teacher struggle with the notion of the line's *x* and *y* intercepts, and with interpreting those points in terms of the problem's real-world context. Sharon's second objection is that the line in the second graph does not actually contain any of the points in the data set. At the end of this exchange, Mr. Garcia asks other students to comment on Sharon's objection, but is called away by a group of Latino students at a nearby table and does not appear to listen to Sharon's response.

1	Sharon	Mr. Garcia, that line don't make no sense at all.
2	Teacher	Why don't you understand that line? How come it doesn't make any sense?
3	Sharon	'Cause it … it makes no sense. I mean, it's not going through the zero. It's not going through that point.
4	Teacher	Any ideas? Hold on a second.
5	Sharon	'Cause it's even.

EXCERPT 2 Sharon challenges a strategy.

About a minute later, after a quiet, sidebar conversation, Mr. Garcia returns his attention to the class and to Sharon's objections. In Excerpt 3, he calls on Derek, a male African American student, who elaborates on Sharon's answer. Derek claims that the line might have been produced to balance the number of actual data points above and below the line. That is, the line should provide an equal number of over-predictions and under-predictions. This exchange is a typical example of how *revoicing to position* is used in this classroom. The teacher reutters part of Derek's statement "even off the data" explicitly attributing the contribution to Derek when Mr. Garcia interrupts Sharon to tell her to, "let *him* finish." The teacher then positions Derek and his claim as a legitimate viewpoint that stands in opposition and counters Sharon's objection.

1	Teacher	Go ahead, Derek.
2	Derek	Even off their data.
3	Teacher	To even off their data. "Even" in what sense?
4	Sharon	I guess they were trying to …
5	Teacher	Hold on, let him finish now, please.
6	Derek	So they can understand it more better. So they, like- I don't know, they got two on each side.
7	Teacher	Two on each side.
8	Derek	Maybe they could read it more better.
9	Teacher	We mentioned that before that might be a good thing. Maybe that's why they did that.

EXCERPT 3 The teacher positions Derek as having made a legitimateclaim.

Sharon persists with her objection to the second line in the display. In Excerpt 4, she begins by restating that it would be more important for the line to

go through the origin or a large number of data points than to "even off the data." She then illustrates a problem with the second displayed line by extrapolating from the situation. She points out that if more points were to be added to the dataset, one would not know how to adjust the line. Additionally, she claims that there would be more than one way to achieve an equal distribution of points above and below the line, thereby making the accuracy of this particular line dubious. Mr. Garcia responds by restating Sharon's conclusion that the second line is "not a very good line," but omits her rationale.

1	Sharon	But that's the most non-logical one. I mean, you would either try to at least get through the zero or at least get through most of the points.
2	Teacher	At least get through the zero or at least get through the most of the points.
3	Sharon	I mean, 'cause how can you make a prediction off something like that? So every … so they go … how do they go … Like, (if they get) their predictions, they can go … like, after these two are above the line, these two are under, they are going to try to just guess where two more points will be above the line and two more will be under the line? I mean, that's … that won't be accurate at all.
4	Teacher	So, I think what you're saying is this is-
5	Sharon	That, that line don't make no sense.
6	Teacher	Not a very good line.
7	Sharon	Not at all.
8	Teacher	How about the other line? Is the other one better?
9	Sharon	That other line—that was tight.
10	Student 1	Oh, yeah, that's nice.
11	Student 2	That's a nice line.
12	Teacher	What do the rest of you think?

EXCERPT 4 The teacher acknowledges Sharon's claim without positioning her warrant as legitimate.

In Excerpt 5, immediately following this exchange, Francisco, a male Latino student, brings up the issue of the x-intercepts of the two lines. Mr. Garcia pursues this question in a more vigorous manner then he did when Sharon raised her objection. After clarifying the question in line 8, Mr. Garcia marks the question as legitimate and makes it an explicit topic of discussion for the class.

1	Francisco	Por que las lineas llegan a (inaudible) del punto cero? (Mr. Why do the lines get (inaudible) of the zero point?)
2	Teacher	Say that one more time, Francisco. Why is the line what?
3	Francisco	Por que una linea (inaudible)? (Why does one line (inaudible)?)

