

Teaching for Justice While Navigating Shifting Political Landscapes: Developing Criticality Requires Taking Action

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Navigating a world regularly experiencing record-breaking weather events, combating emerging diseases, facing extreme water insecurity, and wrestling with issues of sustainable development (UNESCO, 2024) puts a premium on individuals who can utilize science to develop solutions to these and future pressing societal issues. Because our students are increasingly subjected to and impacted by these “wicked problems” that don’t have clear solutions (Rittel & Webber, 1973), a science education that provides students with epistemic and ontological agency has never been more critical. Epistemic agency involves giving students the authority to make and share meaning in the classroom (Bang et al., 2012; Burton, 1995; Valencia, 2010). Ontological agency involves positioning students as actors who can use science to understand the world from a critical perspective and author new roles for themselves in new, more socially just visions of the world (Gutiérrez et al., 2009; Gutstein, 2006). In short, quality science education centers students as designers of potential solutions to the wicked problems that impact their lives and communities.

Science education holds significant potential as a tool for addressing genuine community needs, such as issues related to environmental justice, racial inequalities, and community-based design (Flanagan et al., 2022). The incoming administration’s politicization of these very issues puts science education in a tenuous position. Proposals to dismantle or reduce the Department of Education (Schultz, 2024) could shift curriculum control to states, affecting the consistency of science education nationwide. Likewise, the dismantling of Diversity, Equity, and Inclusion (DEI) offices [an umbrella term encompassing a broad range of policies meant to ensure equitable access and opportunity to all people, particularly those historically excluded from them] in some areas is part of a broader pushback against DEI programs, particularly in public universities.

States with primarily conservative majorities and leadership have enacted laws or policies that eliminate DEI offices, reduce funding, or repurpose diversity-focused positions into more generalized roles (Pandey, 2024). In Florida, DEI offices at public universities have been dissolved, with previously allocated funds redirected to other areas, such as faculty recruitment (Diaz, 2023). This dismantling includes reclassifying positions and removing race- and gender-specific initiatives. Advocates argue this erodes inclusivity in education, especially in a diverse state like Florida. Similarly, Missouri has closed its Inclusion, Diversity, and Equity (IDE) office at the University of Missouri, citing compliance with state mandates (Knox, 2024). This closure follows earlier efforts to phase out scholarships and programs

based on racial eligibility. Critics claim such actions reverse gains made after campus protests against racism and undermine targeted resources for underrepresented groups. In Utah, new legislation has banned the use of DEI statements in hiring and admissions processes, leading to the elimination of central DEI offices at public institutions (The University of Utah, 2024). Some programs remain allowed under specific conditions, but the shift reflects growing resistance to initiatives seen as prioritizing identity over merit. Proponents of these measures argue that DEI programs can promote racial animosity, while opponents believe dismantling them stifles diversity and hinders efforts to address systemic inequities in education. The changes highlight a national debate on the role and value of DEI in public institutions.

Removing DEI language from course syllabi has also become increasingly common, particularly following legislation targeting DEI initiatives. For example, Texas passed Senate Bill 17, which eliminated DEI offices at public universities and restricted the use of state funding for DEI efforts. Although the law explicitly exempts course instruction and research, institutions like the University of North Texas (UNT) have chosen to rename courses to remove terms such as “race” and “equity” (Alonso, 2024; Bryant & Appleby, 2024). Some administrators argue that these DEI-related changes align courses with state education standards rather than directly responding to legal mandates. However, critics, including faculty and organizations like PEN America, view these adjustments as preemptive censorship, arguing that the ultimate goal is to limit the exploration of DEI-related topics in the classroom (PEN America, 2023). At a faith conference during the summer of 2024, the incoming president threatened to pull accreditation and federal funding from schools and colleges promoting “critical race theory, transgender insanity, and other inappropriate racial, sexual, or political content” (Leingang, 2024). Many others have derided related policies as “wokeism” and rallied against diversity-focused curricula and hiring practices (Alfonseca, 2024). The administration from 2016-2020 proposed significant federal budget cuts for scientific research and pressured governmental departments to withhold information or lie about a global pandemic (Thomas, 2021).

These actions, policy initiatives, and nominations of individuals who some may consider ‘anti-science’ (Philipp-Muller et al., 2022) to cabinet positions raise serious concerns about the long-term support for science education, scientific research, and innovation. The broader implications of these measures are significant, as they may curtail opportunities for students to engage with topics related to systemic inequities and social justice, potentially undermining the goal of fostering inclusive academic environments. If teachers and students are restricted from discussing the impacts of federal, state, and local policy decisions on marginalized communities, then the premise of an inclusive, identity-safe classroom becomes an unachievable myth.

Moving Forward and Pushing Back

Given this ever-changing and increasingly politicized educational landscape, attention is needed to connect science teaching with real-world science problems and frameworks toward creating a more just world. As science teacher educators, we must critically examine our instructional practices and determine whether we are perpetuating a science education that maintains the status quo or engaging teachers with learning experiences that expand what they consider science and how they conceptualize the purpose of good science education. I argue that the purpose should be to challenge, critique, and disrupt inequities and injustices in the world by positioning science as integral to justice movements (National Academies of Sciences, Engineering, and Medicine [NASEM], p. 2022). Davis (2022) suggests that transformative change requires teachers and teacher educators to engage meaningfully with community members to ensure science serves as a tool for problem-solving rather than merely presenting it as a collection of facts and terminology. Therefore, transformative change requires education, commitment, and a willingness to address harmful concepts, especially if they are sociopolitical in nature. In this vein, I present several questions science teacher educators might reflect on during the design phase of courses and learning experiences:

- What steps are we taking to ensure that science teaching and learning happens in their future classrooms, not as a means to learn facts but to empower students to engage civically within their communities?
- How do we ensure that our science teachers are engaged in a science teaching that develops lasting and integrated conceptual understandings of disciplinary core ideas?
- How do we prepare science teachers to critically explore the history of racism, homophobia, misogyny, classism, etc., across fields of science as an attempt to address and disrupt inequities in science learning?
- What would our classrooms look like if we centered practices that prepared science teachers to engage their students in critically examining wicked problems?

