The Inclusive Potential of Teaching the History of (White Mainstream) English as the International Language of Science

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Students whose primary language is not White Mainstream English, the version of English most valued by academia, often feel disadvantaged in classrooms where the majority of the reading, writing, and discussion is conducted in White Mainstream English. Students may view their language identities as a liability rather than an asset, which can hinder their ability to think through course concepts, read and comprehend academic publications, participate in class discussion, and complete ambitious and thoughtful writing projects (Baker-Bell, 2020). This view is reinforced when their field and their instructors implicitly or explicitly uphold the notion that White Mainstream English is the rightfully preferred English variety for the field, ignoring the historical and ongoing impacts of white language supremacy (WLS) on our everyday linguistic practices (Lee & Rice, 2007); this is why I am using "White Mainstream English," rather than terms like "Standard Written English" or "Edited American English," in this chapter: to highlight the role that white privilege plays in making certain Englishes or languages "standard" (Baker-Bell, 2020, p. 3). In STEM writing classes, this notion is codified by the concept of English as the International Language of Science (EILS) or the use of White Mainstream English in most publications, conference presentations, and other texts circulating within the field. While we ought not assume that any student who does not have a background in White Mainstream English will automatically struggle with confidence or communication in a writing course and must assume that even students from similar linguistic backgrounds will have different attitudes and experiences, acknowledging that white supremacy culture has created a barrier for many of our students is an important first step in enacting anti-racist pedagogical practices in writing instruction to create a more inclusive classroom. For STEM writing instructors, one way to do this is to teach the historical origins of EILS to illustrate that White Mainstream English's use in their field is not a rightfully-earned position but rather the result of factors related to colonialism, power, and luck (Huttner-Koros, 2015; Phillipson, 1992; Porzucki, 2014).

In this chapter, I present a series of lessons that use translingual pedagogical approaches to challenge white supremacist conceptions of linguistic ability and create a more inclusive STEM writing classroom. The lessons teach students the history of

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EILS as a means of challenging embedded notions of White Mainstream English supremacy in STEM, pairing that with reflective writing on the students' own views of their linguistic practices. Table 2.1 outlines the different parts of this lesson.

Table 2.1. Overview of Assignment Sequence Detailed in This Chapter.

Activity	Topic
Individual written reflection	Personal views of writing ability, specifically looking at multiple linguistic identities or practices
Whole class discussion	Personal views of writing ability, specifically looking at multiple linguistic identities or practices
Small group discussion	Hypothesizing about how and why White Mainstream English became the language of science (EILS)
Assigned reading	History and complications of EILS, specifically: Nina Porzucki's "How did English become the language of science?" from The World Adam Huttner-Koros' "The Hidden Bias of Science's Universal Language" from The Atlantic
Individual written reflection	Identifying and challenging limiting beliefs about writing ability
Mini-lecture	Benefits of multilingualism and speaking or writing in multiple Englishes

To better understand the context and necessity of these lessons, I begin the chapter with a review of the damaging impacts of WLS on STEM students and examine how translingual pedagogies may assist in addressing those harms. I then discuss how to enact a translingual pedagogy in a STEM writing course through these lessons, discussing each part of the lesson in depth and ending with student responses, including how to respond to student resistance.

(White Mainstream) English as the International Language of Science (EILS)

In our pursuit of inclusive pedagogical practices, we must first acknowledge that the dominance of this particular variety of English, White Mainstream English, is both the product and proponent of WLS. The Conference on College Composition and Communication's (CCCC) "Statement on White Language Supremacy" defines WLS as a structural tool of white supremacy that uses "the ideology of individualism as it works with meritocracy" to position performance in White Mainstream English as a valid criterion for evaluating communication skills (*CCCC Statement*

on White Language Supremacy, 2021). White Mainstream English's dominance in STEM fields is tied to the global spread of English and is largely the result of Western countries using English as a tool to dominate and control new, current, and former colonies, a tactic Robert Phillipson (1992) refers to as linguistic imperialism. While there are obvious benefits to having a global lingua franca (or common language), the dominance of White Mainstream English has created concern about its negative impacts for other languages because this linguistic imperialism places White Mainstream English above other Englishes and other languages. While the debates about the causes, costs, and benefits of EILS will continue to produce important insights, for the purposes of the set of lessons I present in this chapter, I will focus on the ways EILS's positioning of White Mainstream English as the "rightful" and "natural" language of science harms multilingual students.