4	Teacher	Oh, this one.
5	Francisco	Yeah.
6	Teacher	Versus this.
7	Francisco	Yeah.
8	Teacher	Why does one line cross through one and a half on the *X*-axis and the other line cross through one-half on the *X*-axis? I don't know, Francisco. That's what we are talking about right now is which one of those is better? What does that mean? Do you know what that's saying? Maybe we should talk about that for a second. What does it mean that the line crosses through this point? What's the prediction there? What would be those coordinates?

EXCERPT 5 The teacher positions Francisco's claim as something the class should talk about.

Unlike in Excerpt 2 with Sharon, this time, the teacher explicitly chooses to keep the class' collective focus on this topic. In Excerpt 6 (below), Mr. Garcia persists with Francisco's question by mapping the predictions back to the real world context to see if the predictions "make sense." Although the discussion has now returned to the essence of Sharon's complaint that "the line don't make no sense," and the teacher now seems to agree with her—there is no attribution back to the earlier part of the discussion. Instead, Mr. Garcia revoices Francisco and elaborates the idea in the context of Francisco's question. The result is that it is Francisco, and not Sharon, who receives the credit for pointing out a problem with that second displayed line.

1	Teacher	What is … let me stick with Francisco's question. Francisco, what does that mean about layers and how many pennies?
2	Francisco	What?
3	Teacher	Que dice sobre la diferencia cuantos niveles en el puente y cuantos pennies? (What does it say about the difference between the layers and the number of pennies.)
4	Francisco	Pues que pues, dependiendo en el numero de pennies va a mantener el numero de niveles. (That depending on the number of pennies, it will maintain a certain number of layers.)
5	Teacher	Yeah. But, specifically, this point- what are those two values between 1.5 and zero? How many layers are they talking about there?
6	Francisco	Pues, no tiene nada. (Well, nothing.)
7	Teacher	For pennies or for layers?
8	Francisco	No, for pennies.
9	Teacher	Okay, but how many layers are there?
10	Francisco	1.5.
11	Teacher	Okay. Eso tiene sentido. (That makes sense.)

		Que para un puente de 1.5 niveles no requiere ningun penny (inaudible). (That for a bridge of 1.5 layers, no pennies are required (inaudible).) If you look at those two values, the *X* stands for the number of layers, right? And the zero stands for the number of pennies. What are they trying to tell us about a bridge that has one and a half layers? How many pennies does it take?
12	Francisco	None.
13	Teacher	None. Does that make any sense whatsoever?
14	Francisco	[Students calling out]
15	Teacher	So it doesn't make a whole lot of sense. But how about on the other one?

EXCERPT 6 The teacher revoices Francisco.

This stretch of classroom talk (Excerpts 1–6) serves as an example of what participation typically looks like in this classroom. First, it shows that Mr. Garcia relies on the students' contributions to advance the lesson, in the IRE sequences, and also in more meaningful ways such as the treatment of Sharon and Francisco's questions. Second, and in apparent tension with our first point, it shows the centrality of the teacher in the shaping and directing the conversation. Every turn of dialogue in these six excerpts, including student initiated turns, went through the teacher. Third, it shows that although there are a variety of ways to legitimately participate in this classroom, only six students participated, and only three made significant contributions to the content. Finally, in this stretch of talk, we illustrate the contrast between the multiple cases of revoicing (including the IRE sequences) and the two cases of *revoicing to position*. We think these four characteristics present an accurate and representative picture of what it means to participate in this classroom and set the stage for our analysis of *revoicing to position*.

Quantitative Findings

Within the seven analyzed lessons, we identified and coded 52 instances of *revoicing to position*. Our analysis found that Mr. Garcia used *revoicing to position* in seven different ways. Table 2 shows the frequency and variety of how often he used *revoicing to position*. However, three functions of *revoicing to position* were more frequent than the others—positioning the student as right or wrong (i.e., evaluating mathematical validity of a student's statement), positioning the student as being consistent or inconsistent with the social and/or sociomathematical norms, and positioning the student's contribution in relation to the task structure of the mathematical problem solving.

