

Centering Environmental Justice in Computing Education

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ABSTRACT

In this Birds of a Feather, we will discuss the roles of computing education in preparing students to understand and address the disparate impacts of climate change in local and global contexts. We intend to have open discussions on the challenges and opportunities related to connecting computing education with climate change and the injustices that climate change exacerbates. We will focus discussions around three questions: (1) How can we center justice-based perspectives on understanding and addressing climate change in computing education? (2) What are the relationships between computing, climate change, and overall environmental impacts? and (3) How should we reimagine traditional notions of “development” and “progress” in computing in ways that challenge how current framings within computing misunderstand or misteach computing’s environmental impacts? We invite all computing educators, researchers, administrators, practitioners and anyone else with any level of curiosity about climate change to join this discussion (because it affects all of us!). Expected outcomes for this Birds of a Feather include sharing resources and experiences to build a community for knowledge sharing and collaborations.

CCS CONCEPTS

• **Social and professional topics** → **Computing education**; • **Applied computing** → *Environmental sciences*.

KEYWORDS

computing education, climate change, environmental justice, ecopedagogy, birds of a feather

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1 SIGNIFICANCE & RELEVANCE OF TOPIC

Climate change is a multi-generational challenge that will disparately affect communities around the globe. More severe weather events, rising sea levels, and changing climates will result in radical shifts in societal structures and norms.

Computing has contributed to the climate crisis, such as through the emissions from power production for energy-intensive activities (e.g. cryptocurrency mining, training of machine learning models) and the increased creation and improper disposal of computer components and batteries containing toxic materials. However, computing can also be part of climate change mitigation and adaptation strategies (i.e. remote sensing of emissions, more accurate predictions of renewable energy generation, organizing for collective action). Despite these challenges and opportunities, computing education largely does not engage with climate change. New approaches to teaching about climate justice investigate relationships between communities and environments to consider who suffers in the name of “development” and “progress” [1]. In this Birds of a Feather (BoF), we seek to explore and reimagine how we teach computing and its relationships with climate change. The goal of this BoF is to identify interests, assets, and needs related to computing education and climate justice and to build a coalition for its advancement.

We plan to welcome diverse stakeholders to this BoF to consider questions such as the following:

- (1) How can we center justice-based perspectives on understanding and addressing climate change in computing education?
- (2) What are the relationships between computing, climate change, and overall environmental impacts?
- (3) How should we reimagine traditional notions of “development” and “progress” in computing in ways that challenge how current framings within computing misunderstand or misteach computing’s environmental impacts?

2 PROPOSED ACTIVITY AND DESIGN FOR INCLUSIVE IN-PERSON EXPERIENCE

We will spend the BoF having small group discussions in tables. The questions listed above will serve as discussion primers. Each table will have at least one select-selected notetaker, enabling not just documentation, but also another opportunity for engagement. We will then ask a member of each group to summarize their discussion to the entire BoF. Following this, we will have a group-wide

discussion to discuss next steps. These next steps could include an online community, virtual follow-up meeting, or partnerships for further investigation at the intersection of computing education and environmental justice. We share contact information for all participants at the end of the BoF to enable follow-up engagement.

We plan to foster an inclusive in-person environment by ensuring participants follow a code conduct (e.g. say your name before speaking to ensure low-vision attendees know who you are), providing tools to enable accessibility (e.g. passing microphones), and facilitating engagement within and across small groups (e.g. turn-taking during group-wide discussions). Discussion leaders for this BoF will ensure a safe and inclusive space for participation.

2.1 Expected Audience

Given the timeliness of the topic, we expect 25 to 50 attendees that could include K-12 and higher education educators, students, researchers, administrators, and industry affiliates. We expect most to have more experience and expertise with computing than with climate change and social injustices. Therefore, this BoF will focus more on open-ended questions and discussion to engage attendees with diverse and developing expertise.

3 DISCUSSION LEADERS' EXPERTISE AND POSITIONALITY

All discussion leaders are active computing education researchers and members of the SIGCSE community. Individually, the discussion leaders have engaged various environmental justice work, research, advocacy, and engagements. As computing education researchers, they have questioned the role of computing education and the broader CS community in forefronting and addressing real issues of climate change.

Benjamin Xie, Ph.D. (he/they) is an Embedded EthiCS Postdoctoral Fellow at the Stanford University Human-Centered Artificial Intelligence Institute and McCoy Family Center for Ethics in Society. He designs socio-technical interactions for critical discourse with and about data for equitable learning, community advocacy, and ethical AI use. He engages with computing education, human-computer interaction, and critical data studies communities. His current work involves partnerships with community-based organizations and schools in minoritized communities to co-design technology and learning experiences for resiliency and solutions to climate change. He wants to foster joy, hope, and coalition at community and societal levels to address the climate crisis through systemic changes.

Greg Nelson, Ph.D. (Greg) is an assistant professor of computer science at the University of Maine. Greg's work includes theories and assessments of computing knowledge, and reading-based approaches to learning computing that show how computing can

help and worsen human and ecological problems. Just arriving at UMaine, Greg is beginning community-based research on connecting local sustainability to computing education, building on decades of local work on food sovereignty, agroecology, and existing partnerships at the Mitchell Center for Sustainability Solutions. Greg hopes to help facilitate research communities on teaching computing in rural and agricultural settings that embrace indigenous knowledge and empower communities to build automation that serves local needs instead of big corporate interests.

Francisco Castro, Ph.D. (he/siya) is a Computing Innovation Research Fellow at the Steinhardt School of Culture, Education, and Human Development at New York University. His work focuses on the human-centered design of technologies that empower learners and practitioners through computing. He is a Filipino immigrant who also brings in his experiences working directly with environmental advocates, farmers and fisherfolk, and healthcare practitioners in the Philippines in identifying and developing technologies to enhance their practices and livelihood. In these efforts, he also centers care, ethical, and critical design in these technologies to ensure sustainability not only in workers' and practitioners' livelihoods, but also the environments (e.g., farmlands, seas, forestlands) they live and work in.

Nicholas Lytle, Ph.D. is a Computing Innovation Fellow at the University of Florida specializing in computing education in K-12 core classrooms. His research experience infusing computing into science education demonstrates the capacity for computing education to reinforce science education. He is interested in developing targeted computing lessons that simultaneously teach climate change topics.

Briana Bettin, Ph.D. (she) is an assistant professor of computer science and cognitive and learning sciences at Michigan Technological University. Her research work broadly centers computing education with focus on human interests, impacts, and learning within our increasingly technological society. Her goal is to help us all learn to better live with, work with, (re)imagine with, and be represented equitably within the increasingly digital landscape of our world. The goals of her research intersect with issues of environmental justice, advocacy and activism, and sustainability, as considering and (re)imagining better futures with technology requires considering the analog world impacted by these technologies as well.

4 ACKNOWLEDGMENTS

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- [1] Gregory William Misiasek. 2021. *Ecopedagogy: critical environmental teaching for planetary justice and global sustainable development*. Bloomsbury Academic, New York, NY.