Publication in STEM journals demonstrates the negative impacts EILS has on multilingual writers. Writers based in the United States enjoy a greater rate of publication and are more likely to serve on the boards of academic journals in their fields (Canagarajah, 1996, 2002; Gibbs, 1996), and more recent metanalyses from multiple STEM fields have found that academic journals feature more writing from scholars in countries where English is the dominant language (Clavero, 2011; Yen & Hung, 2018). The deep, personal impacts this has on STEM students are visible in Dhatri Badri's opening vignette (this collection), where she shares the ways in which her identity as an Indian woman prevented her from feeling a sense of belonging in STEM. Scientists whose first language is not English face a 30 percent lower chance of having their papers be accepted for publication than native English speakers (Pronskikh, 2018) and cite their own English-language research more frequently than the research written in their mother tongue (Grabe, 1988), highlighting that publishing in White Mainstream English is an important tool for gaining cultural capital. These practices, often made obvious in bylines, impact how STEM students view themselves, their linguistic abilities, and their chances of contributing knowledge in their field. A study of 45 multilingual international students found that 82 percent of respondents rated their English skills as "weak" or "adequate," and there was an inverse relationship between respondents' assessment of the strength of their English abilities and their perception of English's importance in their field (Tardy, 2004). Multilingual students may feel defeated or overwhelmed by the position of White Mainstream English as the primary language of STEM, particularly if White Mainstream English's position of supremacy is seen as innate and their language practices are seen as detracting from their ability to communicate in White Mainstream English.

Yet despite these harms, STEM (writing) instructors may not prioritize linguistic justice, which Jerry Won Lee (2016) defines as "confronting the inequitable discursive economics that afford disproportionate amounts of social capital to certain language practices over others" (p. 176). This may be because they view STEM writing

as chiefly communicating objective knowledge. In the previous chapter, Jameta Nicole Barlow and Kylie Quave pinpoint how the misunderstanding of science as a "neutral, value-free way of knowing the world" often hides the influence of colonialism on STEM and the inequities embedded in the generation of scientific knowledge (this collection). This misunderstanding can also hide linguistic hierarchies. Many hold the view succinctly articulated by Vitaly Pronskikh (2018) that "[m]uch of the STEM discourse is sufficiently technical to reduce the role of natural language and linguistic injustice to a relatively minor degree" (p. 83). This avoidance is further incentivized by a false belief that writing instruction is separable from the course content (Donnell et al., 1999; Minakova & Canagarajah, 2020) and by institutions' undervaluing of teaching writing across the curriculum, which allows them to relegate writing instruction generally, and critical literacy awareness more specifically, to first-year writing programs and writing centers (Jordan & Kedrowicz, 2011). But the reality is that STEM writing's replication of linguistic injustice has major consequences. Beyond impacting students' views of their own language practices and scholars' publication rates and prestige, the linguistic injustice caused by complicity with WLS in the STEM writing class reduces our capacity to address global problems meaningfully, as explained by Ghanashyam Sharma (2018):

> These monolingual orientations are uniquely harmful for the STEM fields because scientists are among the first in line to have to cultivate a sense of global citizenship, advance knowledge, and address social challenges on global scales. Curricular and pedagogical blind spots created by monolingual worldviews can create practical challenges when STEM scholars and students are faced with the complexities of conveying specialized knowledge to outside and mixed audiences. They can also undermine academic engagement in cross-cultural and transnational communication as well as obscuring political and socioeconomic issues in academic and professional writing. (p. 44)