Further, Mr. Garcia was consistent across the two classes in the frequency and form of *revoicing to position*. Although there are too few occurrences to draw any

TABLE 2
The Various Functions of Revoicing and Their Respective Frequencies over the Seven Days Coded (Rounded to the Nearest Percent)

Function/ positioning	*Bilingual*	*Multilingual*	*Total*
Juxtaposing with another student	0 (0%)	1 (2%)	1 (1%)
Evaluating mathematical validity	11 (25%)	10 (19%)	21 (22%)
Social and/orSocio-mathematical norms	10 (23%)	8 (15%)	18 (19%)
Task structure	16 (36%)	16 (31%)	32 (33%)
Goals of the class/mathematics	1 (2%)	5 (10%)	6 (6%)
Developing mathematical identities	2 (5%)	5 (10%)	7 (7%)
Modeling academic English	4 (9%)	7 (14%)	11 (11%)
Total*	44 (100%)	52 (100%)	96 (100%)

*The functions are not mutually exclusive, so the sum of the frequencies exceeds the 52 total episodes.

strong conclusions, comparing the percentages of the first two columns in Table 2 reveals a similar distribution of functions both before and after the addition of the African American students. The three dominant functions—positioning the student as right or wrong, positioning the student as being consistent or inconsistent with the norms, and positioning the student's contribution in relation to the task structure—account for 74% of the positioning occurring in the classroom. One interpretation of this finding is that Mr. Garcia primarily used revoicing to construct a coherent narrative and to position the students as having co-constructed the narrative with him. Notably, except for one occurrence, he did not use revoicing to juxtapose students' ideas against one another as a way of initiating classroom debates, in the way that is depicted in the mathematics education research literature.

Although it seems that there is little change in the function of revoicing before and after the change in student composition, there is a change in terms of which students are revoiced and in which language the revoicing occurs before and after the change in student membership. Table 3 shows the number of revoicing episodes that occur in the bilingual class when everyone in the class understood Spanish. Table 3 further categorizes these episodes according to the locus of revoicing (i.e., the public whole class setting or the local, small groups) and the language being spoken (i.e., English and/or Spanish). From Table 3, one can see that the most typical type of revoicing was public translations from Spanish to English (14 occurrences).

Table 4 shows the frequency of revoicing to position episodes in the multilingual class after the class membership changed to include English -peaking African American students. Of the 28 episodes, 21 occurred on the public floor, even though half of the class time was spent in local, small-group work. Although the public discourse in this class was conducted mostly in English, Spanish was

TABLE 3
Number of Revoicing Episodes in the Public and Local Settings in the First 3 Days Preceding the Addition of the Non-Spanish Speaking, African American Students to the Class

Revoicing with Positioning		*Social Configuration*		
Utterance	*Re-utterance*	*Local*	*Public*	*Total*
English to	English	2 (.40)	5 (.26)	7 (.29)
English to	Spanish	0	0	0
Spanish to	English	3 (.60)	14 (.74)	17 (.71)
Spanish to	Spanish	0	0	0
Total		5 (1.00)	19 (1.00)	24 (1.00)

TABLE 4
Number of Revoicing Episodes in the Public and Local Settings in the Past Four Days Categorized by the Language Spoken

Revoicing with Positioning		*Social Configuration*		
Utterance	*Re-utterance*	*Local*	*Public*	*Total*
English to	English	4 (.57)	17 (.80)	21 (.75)
English to	Spanish	0	0	0
Spanish to	English	2 (.29)	3 (.14)	5 (.18)
Spanish to	Spanish	1 (.14)	1 (.06)	2 (.07)
Total		7 (1.00)	21 (1.00)	28 (1.00)

still sometimes spoken on the public floor. However, Table 4 shows that the majority (17 occurrences) of the *revoicing to position* episodes involve a student speaking on the public floor in English and being revoiced in English. Only one *revoicing to position* occurrence that was initiated by the student in Spanish was revoiced on the public floor in Spanish. Three other instances of *revoicing to position* were made by students in Spanish on the public floor yet were revoiced by the teacher in English. In the later lessons, Mr. Garcia was involved in a significant amount of local Spanish talk with students. However, as Table 4 shows, local interactions, in general, were less likely to be revoiced, only one occurrence was revoiced in English.

A X^2 $(1, \underline{N} = 50) = 13.49$, $p < .01$ (two-tailed) was performed and suggests that there is a strong relationship (effect size = .519) between the class type, and the combination of languages used. In the bilingual class 77% (17 occurrences) of episodes involved a Spanish utterance revoiced in English as opposed to only 23% (5 occurrences) of Spanish to English revoicings in the multilingual class. From this we conclude that (1) revoicing from Spanish to English was

more typical in the bilingual classroom than the multilingual classroom and (2) revoicing from English to English was more typical in the multilingual classroom. The implication of this association between class type and languages used in revoicing is explored in-depth in our discussion section.

