Translanguaging as an Essential Practice in Socially Just Science Classrooms

How to make *all* language styles appropriate for science learning

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Manuel: Point nine lo pongo?

Rico: Ponle W equals point nueve y high (pause) uno punto uno. Ahora seis. Rápido, tenemos que trabajar rápido.

Translation:

Manuel: *Do I write point nine?*

Rico: *Write W equals point nine and high (pause) one point one. Now six. Fast, we have to work fast.*

In this interaction, Manuel and Rico (all names are pseudonyms) expertly mix Spanish and English to communicate as they collect data in a ninth grade physics lab. Your reaction to this mixture of English and Spanish, what users sometimes call "Spanglish" will depend on your beliefs about language and multilingualism. Researchers refer to these beliefs as *language ideologies* (Gal and Irvine 2019). Due to the absence of clearly articulated language policies in the United States, in districts, and in schools, teachers set the policies for their classrooms and hold students accountable for following or not following these policies based on their language ideologies (Zhang and Pelttari 2014).

Science teachers decide which languages they deem "appropriate" for science learning in everything from classroom conversations to student presentations, writing on tests, and in lab reports. Despite their best intentions, science teachers who are untrained in language and language learning can default to beliefs about language that are inaccurate and harmful to multilingual youth. For example, "English only" poli-cies, and policies that dictate that only a specific version of English is appropriate for learning and doing science, system-atically silence and constrain the partici-pation of traditionally marginalized and underrepresented youth such as Black, Latinx, and emergent bilingual (often labeled "English language learner") stu-dents (Flores and Rosa 2015). Building inclusivity in science classrooms means implementing strategies that incorpo-rate and build not only from students' cultures but also from their full linguis-tic repertoires. In this article we define *translanguaging*, offer a justification for why translanguaging strategies are es-sential in the culturally responsive and socially just science classroom, and pro-vide a list of tips and strategies for imple-menting translanguaging policies and practices in science classrooms.

Translanguaging: A definition

The term *translanguaging* has been used for the past few decades in language education to refer to the code-switching that bilingual and multilingual speak-ers engage in naturally when they are in multilingual communities. The term refers not only to the practice of lan-guage mixing or code-switching but also to the contexts and consequences of this practice. Otheguy, García, and Reid (2015) define *translanguaging* as "the deployment of a speaker's full lin-guistic repertoire without regard for watchful adherence to the socially and politically defined boundaries of named (and usually national and state) lan-guages" (p. 283).

This definition rests on the under-standing from linguistics that the lines that separate different languages, or a dialect from a standard language, are po-litical and ideological lines. This means the lines are drawn based on what peo-ple *believe* about language, not what lan-guage *is empirically*. With this in mind, the definition of *translanguaging* implies that language mixing and switching, the fluid and dynamic practices of multilin-gual people, should be celebrated—not denigrated. Students should be encour-aged to use and expand their full linguis-tic repertoires in classrooms, as opposed to having their repertoires constrained by ideologies that inadvertently repro-duce inequity, such as when students and teachers use status quo assumptions about what language is "appropriate" in the classroom.

Why translanguaging is essential in science classrooms

The shift toward three-dimension-al science teaching called for in the *Framework for K–12 Science Education* (National Research Council 2012) and *NGSS* offers new challenges and op-portunities for multilingual youth in science classrooms. As teachers focus on engaging students in the practices of do-ing science and talking science (Michaels and O'Connor 2012), they have a chance to include translanguaging practices in their new teacher tool kits.

But, you may ask, *why* should sci-ence teachers make this effort to sup-port translanguaging? To put it simply,

translanguaging works! Multilingual and multiracial youth who speak languages other than English or varieties of English that may be labeled "non-standard" (e.g., African American Vernacular English or AAVE/Black English) thrive in classrooms that acknowledge, celebrate, and legitimize their multiple ways of speaking and being (Poza 2018).