Just as Asao B. Inoue (2019) argued that those in the field of writing studies have power in arguments around the valid use of language and thus a responsibility to dismantle WLS, those in STEM fields have a responsibility to challenge the monolingual view of White Mainstream English as the sole valid language of communication for science. While I contend that linguistic justice does not necessarily require removing English as the international language of science, the "confrontation" it requires of us does prompt us to acknowledge and work to undo the negative impacts EILS has on writers from different linguistic and cultural backgrounds. This is owed both to the STEM community, which is made up of (largely multilingual) faculty, researchers, and students from a variety of cultural and linguistic backgrounds, and to the public, which depends on STEM's findings to shape their lives.

Contextualizing EILS through Translingual Pedagogies

Much like Barlow and Quave (this collection) advocate for an anti-colonialist pedagogical approach that examines and challenges how knowledge has been produced in STEM, I advocate for a translingual pedagogical approach that examines and challenges positioning White Mainstream English as the "language" of science in order to create a more inclusive STEM classroom and global community. Translingualism is a tool for challenging WLS's monolingual views and creating a more equitable STEM field. Like multilingual views of language, translingualism acknowledges the validity of multiple linguistic expressions; however, where multilingual views of language suggest linguistic systems are separate and compartmentalized, translingual dispositions view languages as dynamic and fluid, flowing into each other and informing each other more than we might initially think (Frost et al., 2020). As Nancy Bou Ayash (2020) explains, this approach is inherently anti-racist because it "contests a dominant monolingual English-only ideology, which propagates problematic representations and treatments of language as stable, internally uniform, and having status outside and beyond the cultural, political, economic, and ideological forces that bring about its practices" and instead "foregrounds the mutable, performed, and emergent nature of language and insists on the agency of its users and learners" (p. 14). A translingual approach to language not only advocates for those for whom English is their second language but also for those "native speakers" who primarily communicate in other varieties of English like Black English (Lee, 2016, p. 178). Challenging the idea of language as discrete and concrete opens up space for a diversity of language practices, including different varieties of a language, to be considered valuable.

Translingual pedagogical approaches are utilized in two ways in the lesson I present in this chapter: challenging how students view the powerful position of White Mainstream English and leading students to see the value of their own translingual writing processes. To practice a translingual pedagogy means we must be honest with students about the inaccuracies of White Mainstream English's assertion that it has "status outside and beyond the cultural, political, economic, and ideological forces that bring about its practices" (Ayash, 2020, p. 14). The lesson series presented in this chapter does this by teaching students the history of the perception of White Mainstream English as the "language" of STEM, illuminating the forces that brought White Mainstream English to that place of prominence alongside reflections of their own linguistic practices in order to encourage students to feel confident in their own diverse linguistic abilities. One of the most obvious ways that translingual approaches can be adopted is through the creation of multilingual writing products that utilize code-meshing, the practice of using different language varieties or languages in the same rhetorical context (like combining White Mainstream English with Black English or combining English and Spanish) which many see as a tool for promoting egalitarian language practices (Ricker

Shreiber & Watson, 2018). However, this is not the only avenue for embracing translingual writing pedagogy; truly translingual approaches to language show that multilingualism can play a pivotal role at other stages of the writing process, even for writing projects that are monolingual (Lee, 2016). Developing awareness and appreciation for translingual writing processes has the potential to help our students see the value of their own diverse language practices rather than viewing them as detracting from their ability to communicate in White Mainstream English.

Learning the History of White Mainstream English's Ascent to EILS

The lesson I outline in this chapter would be suitable for any discipline-specific STEM writing course or even a general STEM course with a significant writing component. I developed it specifically for an upper-division elective writing course titled Technical Writing for Scientists and Engineers that I taught at my previous institution, a four-year public research university where writing was primarily taught through required first-year writing courses embedded in residential colleges. This was the first upper-division interdisciplinary writing elective offered on our campus, and it grew out of conversations with STEM professors and department administrators who wanted to both prepare their undergraduate students to write in the major and provide graduate students with the opportunity to TA for the course, giving them teaching experience that might also further hone their own writing skills. The goal of the course was to acquaint students from different STEM fields with some of the most common genres of STEM writing, including research articles, review articles, research posters, and conference proposals. STEM professors I collaborated with on the course expressed a desire for students to develop confidence in these genres and in their writing, reading, and critical thinking skills.