Qualitative Findings

In this section, we examine several *revoicing to position* episodes. The first revoicing episode (Excerpt 7) takes place in the first semester, when the classroom was comprised solely of bilingual students. Mr. Garcia had just asked the students to list important features about the track race depicted in a given distance versus a time graph (see Figure 2). A student, Sandra, makes the observation, in Spanish, that one person had a head start in the race. Mr. Garcia revoices Sandra's observation as he explicitly validates part of the statement as correct. At the same time, he also translates it and makes Sandra's utterance mathematically specific by changing "empezar desde abajo (started from the bottom)" to "started from zero."

1	Mr. Garcia	No. Sandra then. Que otra cosa es importante? (What other thing is important?)
2	Sandra	En que Tara llego … salio mas pronto que- que Ingrid. (That Tara got there … she left before Ingrid.) Tara empezar desde los cuarenta metros y esta Ingrid empezar desde abajo, desde el principio. (Tara started at forty meters and Ingrid started from the bottom, from the beginning).

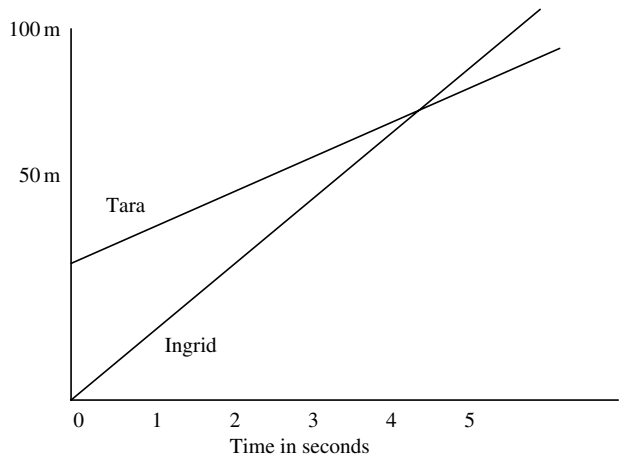

FIGURE 2 The graph of the race the students are analyzing.

3	Mr. Garcia	Okay. Now, *when you say*, "salio mas pronto", *I agree with the second part* *you said* … she started forty meters ahead, whereas Ingrid started **at zero**. Que significa, "salio mas pronto"? (What does "salio mas pronto" mean?) I don't know. "Mas pronto" es igual que adelante o enfrente? (Is "mas pronto" the same as in front or ahead?)
4	Sandra	No.
5	Mr. Garcia	So, "mas pronto", como por ejemplo, se a … (So, "mas pronto", for example, is …)
6	Sandra	(mas pronto es) antes ("mas pronto" is before).
7	Mr. Garcia	Antes. (Before.)
8	Sandra	Antes. (Before.)
9	Mr. Garcia	So, for example, *you're saying*, if Ingrid is here [**points to board**] and Tara is here [**points to board**], that Tara has started the race and **then so many seconds** later Ingrid started the race.

EXCERPT 7 Revoicingccc[2] to emphasize the class' mathematical goals.

We argue that the main function of *revoicing to position* in this classroom was primarily to relate the student's idea to the larger goals of the class and mathematics—in this case precision. The overall effect of this conversational move is to rebroadcast to a wider audience an idea that the teacher thinks is important for everyone to hear. Mr. Garcia's focus on the phrase "mas pronto" is likely to highlight two ideas that students may be conflating—a head-start in terms of the runner's starting location (the case depicted in the graph) and head-start in terms of one runner starting the race prior to the other. Mr. Garcia takes Sandra's everyday notion of a head start and highlights that this has mathematical significance, directing them toward an interpretation of the two *y*-intercepts.

It is important to point out that Mr. Garcia did this rebroadcasting in English, while the student's utterance was in Spanish. Translation, particularly in disciplinary and professional conversations, is almost never a direct word-for-word

[2]To help the reader see the ways in which talk is being reported, attributed, modified, and positioned, we use the following conventions to highlight the relevant aspects of the transcript. First, to highlight the relationship between the original utterance and the reporting of that speech, we underline the segments of each turn where these two parts of the episode are occurring. Second, to highlight attributions of ownership and juxtaposition with other people or groups, we mark these parts of the transcript with asterisks at the beginning and end of the part of the text where authorship is attributed. Third, to highlight the ways that the utterance is elaborated changed, or extended by the teacher, we mark these segments with **boldface**. Fourth, to highlight positioning of the student in relation to norms, roles, and goals within the intended classroom culture, we mark these segments of the transcript with *italics*.

translation. There are always certain aspects that get elaborated on and other aspects that are downplayed. However, this particular example depicts that the teacher is doing more than translating; in this case, the student is positioned as being partially correct and part of the idea is made more mathematically precise (see the **boldface** portions of the excerpt).

