



## Coping and scholarship during a pandemic

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I began to write this editorial as global COVID-19 cases had risen for over nine consecutive weeks, and as regions around the globe were experiencing second and even third waves, with over 3 million deaths world-wide (WHO, 4 May 2021). As this issue of CSSE is going to press, cumulative deaths attributed to COVID-19 have now surpassed 4 million, with 3 million new cases having been reported globally this week alone (WHO, 13 July 2021). These are staggering statistics, hinting at some of the wide-ranging human and societal costs associated with the pandemic, with a disproportionate impact on those already experiencing inequalities (Pirtle 2020).

The process of education has become centered around remote teaching, learning and working from home over the past year, with drastic and unplanned changes to educational systems impacting over 94% of the world's student population (Pokhrell and Chettri 2021). Most of the international science education community has faced disruptions and upheavals due to COVID19. Our collective lives on campuses and in classrooms were abruptly halted, and many found themselves suddenly faced with the need to balance changing structures and roles both at home and at work. University learning quickly “went remote” and faculty focused on the time-consuming process of converting courses that were once taught in person into online formats. Shifting responsibilities and restructured time commitments coupled with the challenges of uncertainty ushered in profound implications for the educational research community. While coping with unexpected responsibilities and new personal and professional roles in response to the pandemic, research productivity was challenged, especially for early career scholars, doctoral students and scholars of color (Levine et al. 2021). Many academics struggled with increasing obligations, and with finding time and space for research and writing, and all this at a time of crisis. Female academics are particularly at risk (Peters 2020), with recent journal publication trends already showing a decrease in representation of women scholars since the start of the pandemic (e.g., Pinho-Gomes et al. 2020). This raises the possibility of a frightening lack of diversity in the voices that are heard in future research literature.

With ideologies that emphasize individual attainment shaping education systems, and a pervasive underpinning assumption that “going remote” is a simple shift in modality for information delivery with little other implications, this is a time of great concern for

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educators who center social justice. It is of particular importance to work toward creating spaces to come together in scholarly community and to find ways to support each other. The creation of such spaces, and resultant efforts to forge relationships in new ways, can promote the creation of moral, ethical and just relationships within the wider research community. More than one year into this pandemic, chance encounters and informal exchanges have become near-to-impossible in many contexts, underscoring the importance of explicitly working to develop social practices that foster connection and well-being. When we center relationships, collaboration and support for one another, we can build structures that nurture scholarly collectivity through sharing resources, distributing leadership and prioritizing solutions towards community and planetary well-being. The articles herein bring a range of perspectives on science education that can provide inspiration for looking forward. Arundhati Roy's (2020) essay, *The pandemic is a portal* cautions us not to seek a prior normalcy but rather to acknowledge the profound rupture that has happened in our lives. She reminds us that "returning to normal" is not something we can afford, inviting us to use the pandemic as a reflexive chance to imagine new worlds and opportunities, without "carcasses" of prejudice, hatred, emphasis on metrics of achievement and a dying planet. Roy's essay inspires reflecting on, and fighting for, possibilities of a re-imagined world. This issue of CSSE features manuscripts that can inspire imagining such new worlds in and through science education research. Authors have contributed critically grounded examinations and reflections on the role of science education, raising further questions and underscoring the need to examine and push back on neoliberal forces that are impacting children, teachers, and researchers during a time of global crises.

CSSE seeks to establish bridges between science education and social studies of science, promoting public understanding of science, science and human values, and science and literacy, bridges which are critical now more than ever. An earlier editorial in this journal introduced a call for papers addressing reflections and responses to COVID-19 from the CSSE community, raising the question: "How can the Cultural Studies of Science Education community contribute to understanding, responding to, and re-envisioning this era of pandemic?" (Siry 2020). Further questions inspired by that call include: Is it a time for collectively, albeit remotely, considering what it is that we are working toward? What should science education and research accomplish at this time? Can we envision a way to reimagine what it means, to participate in science education research? What do we hope for in the future, and how can those goals be worked toward now? How can collaboration and mutual support be part of the research conversation? And how can we support each other in coming together in community and solidarity?

We had envisaged a fast-track review for papers submitted in response to the call given the timeliness of the topic, yet in the months since the call was published, members of our community faced varying unexpected challenges, and planned fast-tracked reviews often became far from fast due to reconfigured approaches to working, coupled with increased caring responsibilities for many. Rather than having one issue of the journal dedicated to COVID-19 as initially planned, we have decided to highlight papers that deal with COVID-19 in clusters over several issues, beginning with this current issue. This approach allows us to not only create conversations between papers within an issue, but also to continue to build conversations *across issues* of the journal as we work toward bringing about new kinds of scholarly communities. A central part of supporting each other in scholarly community is the social connection that is built through communication and dialogue. In working toward this current issue, there has been a strong sense of collegiality, as discussions among authors, reviewers and editors have remained at a high level of encouragement, with kindness and humility often centered in interactions around manuscripts. Building and

preserving positive social relations through scholarly exchanges can provide a source of strength during times of physical isolation for many.

