

How Do Multilingual Learners Support One Another's Science Learning and Participation?

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Abstract: As superdiversity becomes the new mainstream in U.S. schools, how multilingual learners support one another's learning and participation warrants better understanding. We analyzed interactions of four dyads of multilingual Burmese youth in an afterschool science program as they made predictions about region-specific climate changes in the next 100 years. Findings suggest they used multiple languages and various communicative modes to create an equitable learning environment.

Introduction

Changing patterns of migration across the world create superdiverse learning environments to which learners bring diverse languages, ethnicities, religions, race, and cultural practices (Gogolin, 2011). In the U.S., where our research is situated, superdiversity is the new mainstream (Enright, 2011). In our study, we engaged resettled refugee youth from Burmese backgrounds in collaborative scientific practices in a community-based afterschool program. These practices include asking questions, analyzing data, and arguing from evidence. In schools, opportunities for engagement can be limited for multilingual students (often labeled English Learners or ELs) when they are marginalized or are not supported in navigating multilingual collaborative contexts to achieve specific communicative and sense-making goals. In our afterschool program, we sought to provide a learning environment in which youth with varying levels of proficiency in English and multiple indigenous languages of Burma (e.g., Hakha, Falam, Zophei) agentively pursue their own learning and participation opportunities while supporting their peers' learning. Our study aims to contribute knowledge and provide implications that promote equitable participation and learning in superdiverse learning settings. To that end, this paper addresses the question: How do multilingual learners support one another's science learning and participation?

Methods

We implemented a year-long afterschool program (1.5 hours per session; 22 sessions) to engage youth in learning about climate change, and collected data in the form of video-recordings, field notes, screencasts of computer use, and artifact images. In this paper, we analyzed data from Session 17 in which participants formed pairs, conducted online research, and created a poster to answer the question: "What will the earth be like 100 years from now if climate change continues?" We micro-analyzed video-recordings drawing on principles of video analysis (Derry et al., 2010) from an ethnographic perspective. We selected events for close analysis and transcribed them to capture utterances, gesture, body posture, gaze, computer use, organization of artifacts and use of space (Norris, 2004). Exchanges spoken in participants' L1 were translated into English by an external translator. We collectively wrote analytic notes of the microanalysis of each event and created a matrix to generate themes through constant comparison (Lincoln & Guba, 1985) between events within and across focal four dyads.

Findings

Close analysis of the four focal dyads showed that the youth facilitated one another's access to the learning task and collaborative sense-making by using multiple languages and various communicative modes (gesture, gaze, proxemics, images, etc.); thereby leading to a more equitable learning environment. An excerpt from one dyad, Thiri (**T**) and Da Zin (**DZ**), illustrates how they negotiated between their differing ideas on what to research regarding the impacts of climate change in Sydney, Australia. A facilitator, **MJR** asks **T** and **DZ** about what they know about the impacts of climate change. **DZ** forwards the idea that farmers "couldn't farm" because of the scarcity of water. Building on **DZ**'s idea, **T** asks whether farming is a common practice in Sydney. **MJR** urges them to find out and walks away. The following conversation then ensues. Utterances in *italics* are spoken in Hakha (**T** and **DZ**'s L1). Annotations of non-verbals are in **((Bold))**.

01	DZ: So, <i>why don't we write about farmers that we just talked about?</i>
02	T: <i>Do they also do farming in Sydney Australia?</i>
03	DZ: <i>In what she</i> [MJR] <i>said</i>

04	T: Uhuh ((T angles her body towards DZ))
05	DZ: We will write the effect of climate change first, and then with Sydney like, you know we will make that effect connect ((DZ makes an open palm gesture on the poster paper)) with Sydney. Like with Sydney, does this happen in there as well?
06	T: Ahhhh. Do you want to do it like that?
07	DZ: I guess it is like that. In what she [MJR] just said, we will find climate effects and then see if that also affects Sydney and what it's going to be like after in 100 years, I guess it's something like that
08	T: Uhuh ((in agreement)) I was thinking we should just like find out how it is like you know in Sydney right now ((T taps on the keyboard. DZ leans in towards T)) and then uhm the problems that it's facing ((T taps on the poster paper)) and then after the problems we can write out what will happen
09	DZ: Hmmm. Yeah, we can do that
10	T: Yeah or what you said was all of the climate change problems ((T makes an open palm gesture to DZ)) and then like similarity ((T makes a circular gesture over the poster paper)) to the Sydney Australia problems. Which one do you wanna do?

T and **DZ**'s flexible use of Hakha and English throughout the exchange along with the gestures that punctuate their explications (Turns 4,5,8, and 10) has allowed them to engage in exploratory talk wherein they explored one another's ideas critically and constructively (Mercer, 2000). Through translanguaging (García & Wei, 2014), they negotiated their approach to the science problem without constraining language use to English only. They considered their general knowledge of climate change (Turn 7), the specific regional considerations (Turn 2), and negotiated research directions related to their task (Turns 5, 7, 8 and 10). More specifically, at the beginning of this episode, **T** evaluates and challenges **DZ**'s idea of farming by suggesting a criterion of relevance – whether farming is also done in Sydney (Turn 2). **DZ**'s recognition of this underlying criterion of relevance compels her to reframe her idea (Turn 5). This then led to **T** considering **DZ**'s idea (Turn 6) and offering a new idea (Turn 8). In addition, the two girls fostered collaboration by being attentive, open to one another's ideas, and sharing cognitive authority. They showed this by soliciting and taking up each other's perspectives (Turns 1, 2, 5, 6, and 10), adjusting the angles of their body postures (Turns 4, 8, and 10), and sharing of tools relevant to the task (poster paper and laptop; Turns 8 and 10). In this sense, equitable participation is achieved through translanguaging, sharing of cognitive authority, openness to one another's ideas, and mutual engagement in the task.

Conclusions

We explored the ways multilingual youth engaged in collaborative science practices and supported one another's science learning and participation. Through the use of multiple languages and communicative modes beyond the spoken word, they were able to leverage their sense-making practices to further their own and their peer's understandings. The facilitators created space for equitable learning to take place by affording youth the opportunity to use multiple languages. Open-ended, peer-led tasks enabled multilingual youth to share and value one another's scientific contributions in ways that a teacher may not be able to access. By propelling one another's science learning, the youth created a more equitable environment.

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