In the next example, we proceed to the second semester class, which was comprised of bilingual Spanish/English students as well as African American students who do not speak Spanish. The episode below, depicted in Excerpt 8, occurred during a public, whole-class discussion about the bridge-building experiment. Groups of students had collected their own bivariate data, displayed that data in scatterplots, and superimposed the graph of a linear model on their own scatterplot. Given the public display of diversity of data sets and methods of drawing linear models, it is reasonable to expect that if students were going to critique each other's work, this would be a likely time for it to happen.

In the excerpt below, Mr. Garcia calls on an African American student, Derek, whose best-fit line has been drawn through the leftmost and rightmost data points on the scatter-plot. The teacher asks Derek why that strategy might be useful. Although this type of revoicing was less common in the classroom, we see it as an instance of revoicing to position with implications for students' mathematical understanding and for how they see themselves as scholars and successful mathematic students.

1	Derek:	To see where you start at, and then you can, like, go from the last point to actually see where you are at so you can determine the next point that (inaudible).
2	Mr. Garcia:	Ah. Okay. Say that one more time but loud enough for everyone to hear it. And then I'm (inaudible). (Pause) This is your starting point?
3	Derek	Then, like, the last point, then you could, like, use that to determine the next point that you (inaudible).
4	Mr. Garcia:	Exactly. *One of the whole purposes of this is to be able to predict-* **predict what's gonna happen after five layers because we didn't experiment with anything after five layers**. *So what Derek is saying* is that if you force your line to go through that last point … **if you think about it, if any of these layers are gonna have the most influence on layer six and seven, it should be the most recent one, layer five. And so you would want your line to be as close as possible to the value at layer five**. **Cause he thinks* you'll get the best prediction for six and seven if you're definitely sure that your line goes through the ver … the … the point at layer five. I like that idea. So maybe it's important to go through the first and last* (inaudible). Anybody else use a different strategy?

EXCERPT 8 Positioning and developing academic identities.

The student in this episode says that he thinks that it is important for a best-fit line to go through the last point on the scatter-plot to "determine the next point." Mr. Garcia rephrases Derek's idea and positions Derek as (a) having made a prediction and (b) acting in accordance with the "purpose" of the classroom. Mr. Garcia relates the role of making predictions to Derek's assertion about the graph as well as to the context of the problem (layers of a bridge). In offering his version of Derek's idea, Mr. Garcia adds more concrete mathematical reasoning (e.g., the layers closest to the one being predicted are likely to provide the most influence) to the argument, and attributes that reasoning to Derek.

The attribution to the student of an elaborated version is a key element in validating students' contributions and marking potential discursive identities. In this case, the teacher marks and aligns his students with standard mathematical discourse practices by extracting and refining their ideas. This creates openings that encourage the participation of newcomers to this style of discourse. It is the explicit attribution of authorship that positions students as having contributed to the knowledge of the whole class. The teacher takes students' contributions and shows exactly how their ideas are legitimate mathematical contributions. In effect, he makes visible the various activities that mathematicians engage in when they do mathematics—questioning, predicting, and relating the mathematical abstractions to real world constructs—and positions the students as having already participated in one of these activities. For example, when Mr. Garcia says, "Cause he thinks you'll get the best prediction for six and seven if you're definitely sure that your line goes through the point at layer five," he positions Derek as already engaged in making predictions (Figure 3).