I've primarily taught this lesson in courses where the majority of students were multilingual, though, as I'll share later in the chapter, students whose home language closely resembled White Mainstream English also benefit from this series of lessons. Because the course was writing-focused, we did have explicit conversations about WLS from the very first day of class. On the first day of all of my writing classes, I show Jamila Lyiscott's spoken word poem "3 Ways to Speak English" (https://www.ted.com/talks/jamila_lyiscott_3_ways_to_speak_english) as a way to introduce thinking about text rhetorically and linguistic justice. In it, she challenges the ways white people react to her performance of White Mainstream English as a Black woman and highlights the ways her being a "tri-lingual orator" is both shaped by violent historical forces of colonialism and works to make her a better communicator (Lyiscott, 2014). While explicit classroom conversations about WLS in academia will support the lesson presented here, it can stand on its own as an introduction to EILS.

I find it most impactful to teach this early in the semester or quarter, though it may also be helpful at the start of units focused on style or editing.

Beginning to Examine Personal View of Writing Ability

I begin with an in-class reflective assignment where students freewrite (record one's thoughts in writing without stopping to consider structure, composition, or grammar) answers to the following questions about their writing development:

1. How would you assess your overall writing ability? What do you think are your strengths? Your weaknesses?
2. What types of feedback have you gotten from instructors in the past? What negative feedback sticks out in your mind? What positive feedback can you remember?
3. Do you speak different languages with your family, friends, or in other contexts? Or do you speak other types of English than the type of English we read in STEM journal articles? Describe the different languages and/or Englishes you speak in different contexts.
4. Do you think the different languages or Englishes you speak help or hurt your ability to write in academic settings? Why or why not? Do you ever use your other languages or Englishes when thinking about, planning, or drafting writing assignments? If so, how?

Though these can be assigned for homework or presented to students all at once, I prefer to put one set of questions up on the board or projector screen, allow a few minutes for students to write, and then put up the next set, telling students that they can take more time on questions they find more generative. This approach also gives me the opportunity to explain what I mean by "other Englishes" and list examples of how they might use different languages and Englishes in their composing processes. I then have a fifteen-minute whole-class discussion, asking for student volunteers to share their responses to questions 3 and 4. This discussion can alleviate students' sense of alienation in their language practices or beliefs about them and introduce them to new ideas or insights about linguistic practices. We also begin to discuss concepts like White Mainstream English and WLS toward the end of this discussion if we have not covered them in previous classes. I also collect students' freewriting so that I get to know students' individual experiences and viewpoints of their linguistic practices.

Brainstorming then Reading about the Causes of EILS

I then put students into groups of 3 or 4 to hypothesize about why White Mainstream English became the international language of science, asking them to

appoint one student notetaker to record their ideas. For interdisciplinary courses, I put students in groups according to major (or similar majors) so that they can discuss both EILS broadly and why they think White Mainstream English is the language most often used for their specific discipline. This leads to the next question I give them to discuss: "Is English, specifically White Mainstream English, a 'good' language for science? Why or why not?" After groups have discussed for about ten minutes, I have each group share the ideas that came up in their discussion. Some are able to pinpoint specific historical phenomena that contributed to White Mainstream English becoming a default language, like computers and coding languages being created in the United States. Other students may have knowledge about other languages (Latin, French, or German) being used in their field in past decades and centuries. This discussion, especially sharing ideas about whether or not English is a "good" language for STEM, is an important first step toward examining the belief that White Mainstream English's higher status is innate and separate from those of other Englishes or languages.

