Ideologies, Teacher Discourse, and Language Learning in the Elementary Science Classroom

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Abstract: The monolingual ideologies that are systemically reproduced in the United States educational system impede equitable learning for all students, and particularly for multilingual learners. Drawing on Philip's (2011) ideologies in pieces framework, this study seeks to understand what elementary science teachers' discourse reveals about their ideologies surrounding language and science learning. Using qualitative video analysis, I analyzed discourse from three elementary science teachers. I found that teachers' discourse about language learning both reproduced and contested systemic monolingual ideologies, while their discourse about science learning was primarily asset-based. Implications include design suggestions for professional development as well as further research to gain a deeper understanding of how teachers might transfer asset-based ideologies across learning contexts.

Introduction and theoretical framework

Monolingualism is positioned as normative in U.S. education, despite an increasingly ethnically and linguistically diverse student population. Reforms such as the Next Generation Science Standards (NGSS) push for rigorous content for all learners, but the language demands required by these standards often remain invisible for teachers working with multilingual learners (Buxton & Caswell, 2020). Ideologies, defined by Louie (2020) as "a resource—not necessarily good, and not necessarily bad—that teachers use to make sense of their work" (p. 3), impact the instructional practices teachers use to support multilingual learners (Lemmi et al., 2019). It is important to note that monolingual ideologies are systemically reproduced and lead to inequitable learning opportunities (Valdez et al., 2016). For example, the ideology that language proficiency is a necessary prerequisite to engaging with science concepts (Lee et al., 2007), might lead teachers to lower expectations and provide less ambitious science learning opportunities for multilingual learners.

Teachers may inherit monolingual perspectives reproduced by the educational system and (un)consciously express them through their instructional practices. However, recent research has shown how professional development (PD) can help teachers interrogate and disrupt these ideologies and shift their practice in ways that are more inclusive to multilingual learners (Lemmi et al., 2019; Menken & Sánchez, 2019; Pacheco et al., 2019). Because discourse is one way in which ideologies are made manifest (Pacheco et al., 2019), this study considers elementary science teachers' talk about their multilingual learners in the context of a PD and what their discourse reveals about common language ideologies in relation to science learning.

In considering teachers' ideologies, I draw on Philip's (2011) framework of "ideologies in pieces." Philip views ideologies as a tool born through a *sensemaking* process that comes from one's own or others' lived experiences or from social assumptions. These *commonsense* elements of ideologies are widely accepted in a community with little need to justify them and are often difficult for individuals who hold them to articulate or explain. Similarly, because monolingual ideologies are reproduced by the educational system, many teachers accept them without question based on the cultural assumptions about language learning. Over time, ideologies within a community may go through a *rearticulation of meanings* as the accepted commonsensical meanings are questioned and new meanings are negotiated (Philip, 2011). Philip also notes that because ideologies are context-specific, conflicting ideologies can coexist for an individual. Thus, teachers may hold problematic monolingual ideologies alongside predominately asset-based science learning ideologies.

Methods

As Pacheco et al., (2019) note, "discourse not only provides a lens into teacher thinking but gives shape to ideologies that inform practice" (p. 198). Thus, by analyzing teachers' talk about their practice, I seek to identify the inherited ideologies that emerge through the teachers' *sensemaking* process about their multilingual learners, as well as if and how the *commonsense* elements of those ideologies undergo any *rearticulation* of meanings (Philip, 2011). Finally, I contrast these language ideologies with teachers' discourse about their science practice.

Nine teachers from a large urban school district in the southeast U.S. participated in this study, which was part of a multi-year PD project designed to focus on the use of representations in inquiry-based science. This data came from the first year of the project, which included an initial five days of summer PD where teachers were positioned as learners and as instructional designers. One hour of this initial PD focused on strategies for supporting English learners (EL). Participants then met quarterly during the school year for video clubs. At each

club, teachers analyzed and reflected on student work and on video of their classroom science instruction (Sherin & Han, 2004). Reflecting on multilingual students and their science learning was a discussion prompt at each video club but was not always discussed. The last club of the year focused explicitly on ELs.

Data sources for this study included the four video club sessions from Year 1 of the project. All video recordings of the sessions were transcribed and reviewed for teachers' turns of talk focused explicitly on ELs, which became the units of analysis. These units were then studied using a qualitative content analysis of video data (Powell et al., 2003) to identify language ideologies as manifest through teachers' discourse. A representative five-minute clip is highlighted in this paper. The clip came from the final video club of the year, in which three of the nine participating teachers were discussing a science lesson taught by Soren, a kindergarten teacher. The three teachers included Soren; Kourtney, a third-grade teacher; and Toni, a fourth-grade teacher. In Soren's lesson, students were using a representation to identify objects in the schoolyard as living or non-living. The facilitator, also a research team member, asked Soren if she felt that the words or the pictures on the representation were more helpful to the students. Over the course of the next five minutes, all three teachers shared narratives about their ELs. These individual narratives are presented below, as well as an analysis of some of the ideologies that emerged from this discussion about the language learning process in the context of science learning.