As we noted in the quantitative analysis, after the addition of African American students to the class, contributions in English were revoiced more than contributions made in Spanish. However, there is still some Spanish speaking in the classroom (approximately five minutes on the public floor) and a relatively

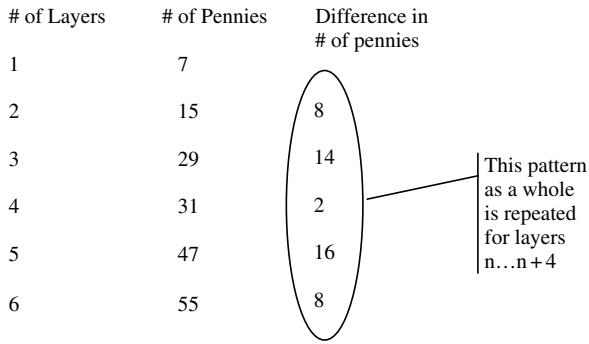

FIGURE 3 Francisco's idea.

high percentage of this is revoiced. Further, some of these episodes that revoice a Spanish idea in English are both quite extended and mathematically rich.

In Excerpt 9, the teacher revoices Francisco, the same student revoiced in Excerpt 6. The excerpt below (Excerpt 9) is taken from Francisco's group's presentation of their data and strategy for extrapolation. Their idea is to reiterate a series of differences between adjacent y-values as a way to predict the next several data points (See Figure 3).

1	Mr. Garcia	Okay. And then how did you get the next eight there? Between forty-seven and fifty-five, what told you that?
2	Francisco:	Como dice ahi la pregunta C, dice que saquemos el inverso … de seis.(The question C, ask us to get the inverse of … 6.)
3	Mr. Garcia	Okay.
4	Francisco:	Entonces que, empezamos de nuevo otra vez la tabla. Tomamos la diferencia de 7 y 15, que es 8.(So then we start to do a table all over again. We take the difference of 7 and 15, which is 8.)
5	Mr. Garcia	Uh-huh.
6	Francisco:	Lo que se da en la diferencia de 47 y 55. 47 y 8 son 55. Y asi es una forma de sacar. (Which you can find in the difference of 47 and 55. 47 and 8 is 55. And that is another way to get the result.)
7	Mr. Garcia	Okay. *So what he is saying* is that look at the four **rate of changes** they have: Eight, fourteen, two, and sixteen. What *they decided to do* for six layers is to restart that pattern. So between five and six, they are going to go up by eight because that was the **first rate of change at the beginning**. So then between- so for the next one they are going to go up by fifteen because that was the **second rate of change**. So if *they* were to do layer eight, they would go up by- what's that (inaudible)? Two. And then layer nine would go up by - what is that last one? Sixteen. And then *they* would start over again. Layer ten would be eight again. And then fourteen. And then two. And then sixteen. *I hadn't seen that from anybody but this group. I thought that was kind of interesting*.

EXCERPT 9 Moving ideas from one language to another.

In this episode, Mr. Garcia revoices Francisco's idea and explicitly attributes the strategy to Francisco. The teacher also expands, clarifies, and elaborates on Francisco's idea. As was the case in the days before the change of the class composition, we argue that this example depicts more than translation because the student is positioned in two ways. First, the idea is positioned as being "interesting." Second, Francisco's idea is positioned as different from the ideas

of the rest of the class when he says, "I hadn't seen that from anybody but this group." This latter type of positioning has the potential to spark debate among students about the validity and value of different strategies. However, in this case, the teacher does not juxtapose the student's idea with any other specific group or idea, nor does he end the turn with a bid for a comment from other students on this group's "interesting" idea. As a result, the conversation moves on, without further discussion or critique of their prediction strategy.

Revoicing functioned in this episode as a way to transport ideas presented in one language into the dominant language of the classroom. In this case, the exchange happens in the public space with the student talking exclusively in Spanish and the teacher revoicing the ideas in English. Although there are good reasons for teachers to model AEL, given the extensive elaboration and clarification by the teacher of the student's idea, it is worth considering the equity implications of this practice when students have differential access to the discourse.

Francisco presents the idea exclusively in Spanish and in a procedural manner, describing each step taken. For example, "Entonces que, empezamos de nuevo otra vez la tabla. Tomamos la diferencia de 7 y 15, que es 8. (So then we start to do a table all over again. We take the difference of 7 and 15, which is 8)." When Mr. Garcia revoices Francisco, he recasts the idea using mathematical terms such as "patterns" and "rates of change." Perhaps just as importantly, Mr. Garcia provides justifications for each of the procedural steps that Francisco described. It is unclear how much of the elaborated academic English discourse is understood by the ELL students, given that Mr. Garcia does not revoice Francisco's idea in Spanish. We return to this issue in the discussion section after we present a complete picture of the patterns of discourse associated with revoicing in this classroom.