I typically end class here and assign students two brief readings from popular journalism sources that explain the history and consequences of EILS. The first is an audio broadcast (also available as a text article) produced by Nina Porzucki (2014) for *The World*, titled "How did English become the language of science?" The piece covers the rise of EILS in the 20th century, attributing it largely to German falling out of favor after World War I. Understanding how EILS is culturally and historically influenced enables students "to develop an understanding of the discipline as culturally situated" and challenge the "Eurocentric perspective" that STEM is taught from, as Alicia Bitler and Ebtissam Oraby elaborate on in their chapter later in this section (this collection). The second piece I assign, "The Hidden Bias of Science's Universal Language," by Adam Huttner-Koros (2015) in *The Atlantic*, focuses on the ways EILS harms scientists whose native language is not White Mainstream English, the production and circulation of scientific knowledge, and other languages. I like to start the next class period with an open discussion in which students share their reactions, experiences, and questions they have about the content presented in the readings. If discussion stalls, I'll ask students to take a few minutes to review the pieces and write two discussion questions, then ask them to read their questions aloud. For especially quiet classes, taking five minutes for students to freewrite a reflection can help them gather their thoughts to begin a class discussion, or students can be paired off to share their freewritten thoughts with a partner.

Challenging Limiting Beliefs about Writing and Multilingualism

After this discussion, I transition back to where this series of activities started: students reflecting on their views of themselves as writers. I ask students to revisit

their writing from the previous class, specifically their thoughts about their weaknesses as a writer. I explain the concept of limiting beliefs, which are ideas that people hold to be true about themselves that hold them back in some way; they often begin with statements like "I can't" or "I don't" and are typically adopted from our experiences, education, faulty logic, or out of fear. I then prompt students to write out some limiting beliefs they have about themselves as a writer, sharing some examples like: "I don't have anything original to write about," "Nobody will care what I have to say," "I'm not a good enough writer to do this topic justice," or "I am bad at grammar." I share research with students about the negative impacts of limiting beliefs, of which there are many; Tamlin Conner and Lisa Feldman Barrett (2005), for example, found that unconscious beliefs can hinder our ability to embrace challenges, and thus simply identifying our limiting beliefs can be an important first step to becoming more capable and confident writers. To continue this process, I ask students to do the following with their limiting beliefs:

1. Write out where you think these beliefs originate from. Are you extrapolating one piece of feedback you received once? Are you using this as an excuse to not try something new or something that scares you?
2. Challenge your limiting beliefs. Write out evidence that contradicts or challenges your limiting beliefs. What positive feedback have you received about these aspects of your writing or thinking? Alternatively, how might simply identifying these limiting beliefs serve you in your journey to dismantle them?

I conclude by sharing overviews of research on the writing skills of multilingual students and students who speak different versions of English in order to help students see their language practices as assets rather than liabilities before prompting them to reframe their own limiting beliefs in light of this information. There are numerous pieces of research supporting the assertion that multilingualism improves creativity, critical thinking, and cultural awareness, but I like to show students the American Academy of Arts & Science's 2017 report from the Commission on Language Learning's executive summary, which highlights the specific positive impacts speaking multiple languages has on one's cognitive abilities, cultural sensitivity, and even on preventing or slowing negative health impacts associated with aging (Commission on Language Learning, 2017). I invite multilingual students who have examples of their multilingualism giving them greater rhetorical knowledge and flexibility to share those experiences with the class, providing concrete examples of how these strengths manifest themselves. Once we've discussed the specific benefits of multilingualism, I prompt students to think about how this might cause them to rethink their limiting beliefs. I then ask students who are comfortable to submit their written reflection on limiting beliefs to me so that I can be aware of the areas they are working on gaining confidence; given that all students have different experiences and perspectives, these are helpful for me as I continue to deepen my

understanding of my specific students' attitudes toward writing and their linguistic abilities, especially those who are less willing to share in discussion. I can also refer back to these before commenting on students' writing to tailor my feedback to their specific concerns.

