

Educating students in solutions-oriented science

The climate crisis is upon us. Our physical world is changing as our climate veers away from its historical state and societies comprehend the magnitude of this disruption. Youth, students, and many others are in the streets, demanding deeper, faster, and more equitable action to protect their future. Simultaneously, we as ecologists, environmental scientists, and climate and sustainability educators are confronting an increasingly distressed and disempowered public. Higher education is being buffeted by this confluence of crises in 2020. How can we educate students to become effective citizens across the scientific, ethical, cultural, and policy landscapes that they are plunged into, without exacerbating their burden of eco-anxiety? We believe that solutions-based student learning that facilitates active participation in policy-making processes is one way to accomplish this goal.

Students are aware that they will always need deep disciplinary knowledge, but many are also demanding a solutions-based education that integrates interdisciplinary experience with human and environmental well-being. This need becomes even clearer under the current COVID-19 pandemic. The traditional science curriculum must evolve to incorporate skills in leadership, cross-cultural communication, innovation, resilience, and advocacy. We, the authors, are bridging this gap by immersing students into the policy-making process through engagement with decision makers at the international Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC).

As science educators we found that the UN Sustainable Development Goals (SDGs) provide a robust framework on which to weave these multiple threads. The SDGs are comprehensive yet specific enough to guide inquiry, while being inherently multicultural and transdisciplinary. They are effective research and teaching tools because they are science-based, and require us to critically examine the social, economic, and ecological consequences of environmental change. We are aware that advocacy can be a fraught term for scholars who prefer to maintain a dispassionate distance. The SDGs allow us to break away from that traditional view of the environment, which still reflects Eurocentric 18th-century thought, in favor of an Earth-systems view that connects environmental and social issues across populations who view the world through distinct cultural lenses.

As we move into the new decade, solutions-oriented education that helps students become agents of change can be provided in multiple ways. Many scientists incorporate literature and best practices from different cultural spectra into their curricula. Educators provide interdisciplinary multicultural curricula that give students the tools needed to navigate landscapes with embedded cultures. Such courses may include strong emphasis on project-based learning with participation in local policy generation, co-production of research projects with stakeholders, and consultancy projects whereby students solve real-world problems using the SDG framework in the language of international governments, industry, and local communities. Technology now allows us to effortlessly create these courses and reach students, faculty, and external partners across countries and cultures. To achieve this goal, future change-agents and sustainability leaders can work from the perspectives of their own cultural landscapes, while honoring those brought to the table by diverse multidisciplinary international peers from different socioeconomic and political divides.

We, the authors, have demonstrated such possibilities by co-teaching a mixed delivery (virtual and in person) course with six institutions across five time zones on two continents. Our students created supportive mixed multicultural teams and collaborated both online and in person to evaluate environmental issues through the use of the SDG framework. They thrived in that space and were highly motivated to explore these topics in depth by working together with peers at other institutions and having the goal of presenting results to an international audience at a major UN convention. Many students attended the UNFCCC Conference of Parties (COP25); others participated via live webcasts. Through course evaluation, we found that all students felt directly engaged in productive action and expressed a strong desire for additional academic experiences in multicultural and discipline spaces. Overall, our co-teaching experience shows that project-based, multicultural, and multidisciplinary opportunities provide students with the needed skills for solutions-oriented science.

We cannot do this alone – we need to advocate for solutions-based student learning across disciplines and institutions. Experience across diverse cultural landscapes should be a fundamental part of science education, so that students develop into competent, open-minded leaders before they embark on their career paths. Together, we can help our students gain the skills and confidence to solve today's socioenvironmental challenges. The climate crisis demands it.



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