DISCUSSION

Our analysis of seven days of classroom discourse leads us to argue several claims that expand, clarify, and call into question the character and value of revoicing in a multilingual setting. First, we note, as have others (Forman et al, 1998; O'Connor & Michaels, 1993, 1996), that this move of reuttering another's speech can take on many functions, including but not limited to, facilitating student debate. Our coding scheme was sensitive to seven manifested functions of *revoicing to position*. However, in this classroom, the three most frequent functions of *revoicing to position* were (a) to position and evaluate a student's idea with respect to its mathematical validity, usually affirming the student's answer; (b) to position students in relation to social or sociomathematical norms for participation (Cobb & Yackel, 1996); or (c) to position students in relation to the task structure as the teacher constructed a coherent narrative.

There are many possible reasons why revoicing may have been used in these ways and not to promote scholarly debate, such as the teacher's perceptions of the classroom dynamics, his goals, his beliefs about the nature of mathematics, or his pedagogical content knowledge. Although we know that one of the teacher's goals was to help students see themselves as scholars (Roy et al., 1998), the data do not provide evidence to ascertain how this belief might relate to his other beliefs about teaching or learning mathematics, or the degree to which revoicing as a way to orchestrate argumentation was in his pedagogical toolkit. This is a limitation of our study.

Our results show revoicing to be a predominately English phenomenon in this multilingual classroom. Although most of the students in the class were Spanish-speaking ELL students, their Spanish contributions were typically revoiced in English. In terms of the informational content of these exchanges, one could argue that ELL students benefit from hearing an English version of their contribution. Rephrasing their talk may contribute to their ability to later express their own ideas in English, or to their learning of new English and mathematical vocabulary. From this perspective, revoicing not only helps to create a coherent narrative from the voices of the students, but also models the academic discourse of mathematics that the students need to learn to be academically successful.

After the addition of African American students to the class, most of the revoicing episodes begin with a student utterance in English that was revoiced by the teacher in English. This trend, however, is softened by three factors. First, because most of the public discourse occurs in English, there are fewer Spanish contributions for the teacher to revoice. Second, because Spanish contributions are rare overall, they are, in fact, revoiced at a higher rate. Third, some of the revoicing episodes that occur in Spanish after the change in membership are quite extended and mathematically rich. Therefore, although the quantity of revoicing episodes that model the academic English for ideas expressed in Spanish is low, the quality (in terms of duration and engagement) of these episodes is quite high.

Still, after the change in the classroom membership, the academic discourse environment is clearly dominated by English on the public floor. There are at least two perspectives that emerge from the implications of an unequal distribution of revoicing across Spanish and English. First, if we look only at what revoicing does to the content of the discourse, then we can question whether the ELL students have equal access to the mathematics. Although mathematical talk is being modeled for all students when their ideas are refined, elaborated on, and put into mathematical language in English, those who understand English would seem to benefit more from the revoicing and positioning of an idea in relation to the task and goal. If one adopts this perspective, then the revoicing episodes that occur exclusively in English can be seen as having much greater effectiveness for those who have a stronger facility with English.

However, we and others argue (Forman et al., 1998, O'Connor & Michaels, 1996) that the value of revoicing is not just in the way the teacher spruces up the mathematical content of student utterances, but lies in its potential to contribute to the development of students' identities as mathematic scholars. We speculate that the way revoicing is used to position students as people who are successfully engaging in mathematical roles and activities increases the likelihood of affiliation and engagement. This is because *revoicing to position* involves the student as the author of an idea, and provides a way for the teacher's talk to be framed as a continuation of the students' ideas. Our overarching interest in this article is in the ways in which the discursive interactions in this classroom open up opportunities and set the stage for the teacher to develop his students into "people that do mathematics." This includes developing openings for the students to identify themselves as learners, as mathematicians, and as scholars.

The implications of these findings are mixed and complicated. Mathematical contributions are being attributed to students, so even though students may not have access to the refined versions of their utterances, their roles as authors and as students are legitimized. In this classroom, a student's lack of academic English does not necessarily mean that the student is relegated to a peripheral role within the classroom discourse. From this perspective, the salient question is not which language was used to revoice the students' contributions, but rather, *which students get revoiced*, and *in what ways are they positioned by that revoicing*? In our analysis, we saw that even after the addition of African American students, Mr. Garcia did not stop revoicing the Latino students' contributions. Actually, he revoiced some of the Latino students' ideas to a greater extent and in more conceptual depth than he did with the African American students' ideas. Finally, when we examined the student-teacher interactions during small-group work, Spanish continued to be treated as a legitimate resource to understanding mathematics.