This lesson combines both instruction on the history of EILS with personal reflection in order to help students not only understand how EILS has been shaped by WLS but how those practices, in turn, impact their conceptions of themselves as people and as writers and thinkers in the STEM community. Combining this with small-group and whole-class discussions gives students the opportunity to learn from their peers' application of the material to their own writing lives.

While the type of reflective writing described here may be less popular in STEM writing courses than in expository writing courses, it is essential for transferring writing skills from one writing situation to another and for facilitating the types of attitudinal shifts around linguistic practices necessary to enact an inclusive pedagogy (Hendricks, 2018; Herrington & Stassen, 2016; Yancey et al., 2014). In her study on how college students develop as writers, Lee Ann Carroll (2002) advocates for writing instructors to help students gain awareness of their own development through "self-reflection that learns a new knowledge or skill by unlearning and revising old knowledge or skill" (p. 131). If we want students to question their internalization of White Mainstream English as supreme language, we must guide them to question their own internalized views of it before introducing new translingual views of writing. This reflection helps students develop a wider, more flexible approach to the writing process, and it is central to aiding in their development of the types of critical thinking skills that will enable them to question the impacts WLS has had on academic writing and STEM writing in particular. Ideas about these and other potential benefits of metacognitive and reflective assignments in STEM writing courses can be found throughout this collection (e.g., Badri; Barlow and Quave; Callow and Shelton; Bitler and Oraby).

Before turning to how students react to this lesson, I'd like to consider how translingualism is at play here. While I do tell students they are welcome to write in other Englishes or utilize code-meshing to write in other languages in their free-written self-reflections (a practice I welcome whenever students do reflective writing), for many students, the readings they did, the discussions we had, and the writing they produced were in White Mainstream English. The reason I label this pedagogical practice as translingual is because it runs counter to the monolingual perspectives upheld by WLS by directly challenging the notion that White Mainstream English is innately superior to other Englishes and languages through teaching the history of the social, political, and economic forces at play in crowning White Mainstream English the international language of science. The final piece of the lesson, teaching students about the benefits of multilingualism and speaking multiple Englishes, begins the work that I will continue throughout the semester

of making room for students' linguistic backgrounds and practices to be seen as having a positive impact on their language abilities. This work includes Lyiscott's "3 Ways to Speak English" from the first day of class and also includes instructional texts on science writing that acknowledge the ways power and privilege play a role in shaping what are often assumed to be "objective" scientific texts. In my STEM writing course, I rely on excerpts from *The Scientists' Guide to Writing* by Stephen Heard (2016) because it acknowledges the cultural and historical factors that influence norms of scientific writing, like this excerpt from his chapter on sentences that contextualizes the use of passive voice in scientific writing:

> Early scientific writing was predominantly active-voice (Gross et al. 2002). This fit well with science done by respected gentlemen and with authority derived from virtual witnessing (Box 11.1): vivid description of the actors and the action conferred rhetorical strength. As science became professionalized in the nineteenth century, however, scientists looked for objectivity in prose—with objectivity meaning "knowledge that bears no trace of the knower" (Daston and Gallison 2007). The passive voice let writers suppress any mention of the person who actually conducted the experiment, analyzed the data, or drew the conclusion. This is odd, though, because we all know it's only pretense: trees don't fell themselves! Authority in modern science comes from our adoption of appropriate conduct and techniques—not from pretending we don't exist. (p.165)

Instructors can also assign texts from the field of writing studies on the rhetorical choices made in scientific texts, including Wayne C. Booth's (2004) discussion of the decisions made by Watson and Crick to humbly present their double-helix findings (pp. 57-59). These texts and ideas help students continue to hone their rhetorical skills by considering the ways in which context, purpose, and audience shape even seemingly objective scientific texts, and they elucidate the reality that our conventions around language are culturally produced.