Findings

The teachers' discourse about their ELs sometimes reified and sometimes challenged monolingual ideologies about language, but their discourse was consistently more asset-based when discussing science. These coexisting ideologies were reflected in the contrast between participants' narratives and sensemaking around their ELs and the language learning process and their analysis of their science practice. Soren's narrative began in response to the facilitator's question about words or pictures being more helpful to her kindergarten students. Soren noted that one of her ELs began the school year easily able to understand "pictorial representations," and because both of her ELs are "very bright", they quickly learned vocabulary and caught up to participate along with the class. Toni responded to Soren's narrative by highlighting the importance of students having content knowledge about science in their home language before learning science in English. Soren agreed and attributed her students' success to the fact that most of the ELs at her school have parents who are involved with research at universities in the area, so the students come in with background content knowledge. Kourtney provided an additional example as she shared a narrative of two students in her class, one of whom was not literate in Spanish and struggled learning English, while the other student was literate in Spanish and quickly achieved some English proficiency. Toni built on this example with her narrative of a student from last year who started the year and "knew absolutely no English, yet he exited out of EL at the end of the year." Toni attributed this success to several factors, including intelligence, language skills in his home language, prior academic success in his home country, parental support, and parental knowledge of English. Figure 1 highlights the different ideologies that the teachers used as tools to make sense of the narratives and of the language learning process.

Language Ideology 1: There is an important relationship between students' prior knowledge & their emerging English abilities.	
Soren	"He **came in understanding pictorial representations** nicely but **adding the vocabulary** to it was a lot of what we did at the beginning of school for him especially…[he's] coming from a background where **[he has] all of that [background knowledge]**."
Kourtney	"I have one [student] who can [read and write in Spanish]…And **she is speaking in English**. She came in the first day of school and **she wrote me three paragraphs about herself in Spanish. She is writing paragraphs in English now**"
Toni	"When they have **the content knowledge in their own language first** it makes a big difference. … <u>So</u> like, that's huge, I mean to be able to go from no English to exiting EL in one year. It's crazy, but it's because **he was just making a connection to what he already knew**."
Language Ideology 2: Successful language learning is a result of students' innate abilities & attributes.	
Soren	"He caught on pretty fast, **and he's a very, very intelligent child**. …Somehow I'm blessed with these two babies who came in not speaking much English or understanding much English **but they're so bright** that they have not made me work very hard."
Kourtney	"And <u>so</u> the one who was literate…is writing paragraphs in English now…in less than a school year, because she had those skills…but it does illustrate, I mean **part of it is motivation**."
Toni	"I had a kid last year who came in first day of school knew absolutely no English, yet he exited out of EL at the end of the year, but **he was really bright in Spanish**."
Science Ideology: Students bring a wide range of resources with them that can be drawn on to engage in rigorous scientific sensemaking.	
Soren	"I was trying to ask them questions **based on themselves**, often, **or other living things that they understood**."
Kourtney	"<u>So</u> they might **make a connection** between one of the representations…Oh, now that I see this other one, **I can relate it to something else that I already know**."
Toni	[Questions to help students make connections] "What does that **mean**? Where is this **happening**? How could **you describe that to someone that wouldn't know** what the Ring of Fire is?"

Figure 1. Representative ideologies about language learning and science

Figure 1 highlights three representative examples of the teachers' ideologies. The first demonstrates a language ideology with elements that contest systemic framings of monolingualism as normative, while the second appears to reify traditional monolingual ideologies. The third presents a contrasting asset-based science ideology. The first ideology teachers articulated was that there is an important relationship between students' abilities in their first language and their emerging English abilities. Teachers' talk showed a fairly sophisticated understanding of the support that first language literacies can provide when learning an additional language. They recognized that existing skills in other languages serve as vital resources for students as they learn English (Menken & Sánchez, 2019). This framing begins to contest monolingual discourses that position students with emerging English proficiency as not having the language resources necessary to engage in scientific sensemaking (Lee et al., 2007). At the same time, teachers' articulation of this ideology was limited to identifying how multilingualism supports language learning; the articulation did not extend to consider how first language resources might be leveraged in science learning.