Thus, unequal patterns of revoicing across the different contexts and languages do not necessarily signify inequity. There are logical reasons why a teacher might want to revoice a student's contribution in English, both in terms of modeling AEL for students and for creating a an accessible classroom community. At the same time, the lack of revoicing into Spanish in the public space is potentially problematic in that it could send a meta-message about the value of Spanish as a resource for understanding mathematics (Sfard & Kieran, 2001). From the way that Spanish as a language is positioned in this classroom, one interpretation might be that it is being cast as a legitimate resource for the construction of personal understanding only and not for public or formal communication.

It is our impression that the change in classroom membership added serious tensions to Mr. Garcia's classroom. In the first semester, the lessons included whole-group discussions, reasonably widespread participation, and a balanced distribution of spoken Spanish and English on the public floor. With the addition of the African American students who did not speak Spanish in the second

semester, Mr. Garcia had to revise his classroom norms. Making his job more difficult was the fact that this second semester class was labeled as a "last chance" for the students. The students in this spring class had all previously failed this mathematics course at least once and needed to pass this class to meet graduation requirements. Thus, the assumptions about the students' abilities and what they might need to do to be successful in the class may have changed—from assumptions about their English language ability to assumptions about their mathematical competency. Although the ELL students were not necessarily all in the same place mathematically, they were united by their need to learn AEL as well as mathematical discourse. After the addition of the African American students, the unity around academic language issues diminished.

Ironically, it may have been the African American students that were most marginalized by the administration's choice to place them in this classroom. Although our findings show that Mr. Garcia changed his practices in ways that could be viewed as privileging the African-American students as English speakers, our qualitative analysis produced evidence that these students were a doubly marginalized group. African Americans were a minority group in the school at large, and, academically, these particular students had already been marked as "last chance" students and tracked accordingly. Within their new classroom, they were marginalized again, this time by the fact that they could not speak Spanish and therefore could not follow some of the discussion. The administration's choice to place African American students in this class placed Mr. Garcia in a double bind. Had he continued with the same practices regarding the use of Spanish, he would run the risk of marginalizing the African American students. At the same time, by changing his practices around the use of Spanish, he risks his effectiveness for the ELL students.

We wish to be clear: we are not arguing for linguistic isolation or tracking. We think that language diversity can be a positive factor of a classroom community, but it presents new challenges for mathematics classrooms organized around academic discourse and communication. Despite the growing numbers of ELL and bilingual students in the United States, the assumption of English as the norm is still prevalent. It is worth imagining the learning potentials in cases in which English-only discourse is neither the norm nor the standard that all classrooms are striving toward. A true multilingual classroom, where all students are learning various languages, seems to be one possible way out of Mr. Garica's double bind. Short of this institutional and policy change, these goals also could be accomplished at the classroom level. If the bilingual Spanish speakers who choose to speak Spanish on the public floor are encouraged to do so and the teacher consistently revoices these ideas in English, then a productive discourse environment could be created for all students. ELL students are provided opportunities to grapple with the conceptual mathematics using whatever resources they can, including their dominant language. At the same time, revoicing ideas

in English creates opportunities for students to hear and appropriate AEL as a way to express their own ideas. Finally, speakers of other languages could focus on the elaborations and revoicings of the teacher in a language they understand, while still recognizing the authorship of the original student.

These solutions place a high value on teachers who speak the languages of their students and who are also well trained in mathematics pedagogy. If the teacher does not speak his or her students' dominant language, then students are faced with a choice between using all of their resources—including the personally meaningful, informal registers of their dominant language—to understand and communicate the mathematical concepts, or be recognized and intellectually engaged by the teacher and other peers. Further, given the connection between classroom discourse and effective mathematics pedagogy, the professional certification process of mathematics teachers must include aspects of multilingual education.

Increasing linguistic diversity in concert with the emphasis on communication in mathematics classrooms demands that mathematics education research pay more attention to the complexities raised by the presence of multiple languages among learners and teachers. It is not clear how every productive discourse practice transfers to multilingual contexts. If we are to avoid making proficiency in a single dominant language, a precondition for membership into classrooms that promote conceptual understanding, then our empirical studies need to include linguistically complex classrooms.

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