

TEACHER'S SPEECH AND GESTURE AS A COMMUNICATIVE AND STRATEGIC TOOL

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Abstract Educational researchers and the mathematics education community have recently begun to focus on the importance of students engaging in disciplinary conversations. Additionally, researchers' interest in designing more effective learning opportunities for students whose first national language is not English, have begun to investigate the important differences between conversational English and academic English. However, research has shown that academic English is difficult to master and even native English speakers struggle in conveying mathematical reasoning using the proper registers. A challenge that English Language Learners (ELLs) encounter is learning academic content and language simultaneously. Given the importance of academic English to learning and assessment, we need to better understand how teachers can influence students' discourse practices in ways that lead students to bridge their existing and often informal mathematical ideas to the formal registers of mathematics. This paper will assert that gesture (combined with speech) was a tool that a bilingual teacher used effectively to convey and discuss algebraic concepts with Hispanic ELL high school students. We argue that gesture is an important visual resource that can play a valuable role for ELLs in creating effective discourse practices and environments.

Introduction

Educational researchers and the mathematics educational community have recently begun to focus on the importance of students engaging in disciplinary

conversations (Forman, 1996; Lampert, 1989; Lampert, Rittenhouse, & Crumbaugh, 1996; McClain & Cobb, 1998; McNair, 1998; O'Connor, 1998; O'Connor & Michaels, 1996; 1993). Studies show that students can learn mathematics at a deep level of understanding when creating an effective set of classroom discourse practices that lend in mathematical communication and academic English. The push for mathematical discussion and academic English is critical given that students are assessed based on their understanding of written texts and their ability to communicate mathematical concepts in writing and at times via discussion. Research studies have also shown that academic English is difficult to master. Even native English speakers struggle to interpret and communicate in mathematical registers¹ (Pimm, 1987). The challenge is even more complicated for ELLs who must learn academic content and language simultaneously. For this reason, researchers' interest has focused on designing more effective learning opportunities that investigate and pinpoint the important differences between conversational English and academic English for the growing population of students whose first national language is not English. Given the importance of academic English to learning and assessment, we need to better understand how teachers can influence students' discourse practices in ways that lead students to bridge their existing and often informal mathematical ideas to the formal register of mathematics. Teachers' implementation of discourse practices in their classrooms will depend on the way they conceptualize the relationship between mathematical discourse and understanding

By the start of the next century, Latinos will become the largest minority group in the United States (United States Department of Census, 2001). These demographics will affect both K-12 and higher educational systems. To date, schools that are not equipped with appropriate or sufficient resources have underserved Latino students. Pedagogical practices that are not effective in fostering academic English development and academic success have failed to address the needs of these Spanish-speaking ELLs. The traditional question, "Why do 'they' (ELLs) fail?" has been scrutinized by educational researchers in hopes of

reducing the number of students who persistently fail in U.S. schools. However, research has yet to resolve how to close the “achievement gap” or how best to facilitate the transition from everyday language to academic language². Research on monolinguals shows that participating in discourse practices can be a tool that facilitates students’ learning academic content as well as acquiring the appropriate skills needed to communicate academically. This research also argues that scholarly debate and argumentation can promote higher levels of thinking as students present their own ideas and then justify or defend those stated positions (Lampert, 1989a; 1989b). Yet some teachers struggle to incorporate these practices in their monolingual and bilingual classrooms because of the limited support available to them in making informed pedagogical decisions about how best to implement discourse practices.

In the class discussion about Tara and Ingrid’s race, Mr. Garcia’s gesture in conjunction with speech and graphic resources paralleled created meaning when language was abstract, general, or unclear to students. Moreover, the teacher’s gestural performances became an additional strategic tool that lent in resolving multiple meanings, clarifying or reinforcing mathematical concepts, and advancing the mathematical lesson. The teacher was able to advance the mathematical lesson by highlighting and emphasizing particular aspects of his talk or the graphic displays, de-emphasizing the need for academic English language and the formal mathematical register when students were struggling to understand him or express themselves, and emphasizing and facilitating the use of English on the public floor. Gesture and the accompanying talk served as a communicative tool that enabled a teacher and his students to discuss mathematical concepts, procedures, reasoning, and hypotheses. Most importantly, students limited mathematical registers and English fluency did not restrict them from engaging in a mathematical discourse. Mr. Garcia’s gestural performance and talk were purposeful in making mathematical ideas meaningful to students, especially for new or abstract ideas like velocity. His use of gesture also facilitated in modeling academic English as he revoiced or restated his students’ utterances in everyday English (Enyedy, Rubel,

Castellon, Mukhopadhyay, Esmonde, & Secada, under review). Because of the ways that gesture was used as a resource to elaborate talk—and in particular the talk in English—students were able to grapple with mathematical concepts. The confusion of transferring from the English language to mathematical discourse was minimized through the use of gestural performance and speech

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