There are cognitive and social benefits to using students' ways of speaking from their lives outside school as the basis for science classroom talk (Lemmi et al. 2021). By relating everyday experiences to abstract scientific concepts while using all language available to them, multilingual students are better able to navigate scientific conversations in translanguaging classrooms (Karlsson et. al 2019). Translanguaging practices offer a way for science teachers to rewrite the norms for what is "appropriate" language for science learning and in the process create more socially just and equitable learning environments.

How science teachers can support translanguaging

This is the fun part! The first step is to adopt a translanguaging policy. We recommend keeping it simple, something like "In this classroom, all languages and speaking styles are valued!" The teacher can introduce this policy with further explanation such as "Throughout the year we will test out different ways of communicating our thoughts to different audiences. This will mean using various languages like Spanish, Swahili, or Arabic and different styles of English including what we sometimes call slang and informal English. In this classroom, all styles are welcome!"

While the policy can be stated in a course syllabus at the beginning of the year, it should be revisited regularly so that it becomes a philosophy that threads through all dimensions of classroom activity. To support implementation of the policy, science teachers in English-medium classrooms can use various

strategies to welcome varieties of English and different named languages into the classroom (see Table 1). When using these strategies, the focus of science talk should be on students' scientific reasoning, or sensemaking, which can come in many linguistic forms. Teachers might introduce scientific vocabulary and formal science discourse structures as they become relevant to supporting students' reasoning—not as a precondition for engaging with students' reasoning.

To put this policy into practice more concretely, we recommend teachers try the strategies and routines outlined in Table 1. These strategies can be used *with* other inclusive strategies detailed in recent issues of *The Science Teacher* (e.g., "Inclusive Strategies for the Science Classroom" by Ann Haley Mackenzie; May/June 2022). For example, Mackenzie suggests students design a book jacket, write a book review, write and perform a play, or write an edito-

rial. The language students need to be successful in these tasks varies widely and will depend on the specific audience the students select for these products. A translanguaging approach requires teachers and students to explore *how* they will use their full linguistic repertoires to communicate to these different audiences and through these different products.

Nuances in implementation: An example with refugee-background teens

Linguistically and culturally diverse students will come to the science classroom with their own language ideologies and preferences. Secondary science teachers may find themselves with many named languages represented in their classrooms. This diversity is likely to include youth who speak multiple varieties of English, multilingual students who have grown up in bilingual communi-

ties, and multilingual students who are labeled as "English language learners." These learners will perform at various levels of English language proficiency and will have a range of prior schooling experiences, with some students having more advanced academic training in science than U.S.-born students, to students who have experienced interrupted or limited formal schooling. To design linguistically sustaining science learning environments for this diversity of students, teachers must test out different ideas, taking into account students' backgrounds and needs, and be responsive to student feedback.

In our work with refugee-background youth in a STEM-focused afterschool program in 2022, Darryl, a Swahili-speaking student from the Democratic Republic of the Congo, asked a small group of Arabic-speaking youth why they didn't speak Arabic in the afterschool program. Darryl hap-

FIGURE 1

Images of drawings made on cosmic ray detectors built and decorated by refugee-background youth in an afterschool program focused on physics and computing that enacted a translanguaging policy.

Detector 1: Three students made this detector, they shared only English as a common language (they spoke Swahili, Spanish, and Nepali). The Spanish-speaking student tagged his Spanish nickname, "Flacko," on the detector. He took this seriously and practiced on paper before tagging the detector.

Detector 2: This image drawn on a detector depicts the Iraqi flag which contains the words, "God is the Greatest" in Arabic. Students spoke almost entirely in English while working but chose to include this drawing.

Detector 3: Students in this group frequently spoke a mixture of Swahili and English, they chose to write on their detector in English.

> *It's OK to start small and to add new practices and language skills to your own repertoire as you continue to learn with and from your students.*

pily told them, "When I'm around my friends who speak my languages, I always switch it." Naila, a student from Iraq, replied, "Why would you do that when you can speak English?" Janice, an Arabic-speaking student, whose family learned Arabic in a refugee camp in Egypt, then told the group how she playfully uses Arabic and English with other friends "We switch from Arabic to English, I mean we just laugh cause we make up words."