Student Reactions and Growth Opportunities

In this section, I present the most common types of student responses to this sequence of lessons, both to demonstrate their value for students and to prepare instructors for discussions about WLS and potential resistance points. My students' reactions to this assignment vary. I've had a student come to my office hours to tell me they decided to teach their two-year-old child their family's home language after learning there are benefits to multilingualism, and I've also had a student in class

discussion accuse me of not doing my job by presenting this "distracting" lesson when I could be teaching them White Mainstream English. I've also been met with silence in the whole-class discussion portions of this lesson, even if their freewriting shows engagement with the ideas and readings. Even those who are skeptical of the lesson early in the semester sometimes cite it in their end-of-semester reflective portfolios and course evaluations as an important spark for shifting the way they thought about writing. Because no two individuals have the exact same attitude toward language difference, it is important to meet students where they are and to be mindful of their experiences and attitudes in individual conferences and written feedback with them. This section, thus, is not meant to generalize how different student "types" may react to this series of lessons but rather to help prepare instructors for a few broad categories of responses.

Students who respond positively to the lesson often demonstrate how these ideas impacted their own attitudes and approaches to their writing, thinking, and composing processes in their final freewriting on their limiting beliefs on writing, though insights also develop in small and large-group discussions. Multilingual students, particularly multilingual international students, sometimes express relief that their struggles with learning the expectations of communicating in White Mainstream English are not a personal failing and are instead influenced by a specific set of historic and cultural factors. One student wrote in his written reflection identifying and challenging limiting beliefs about his writing ability that he was relieved to hear from other native speakers of White Mainstream English that they, too, struggled with early drafts, and the historical context for EILS helped him see that he was not doomed to be a bad scientist because he struggled with White Mainstream English. In recognizing this historical context, white students who communicate primarily in White Mainstream English are often shocked by the prospect that they could be reading or writing in French or German if not for the circumstances that led to EILS. These students sharing their surprise or commenting on how ill-prepared they would be to read biology articles in French is a stark example of WLS, and it often softens their disposition toward the translingual pedagogical approach I adopt in my classes. For many students, this lesson sequence contextualizes the prominence of White Mainstream English in STEM communication in a way that helps them develop greater empathy toward themselves and their classmates; I see this empathy toward others most clearly in peer review and class workshops later in the semester.

Some students take this awareness a step further and become interested in linguistic justice or in building a more audience-aware communication style in STEM. Building on the earlier lesson using Lyiscott's "3 Ways to Speak English" to illustrate the ways power plays a role in our reaction to different Englishes, and Black English specifically, students who communicate in different varieties of English often connect the role that power played in establishing EILS to the ways their

own varieties of English are treated in the United States. These students are often the most willing to begin to challenge conventions of STEM writing, like adopting the #BetterPoster[1] model over the traditional scientific research poster, and embrace a translingual disposition in their drafting process that helps them integrate their different linguistic practices in a way that feels productive rather than detracting from their ability to communicate effectively. Linguistic justice and shifting STEM audiences' expectations for STEM communication become a secondary interest for some students, whether they are multilingual, speak multiple varieties of English, or adhere fairly closely to White Mainstream English in the majority of their communication. These interests are encouraged by ideas in course readings and discussions, including the Heard (2016) and Booth (2004) ideas referenced earlier, and they can also be explored through class discussions and workshops of sample student texts that continually call attention to audience responses to texts.

Some students are, of course, more resistant, objecting to the pedagogical approach or the content presented in the lesson sequence. For students in any of my writing classes who are resistant to my broader pedagogical practices, specifically utilizing reflection and encouraging a translingual disposition, I share research from the field of writing studies that supports these practices, including many of the texts cited in this chapter. However, some students are so deeply rooted in the idea that writing is a skill that can be easily transmitted to them using the banking model of education that they expect me to be focused solely on sharing knowledge about "good writing" with them rather than leading them to reflect on their own writing processes and the cultural and historical forces influencing them. Though this attitude about the banking model of education is present in most writing courses, in my experience, it is more common in STEM writing courses where students appear to have already internalized the idea voiced by Pronskikh (2018) that the "technical" nature of STEM communication makes it more objective and thus makes linguistic justice less relevant. Multilingual international students who have been working on their White Mainstream English skills for years in order to prepare them for success in their education and future careers, for example, may have little interest in performing inquiry into their own language practices, particularly if they see this as detracting from the time I have to teach them White Mainstream English. When these attitudes appear in class discussion, I like to offer more context for the impossibility of a static "Standard English" existing. One way I do this is by reciting or showing students the prologue to the Canterbury Tales, which is incomprehensible to modern-day English speakers, to show students how drastically the English language has changed in just 600 years. I may also introduce