## About this issue

The papers in this issue utilize a variety of genres and their reach into contexts of learning and teaching is broad. Cultural studies perspectives allow for situating science education broadly and working toward understanding the social, cultural, political and historical ways in which science teaching and learning unfolds in classrooms and other learning contexts. As a whole, this issue reflects timely perspectives with strong relevance to the science education community, beginning with a cluster of papers that explore notions of trust and equity as central considerations in the time of COVID-19. In *Trust in the time of corona—epistemic practice beyond hard evidence* Jessica Leung and Maurice Cheng suggest that conventional school science tends to focus on trustworthiness of data, rather than the people making claims. They reflect upon the human aspect of science and elaborate four epistemic processes that can potentially be of use for students to ground their trust. Trust, and relatedly mistrust, is the focus of Nancy Nasr's contribution *Overcoming the discourse of science mistrust: How science education can be used to develop competent consumers and communicators of science information* in which she explores the discourse of science mistrust around COVID-19 in the USA, elaborates how science mistrust was perpetuated during the pandemic and elaborates ways to support students in overcoming such discourse.

The pandemic has exacerbated existing inequities, and it is essential to work toward equitable spaces for science education. Lucy Avraamidou and Renee Schwartz examine the intersection of Nature of Science (NOS) and science identity in *Who aspires to be a scientist/who is allowed in science? Science identity as a lens to exploring the political dimension of the nature of science*, as they put forth a timely argument regarding the formation of science identities based on robust understandings of NOS and the socially constructed nature of science. Avraamidou and Schwartz argue that these can disrupt power systems in science and offer useful insights about science participation in times of crises, raising critical questions that can support reconceptualizing the purpose of science education with a focus on goals related to equity and social justice.

CSSE encourages a range of scholarly contributions and formats, representing a diversity of cutting-edge scholarship and welcoming work that transgresses disciplinary boundaries, and numerous genres come together in this issue, including two poetic contributions. Poetry can provide a vehicle for emotion and connection in ways that academic prose may not (Stapleton 2019). A poetic inquiry that was previously published in this journal, *Post-modern Metaphor* (Ali Khan 2020), has recently been selected by the author's university as recipient of an award recognizing Scholars Transforming Academic Research. This previously published paper honors the work of one of CSSE's founding editors, Ken Tobin, through a melding of interviews, images, text, poetry and metaphor, and invites readers to explore and rethink the boundaries between science and art. In this current issue two poetic contributions weave together science education scholarship, art and aesthetics, with the first being a piece by Kori Czuy, titled *dear big S science*, in which she explores issues of power, knowledge and control of Western standard science and advances a science that embraces multiple ways of knowing and is inclusive of Indigenous inquiry approaches.

A further genre of CSSE publication are Forum papers, which have the intention of situating a journal publication as a starting point of a dialogue, as they respond to and build

upon points made in an original paper. Forum papers are an interactive opportunity for scholarly exchange, dialogue and debate, which may be published either together with the original paper, or in a later issue of the journal. This current issue features several Forum papers that respond to articles which appear in previously published issues, with the original manuscripts linked by footers with their DOIs. Linking papers in this way allows for continuing scholarly conversations across issues of the journal and over time. In *Interaction rituals, emotions, and early childhood science: Digital microscopes and collective joy in a multilingual classroom*, Sara Wilmes provides her perspectives on Stacey Olitsky's (2021) previously published paper in which Olitsky investigated the processes by which teachers develop a sense of agency, professional identity and group membership in the context of instructional reform. Building from Olitsky's work, Wilmes elaborates the ways in which engaging in science can be an emotionally-laden, and joyful, endeavor. She explores how emotions build among plurilingual children and their teacher through their use of digital microscopes and shows how collective joy and excitement form, and lead to *communitas*.

The second poetic contribution in this issue is Christie Byers and Maria Wallace's contribution *A Story of Bodying in Science Education*, which engages in poetic dialogue with a previously published paper by *Becoming Alive within Science Education (Research): Thinking with Life History(ies), Bodies and Stickiness* (El Halwany et al. 2021). Connecting to El Halwany et al.'s illumination of the ontological tensions of posthumanist research for readers, Byers and Wallace share a body of work that is ongoing, as they illuminate questioning of the onto-epistemological and methodological boundaries of research on science education.

Two forum papers in this issue respond to "They have a lot more freedom than they know": *science education as a space for radical openness* (Williams and Tolbert 2021), which explores teachers' practices during neoliberal educational reforms and consider the ways in which science classrooms and science teachers can be promising spaces of, and subjectivities for, resistance. In *Margin envy: Looking at science education in Arizona from a STEM-ed state* Annette Gough discusses similarities and differences in curriculum, classroom, teaching and standards between Arizona, USA, where Williams and Tolbert's work was situated, and Victoria, Australia, where Gough's work is situated. Gough's essay draws attention to ways in which curriculum deficiencies, teacher qualifications and testing regimes are sources for concern. Williams and Tolbert's (2021) manuscript is also responded to by Noel Gough, in *The Christian right's war on reality: Where do/should American science teachers stand?* Gough explores "lines of flight" for science education that emerge from his reading of their work, identifying a number of ethical questions for American science teachers that arise from the political influence of anti-science constituencies, with particular reference to Christian right positions on evolution and climate change.