Considering the current political landscape, the last two questions are increasingly relevant and critical to our work with science teachers. To answer those questions and equip our learners to address wicked problems, also defined as ‘social justice science issues’ in science teaching and learning (Morales-Doyle, 2017), education researchers have suggested the need for instructional approaches that support the development of teacher’s and student’s critical consciousness and cultural competence (Freire 1970, Ladson-Billings 1995, Morales-Doyle, 2017). Building on the work of these scholars, science education researchers have developed frameworks that integrate science learning with critically exploring pressing social justice science issues while at the same time centering students’ cultural and sociopolitical perspectives. This work is part of a broader effort to reimagine science education as a driver of individual and community transformation, empowering educators and students to contribute to societal change. Highlighted below are several frameworks that provide practice-based guidelines for teaching for justice across varying contexts.

Lee and Grapin's (2022) work emphasizes the importance of equity in design choices, aiming to make science classrooms more inclusive and justice-focused by shifting classroom instruction to so-called "future approaches" that address community-based, justice-oriented phenomena. For example, a teacher might lead an investigation into the impact of climate change on marginalized communities or access to safe drinking water. Engaging in these types of learning experiences allows students to bridge the gap between their in-the-classroom learning and developing solutions to social justice science issues. Moving to a future approach seeks to empower students as informed, active citizens who can advocate for more equitable and just solutions.

Similarly, Luehmann et al. (2024) explore how science teaching can incorporate justice-oriented principles while being culturally responsive, particularly in rural settings. The work builds on Windschitl et al.'s (2020) Ambitious Science Teaching (AST) framework to align it more closely with Paris and Alim's (2014) culturally sustaining pedagogies. The result is the Justice-Centered Ambitious Science Teaching (JuST) framework, which emphasizes using science for social transformation by integrating local cultural contexts and equity into science education. This framework is operationalized via these four tenets: (1) anchoring learning in local phenomenon, (2) incorporating students' personal and cultural stories as part of the lesson design, (3) nurturing revision of scientific thinking with local and diverse experts, and (4) using science to make a difference and advocate for justice in their communities.

Alston and Crabtree (2024) highlight strategies supporting science teacher educators' integration of justice-centered teaching into elementary science teacher education. The study emphasizes culturally relevant pedagogy (CRP) and justice-oriented frameworks, which aim to prepare teacher candidates to address equity and systemic inequities in their future classrooms. The authors suggest that preparing teachers to incorporate marginalized perspectives and histories enhance students' cultural competence and socio-political consciousness while increasing their engagement in science. Furthermore, their framework provides teacher candidates with learning experiences to showcase how systemic injustices are perpetuated through traditional education practices as a gateway to developing their critical consciousness and helping students recognize and disrupt inequitable systems. Alston and Crabtree (2024) suggest that using justice-oriented curricula that examine real-world phenomena during a teacher preparation program led to increased enthusiasm among teacher candidates about using science as a vehicle for social justice.

Davis (2022) outlines four approaches to equity (equity as access, achievement, identity, and power and justice) which "reflect a spectrum of opportunities for how educators can work toward equity and justice in their science teaching" (p. 5). These approaches draw on the four approaches to equity outlined in the recent NASEM (2022) report and are intended to guide preservice teachers in fostering more inclusive and socially just science classrooms. Each approach includes equity- and justice-oriented interpretive frames and teaching strategies for teachers to develop and use in the classroom.

Equity- and justice-oriented frames are defined as the knowledge of and awareness, beliefs, commitments, dispositions, and goals related to issues of equity and justice. Meanwhile, equity- and justice-oriented teaching moves “include building relationships with students; making instruction relevant; building on students’ resources; shifting epistemic authority; and making equity, inequity, respect, and disrespect explicit parts of the curriculum (Davis, 2022, p. 6).

While these frameworks do not represent the full gamut of the innovative approaches developed over the years, they do collectively form a comprehensive framework that integrates access, achievement, identity, and justice into teaching practices, helping science teachers support diverse learners in meaningful ways. Each framework requires significant teacher investments, such as learning about local culture, collaborating with community members, and adapting instruction dynamically to student input. They also exemplify how integrating equity and justice into science education can enrich both teaching practices and student outcomes, particularly for students from underserved and marginalized communities, as they are more able to recognize the value of science as a tool for addressing social justice science issues important to their communities.

The juxtaposition of the conservative ideology for education moving forward with the justice-oriented approaches explored in this editorial could not be more stark. There is a threat of repercussions for teacher educators and teachers in states enacting related policies. Are we going to cave to the pressures of those who choose to ignore science they disagree with while turning a blind eye to the negative impacts political decisions have had and continue to have on individuals from marginalized communities? Or will we answer the call to prepare our science teachers and the students they teach to work towards developing solutions to these wicked problems and social-justice science issues to create a more just world? For me, the answer has never been more apparent. It is time to resist, disrupt, and take up justice-centered science pedagogies in our teacher education classrooms. And it is time to show all of our prospective teachers that we see them, that we see the injustices, and that we are willing to walk alongside them to critique oppressive systems and work to dismantle them.

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