1 #BetterPoster is a template for scientific research posters created by Mike Morrison that minimizes text on the research poster in favor of making it easier for people to read the main finding of a research project when perusing poster sessions. It focuses on meeting the needs of the genre while also encouraging discussion about research during a poster session rather than silent reading.

the concept of World Englishes, asking students to consider what is needed from a lingua franca and why we punish writers who effectively communicate meaning but do not perform White Mainstream English flawlessly. I also express my commitment to helping students work on the literacy skills they want to develop while highlighting the benefits of viewing texts as being shaped rhetorically and influenced by the context in which they were written and approaching grammatical issues by performing inquiry in their own patterns of error. While this does not win over all the skeptics in my class, it tends to soften many students' dispositions toward my approach. I am careful to encourage audience awareness, though, teaching students to be mindful that some professors or journals will be much stricter about adherence to proper grammatical or syntactical conventions; in our class, though, we will focus most heavily on the necessary thinking and composing skills that tend to be more difficult to develop than proper proofreading.

Toward a More Inclusive STEM Writing Class and Community

In this chapter, I've presented a lesson that combines written self-reflection, small-group and whole-class discussion, and instruction on the history of EILS and the benefits of multilingualism and communicating in multiple Englishes aimed at helping students better understand the historical roots of and impact of WLS on STEM writing. I contend that this translingual pedagogical approach challenges assumptions about the "rightful" place of White Mainstream English as the language of STEM, assumptions that can harm the attitudes and practices of students who are multilingual or who communicate in other Englishes. This lesson has taken on additional importance in recent years with the rise of text-generating generative artificial intelligence systems like ChatGPT; these tools are produced by scholars in STEM fields and currently produce text that largely adheres to these standards dictated by WLS. I often follow this assignment with readings about biases in ChatGPT, giving my STEM writing students the opportunity to examine how language bias in STEM can have broader impacts on our world.

Of course, this short lesson sequence is not the only necessary step in creating an inclusive STEM classroom; this approach must continue throughout the semester in order to truly help students feel that their linguistic practices and backgrounds are welcome in the STEM writing classroom. For example, I mentioned earlier that this lesson helped students gain empathy that manifested itself in their response to their peers' papers in group conferencing and peer review. I did not rely on this singular lesson sequence to shape peer review practices, though; I modeled a respectful form of peer response and specifically asked students to focus on

higher-order concerns and avoid making judgments of a student's grammar, punctuation, or other minor language issues. In other words, this assignment sequence is an important foundational lesson in creating an atmosphere that is accepting of language difference and, more specifically, the translingual nature of writing, but this attitude must be affirmed in other teaching practices as well.

My primary goal in this lesson is to create a classroom environment where all students, regardless of their home languages or cultural backgrounds, can learn, and challenging WLS is central to achieving this goal in any writing course. But a necessary and related outcome of these kinds of pedagogical shifts is creating an attitude in academia and in STEM specifically that is more welcoming of so-called "language differences." If English is to be a lingua franca for the scientific community, why can't we loosen our understanding of what "correct" English is? What is lost in the refusal to be accepting of World Englishes? Seeing students embrace these ideas about challenging WLS gives me hope that these kinds of lessons will equip the next generation of researchers and scientists to make productive changes to the expectations of language practices in STEM journals, classrooms, and conferences, but we cannot shirk our own responsibility to push for greater acceptance of language difference. As scholars in writing studies and as scholars in STEM fields, we have the power to influence our colleagues, colleges, and publications to recognize the white supremacist roots of the adherence to a strict form of White Mainstream English. We ought to use it to create a more inclusive field.

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