Two forum papers respond to Luecha Ladachart, Manus Poothawee and Ladapa Ladachart (2020) publication in which they put forth a hypothetical place-based learning progression for haze pollution in the northern region of Thailand. First, Lezly Taylor and Brenda Brand's *Enhancing place-based learning progression through epistemic agency: a response to toward a hypothetical place-based learning progression for haze pollution in the northern region of Thailand* suggests enhancing place-based learning progressions through the development of identity, self-efficacy and epistemic agency. Relatedly, in *Syn-ergizing standards-based and place-based science education* Steven Semken and Ángel A. García put forth an argument for translating standards into highly contextualized curricula through bundling of learning progressions as an approach to bring together place-based curricula with the NGSS.

A four-paper set unfolds around the original paper *Uncovering stories of resilience among successful African American women in STEM*, in which Danielle Ferguson and Catherine Martin-Dunlop examine the obstacles faced by eight African-American women in hostile STEM environments and the strategies they used to overcome obstacles. A dialogue has emerged around this paper, with three papers responding and building out in differing ways. In *A day of reckoning for the white academy: reframing success for African American women in STEM*, Terrell Morton and Tara Nkrumah extend conversations on Black women in STEM by focusing on radical transformations of STEM and proposing resistance frameworks that disrupt mainstream positionings of Black women. Continuing the discussion with *Mitigating the need for resiliency for Black girls: reimagining the cultural brokering through a lens of science as white property*, Christopher Wright and Alexis Riley underscore ways in which institutions such as schools tend to position Black girls in science learning spaces in ways that require their display of resilience, rather than allowing them to play, learn, think critically and/or make mistakes, as they ask “Are there ways in which to reimagine the process of cultural brokering that provides authentic opportunities for Black girls to succeed in K-12 science learning spaces and mitigate the need for compiling ‘resiliency stories’?”. In *Decoloniality in STEM research: (re)framing success* Katemari Rosa and Felicia Moore Mensah elaborate decolonial perspectives to reframe ideas around success in STEM research, as they share reflections with practical implications for Black women and women of color in STEM.

A two-paper set emerges from Bobby Habig, Preeti Gupta and Jennifer D. Adams’s manuscript, *Disrupting deficit narratives in informal science education: applying community cultural wealth theory to youth learning and engagement* in which they extend the theory of Community Cultural Wealth (Yasso, 2005) to youth informal STEM engagement and highlight the need for informal STEM institutions to engage more deliberately with the knowledge and lived experiences that youth bring to programs they participate in. Marijke Hecht responds in *Creating cultural refugia to transform the boundaries of science* by questioning whether the informal science institution of study had changed in response to these young people, as she considers how informal science education institutions might remake themselves as *cultural refugia*, where interrogation of norms of *what science is* can be challenged and transformed.

The controversial issue of fracking is the focus of *The environment and politics in science education: the case of teaching fracking* by Lynda Dunlop, Lucy Atkinson, and Maria Turkenburg-van Diepen, which presents an examination of how this issue is framed in educational contexts as well as about the role of politics in teaching about fracking. Layering together a systematic literature review with interviews of teachers that work in contexts in which operational exploratory fracking is occurring, they find a depoliticization of the topic of fracking through absence of the topic in the literature reinforced by a focus on seemingly “neutral” learning outcomes in practice. The authors suggest that such complex issues are necessary to be included in curriculum and taught because such issues can support young people’s development of critical scientific literacy. The potentially liberating and transformative role of science education is also a consideration of Arthur Galamba and Brian Matthews’ manuscript *Science education against the rise of fascist and authoritarian movements: towards the development of a pedagogy for democracy*, in which the authors argue some science teaching practices are found to be suitable to fascism-like ideologies and that the use of the concept of “scientific literacy” has focused on neoliberal possessive individualism. Drawing on historical perspectives, they outline potential pathways for science education which focus on the social and emotional development of students. Wilton Lodge’s forum paper builds from Galamba and Matthew’s paper to explore how critical

pedagogy can serve as a counterbalancing force to forms of discrimination within science classrooms by elaborating how several of Paulo Freire's themes can be used to advance a more socially critical and democratic approach to science teaching.

Dominant conceptions of what counts as science learning are challenged in Shelley Goldman, Megan Luce, and Tanner Vea's manuscript focusing on families' sensemaking, in which they examine how families engage in efforts toward a family-centric view of science learning. *Opportunities and tensions in family science: challenging dominant paradigms of science education* explores family-based science experiences, underscoring the role of the family regarding science learning and epistemic agency, and revealing the ways in which novice/more-expert interactions crucial, and local knowledges and cultural practices resourced. This issue is rounded out by *A crisis of authority in scientific discourse*, in which Maria Nichols and Andrew Petzold point out a current crisis in scientific authority and draw on Mikhail Bakhtin's work to examine the conventions of scientific discourse. Nichols and Petzold emphasize how there needs to be a recognition of the messiness of engaging in the scientific endeavor, and a greater welcoming of the heteroglossic voices of the lay population in order to disseminate findings to a world in crisis.

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