The second ideology, that students who successfully learn English do so as a result of innate abilities, revealed ways that participants viewed language learning as something exceptional that they as teachers played little role in supporting. The participants' discourse connected their multilingual learners' English abilities to personal attributes such as being "bright" or "intelligent" or "motivated." Such perceptions echo the ways that monolingualism is positioned systemically as normative. In the U.S., access to studying languages in other than English in school is limited most often to academically successful, primarily white monolingual English speakers (Reagan & Osborn, 2002). On the other hand, minoritized learners' skills in languages other than English are seen as deficit (Flores & Rosa, 2015). Thus, participants' discourse implied that "successful" English language learning was positioned as an exceptionality attributed to intelligence or other external factors.

The teachers' discourse surrounding language learning both reinforced larger, societal ideologies and began to challenge some of these ideologies. In contrast, the teachers' discourse about their science practices throughout the video club conversation highlighted ideologies that primarily challenged traditional conceptualizations of science. Rather than viewing science as an abstract set of facts to be learned with students entering as blank slates, all of the teachers recognized that students brought a wide range of experiences with them that could become important resources for engaging in rigorous scientific sensemaking. For example, Soren drew on students' lived experiences and prior knowledge as valuable resources in understanding scientific concepts (Lee et al., 2007). Similarly, Kourtney described using multiple representations to support students in making connections across contexts, allowing them to build their understanding of scientific concepts over the course of instruction instead of expecting them to memorize decontextualized facts (Lee et al., 2019). Finally, in reflecting on a lesson about volcanoes, Toni identified an opportunity where she could have pressed on one student's background knowledge about the Ring of Fire to push her student's thinking further. Toni saw using questions as a discourse strategy that engaged students in scientific sensemaking while attending to audience and register (Lee et al., 2019). All three of the participants' discourse about science practices pushed back on dominant ideologies of science to describe science through inquiry-based, student-centered ways.

Discussion

The teachers' discussion about their English learners and science practice reflected multiple aspects of Philip's (2011) ideology in pieces framework. Rather than drawing on their own personal experiences as learners, they used their *commonsense* lived experiences as teachers to "make sense of, define, figure out and render intelligible the way [language learning] works" (Hall, 1996, as cited in Philip, 2011, p. 300). The narratives of students served as a *sensemaking* tool as the teachers articulated their understanding of the language learning process to and with each other. It is noteworthy that the teachers did not challenge each other's narratives in any way, nor did the facilitator challenge the teachers' narratives. In other words, the ideologies expressed about language learning did not undergo any *rearticulation of meaning* in this community at this time. Instead, participants built on one another's ideas to co-construct the ideologies presented in Figure 1, suggesting that for this group of teachers, the ideologies represented "socially communicated assumptions or experiences of others taken for granted" (Philip, 2011, p. 302). The participants made sense of language learning for ELs in ways that often reified but occasionally challenged dominant ideologies. By contrast, their sensemaking about science was primarily asset-based, likely a result of shared understanding about science learning developed through PD participation. Because language ideologies often go unexamined (Lemmi et al., 2019), as was the case in our PD design, we wonder how teachers might shift toward asset-based framings when invited to examine these assumptions.

Philip (2011) also notes that "people are not compelled to reconcile their sensemaking across contexts, and they may make sense in seemingly contradictory ways without being troubled by it" (p. 300). Evidence of the fact that these teachers' ideologies were in pieces could be seen in the contrast between the teachers' discourse about language learning and their discussion of science learning. The discourse surrounding language learning

drew heavily on others' experiences, discussing students and "their" work connecting, thinking, and learning in a somewhat detached way. Although teachers started to contest some monolingual norms in their ideologies, their discourse fell short of discussing how they as teachers could leverage all students' language resources for scientific sensemaking (Pacheco et al., 2019). By contrast, participants' discourse surrounding science learning was grounded in their own experience in the classroom. Teachers discussed things "I" could do, providing examples of their own instructional decision making to center and honor the knowledge students brought with them into science lessons. The co-existence of somewhat deficit-based language discourse alongside more asset-based science discourse highlighted the contradictory ideologies Philip identifies. Because ideologies are context-specific (Philip, 2011), this group of teachers may be ready to engage in *rearticulation of meanings* if facilitators on the research team made salient the dominant monolingual ideologies and invited them to challenge some of the commonsensical meanings of their language learning narratives to create new meanings that pull teachers' asset-based views of science learning across the two contexts.

Implications and potential impact

An immediate implication of this analysis is in the design of future iterations of this PD project. In reviewing findings from the first year, the research team recognized a greater need to attend to the relationship between science and language. Key goals moving forward include (1) drawing attention to deficit discourse surrounding multilingual learners that is embedded in educational systems and taken up by participants and facilitators, and (2) providing perspectives and asset-based language that contest monolingual norms. It is our hope that the asset-based ideologies teachers express with regard to science learning can be extended to other learning contexts. Furthermore, this work may contribute to a deeper understanding of how ideologies about language learning are taken up, expressed, and contested, leading to more equitable learning opportunities for all multilingual learners.

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