Crucially, the afterschool program's local language policy of supporting translanguaging and multilingualism created a space for students to make their own autonomous choices about which languages to use in conversation and how they wanted to use those languages in other products (see Figure 1). By welcoming various named languages into the classroom, and supporting rather than constraining students' translanguaging practices, science teachers can create spaces for students to make their own choices about how they want to use their linguistic repertoires. This year, Naila has chosen to speak Arabic with one of our program tutors and a sibling. By creating a space that is open and welcoming to all languages, students are free to use their full linguistic repertoires on their own terms.

Conclusion

Socially just science classrooms offer students opportunities to explore and expand their full linguistic repertoires. Translanguaging practices offer a means to accomplish this so that students like Rico and Manuel whose voices you read in the opening vignette, and the other student voices we've included through-

out this article, can experience a sense of belonging and meaningful learning opportunities in their science classrooms. While supporting translanguaging may sound daunting at first, you can layer translanguaging strategies into your practice to build inclusivity using the ideas in Table 1 as a starting place. Eighteen years ago, I started with a multilingual word wall in a ninth-grade sheltered physical science class with emergent bilingual students from 15 different language backgrounds. It's OK to start small and to add new practices and language skills to your own repertoire as you continue to learn with and from your students.

ADDITIONAL RESOURCES

- For further ideas on implementing translanguaging pedagogies to support science learners, try "The Translanguaging Classroom: Leveraging Student Bilingualism for Learning" by García, Ibarra Johnson, and Seltzer.

- For schoolwide and classroom-based materials to cultivate *all* students' multilingual identities we recommend teachers and administrators review the resources from "We Are Multilingual": https://www.wamcam.org

- For ideas on how to go beyond one classroom and to work collaboratively to develop a local school language policy we suggest this resource: https://www.colorincolorado.org/article/how-create-language-policies-local-level

REFERENCES

Gal, S. and J. Irvine. 2019. *Signs of difference: Language and ideology in social life*. Cambridge: Cambridge University Press.

García, O., S. Ibarra Johnson, and K. Seltzer. 2017. *The translanguaging classroom: Leveraging student bilingualism for learning*. Philadelphia: Caslon.

Karlsson, A., P. Nygård Larsson, and A. Jakobsson. 2019. Multilingual students' use of translanguaging in science classrooms. *International Journal of Science Education*, 41 (15): 2049–2069. https://doi.org/10.1080/09500693.2018.1477261

Lemmi, C., G. Pérez, and B.A. Brown. 2021. Translanguaging in the science classroom: Drawing on students' full linguistic repertoires in bi-/multilingual settings. In *Translanguaging in science education. Sociocultural explorations of science education*, eds. Jakobsson, A., P. Nygård Larsson, and A. Karlsson, A., vol 27. Springer, Cham. https://doi.org/10.1007/978-3-030-82973-5_5

Michaels, S., and C. O'Connor. 2012. *Talk science primer*. Cambridge, MA: TERC.

National Research Council. 2012. *A Framework for K-12 science education: Practices, crosscutting concepts, and core ideas*. Washington, DC: National Academies Press. https://doi.org/10.17226/13165

Otheguy, R., O. García, and W. Reid. 2015. Clarifying translanguaging and deconstructing named languages: A perspective from linguistics. *Applied Linguistics Review* 6 (3): 281–307.

Poza, L.E. 2018. The language of *ciencia*: Translanguaging and learning in a bilingual science classroom. *International Journal of Bilingual Education and Bilingualism* 21 (1): 1–19. https://doi.org/10.1080/13670050.2015.1125849

Zhang, J., and C. Pelttari. 2014. Exploring the emotions and needs of English language learners: Facilitating pre-service and in-service teachers' recognition of the tasks facing language learners. *Journal of Multilingual and Multicultural Development* 35 (2): 179–194. https://doi.org/10.1080/01434632.2013.822505

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