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"I heard it wasn't really a myth": Enacting and contesting expertise in an Arizona science classroom

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ABSTRACT

Based on linguistic ethnographic research in a majority Latino/a, lower-income high school in southern Arizona, this article illuminates the fluid, contingent, and contested nature of expertise in a science classroom. Over one academic year, a teacher's talk about discourse practices and behaviors associated with scientists set the stage for individual interactions in which she socialized students to make knowledge claims "like scientists." Thus, interdiscursive relations, or connections between similar "kinds" of speech events, were crucial to the emergence of expertise in particular interactions. At the same time, students displayed cultural and linguistic expertise in science-related interactions, socializing the teacher into understandings and discourse practices associated with the students' cultural identities. Analysis of video-recordings of classroom interaction highlights the central role of participants' epistemic practice, or their management of knowledge claims, in these processes of socialization. The findings are relevant to linguistic anthropologists as well as science educators who seek to promote equity for students from traditionally marginalized groups.

Introduction

In line with recent work in the linguistic anthropology of education (e.g., Bucholtz, Barnwell, Skapoulli, & Lee, 2012; Reyes, 2013; Wortham, 2008), this article explores connections between everyday discourse practices in classrooms and the emergence of social roles and identities – specifically, expert identities – over longer timescales (Lemke, 2000). The article draws on data from a linguistic ethnographic study of a high school Astronomy/Oceanography classroom in southern Arizona (United States) to reveal the fluid, contingent, and contested nature of expertise in a setting where one might expect the teacher's expert status to be taken for granted. In fact, students from the lower-income, majority Latina/o high school contested the (White) teacher's expertise, adopting features of her expert repertoire in the process, and claimed rights to speak about scientific topics. In addition, students socialized peers and the teacher into expert understandings associated both with membership in the classroom community and with Mexican-American cultural identity.

In this Astronomy/Oceanography classroom, an exceptional second-year teacher named Julia Tezich[1] aimed to cultivate scientific personhood, or the ability to display a scientific orientation to the world, among her students. This is especially significant given the demographics of the high school where the study was conducted. Students of color and students

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[1] All names of people and places are pseudonyms.

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from working-class backgrounds in the U.S. continue to struggle to gain access to high-quality STEM (science, technology, engineering, and mathematics) education (Barton, 2001; Lee, 2003; National Science Board, 2006), even as STEM education is seen as increasingly crucial to students' life chances in the 21st century economy.

The analyses below sketch how Ms. Tezich pursued the goal of cultivating scientific personhood in two specific ways. First, through talk about discourse practices and behaviors associated with scientists (generally directed to the whole class), she prefigured interactions in which the students would function successfully as scientific people. Second, longer-term patterns of talk set the stage for individual interactions in which Ms. Tezich pursued the work of coaching students in how to make knowledge claims "like scientists."

As decades of research on language socialization have affirmed, socialization, such as illustrated in the types of teacher-led interactions I analyze below, is almost never unidirectional. Rather, processes of socialization often go in multiple directions, resulting in unpredictable trajectories and uneven outcomes for participants in a given context (Bayley & Schecter, 2005; Garrett & Baquedano-López, 2002; Ochs, 1986). Thus, I also discuss how such multidirectionality was characteristic of the teacher and students in this study. For example, in the midst of a display of the teacher's scientific expertise, students could "flip the script" (Carr, 2010a), or effect changes in the participants' footing (Goffman, 1981), in order to make claims based on their cultural expertise. These phenomena and others I analyze below shed light on the social significance of such overlapping forms of socialization and expertise, with implications for when and how teachers – especially STEM educators working with students from traditionally marginalized groups – might productively defer to their students' domains of knowledge.

This study also offers implications for linguistic anthropology. In the analyses, I show how enacting expert identity depends on participants' negotiation of rights and responsibilities to talk about certain matters (Heritage & Raymond, 2005; see also Bucholtz, Skapoulli, Barnwell, & Lee, 2011), thus highlighting how epistemic practice is implicated in social actors' being and becoming particular kinds of people over time. Being socialized into discourse practices associated with scientists allows one to "argue like a scientist," to assess the scientific or unscientific nature of others' knowledge claims, and to understand how both the basis and form of such claims are crucial to being taken seriously as a scientific person (Lemke, 1990).

In the following two sections, I review work from linguistic anthropology and conversation analysis on the interactional construction of expertise, the social and discursive basis of scientific knowledge, and epistemics in conversation. I then move to a description of the research site and methodology, including the ethnographic background for the study.

Theoretical framework

Expert and novice identities in interaction

"Expert" and "novice" are role expectations (Parsons, 1951, quoted in Agha, 2007, p. 243) connected to beliefs about people's knowledge in relation to a particular epistemic domain or social field. The expert is not expected to know everything, but s/he may be expected to know almost everything about a particular topic (Schütz, 1946, p. 465). Experts are therefore constantly at risk of straying beyond the boundaries of their expertise and being repositioned as relative novices (cf. Schütz, 1946). In other words, one's status as an expert is not guaranteed, but must be negotiated with respect to other "territories of knowledge" and experience (Heritage, 2012a).

Relatedly, research in linguistic anthropology on the performance of expertise indicates that becoming recognized as an expert, in whatever social domain, has as much to do with "the acquisition of a way of representing things" as with knowing things per se (Carr, 2010b, p. 27). This is especially visible in schools and other institutional environments where organizational expectations and conventions for spoken and written language become the basis for ascribing expert or novice identities to people (Cicourel, 1999, p. 72). In addition, expertise is a collaborative and dialogic phenomenon. The expertise of certain people can only be established in relation to other non-experts, as well as ideologically constituted objects of expert knowledge; there are no experts without novices (Carr, 2010b, p. 18). Novices not only depend on experts to socialize them, but actively participate in constructing what it means to be an expert – and, by extension, what it means to be a novice.

Of primary interest to the analysis below is how the configuration of experts and novices in particular speech events indexes people's positioning in "culturally grounded . . . regimes of knowledge and authority" (Jaffe, 2009, p. 7). Expertise takes on a prismatic character, shifting as speakers avow or disavow access to certain truths and as they assert primacy or defer to others' authority (Heritage & Raymond, 2005). These interactional displays of expertise or novicehood with respect to different bodies of knowledge can illuminate the discourse processes through which students or teachers become recognized as certain kinds of people over time (Agha, 2007; Anderson, 2009; Lemke, 2000).

The social and discursive basis of scientific expertise

The question of how scientific expertise becomes recognized and validated has been of special interest to anthropologists and applied linguists. In a classic work, Latour (1987, p. 180) commented on the discrepancy between "the tiny size of fact production" (i.e., the networks of experts who produce scientific knowledge) and "the rest of humanity." He also noted that science has traditionally attempted to highlight what is distinctive about its own approach by making non-experts appear irrational in contrast – and, in so doing, to preserve its privileged place. Other influential work has explored the role of social and discursive processes in the development of scientific facts and scientific authority. In a study of physicists, Ochs and