**Proposal for Journal of Chemical Education Virtual Special Issue**

# Action for Climate Empowerment in Chemistry Education

Lynda Dunlop, Glenn Adam Hurst, Denise Quiroz-Martínez and Jane E. Wissinger

## Abstract

The Journal of Chemical Education announces a call for papers for an upcoming virtual special issue on *Action for Climate Empowerment in Chemistry Education.*

## Introduction

Tackling climate change is one of the most pressing issues of our age, with chemistry having a key role to play in reducing and eliminating harms and creating regenerative solutions, both from within the discipline and in tandem with other disciplines. The American Chemical Society (2023) states that ‘Climate change presents serious risk for civil society, business, and ecosystems. The Earth's climate is changing in response to increasing concentrations of greenhouse gases (GHGs) and particulate matter in the atmosphere, and human activity is the primary cause.’1 Among other recommendations, the ACS calls for the promotion of climate science literacy and education for citizens and policymakers. Yet relatively recent research2 demonstrated that undergraduate chemistry students were lacking key chemical concepts which made it difficult for them to connect carbon dioxide concentrations and climate change.

The *Journal of Chemical Education* announces a call for papers for a forthcoming virtual special issue on the contribution of chemistry education to action for climate empowerment to foreground research and practice in chemistry education that contributes to quality climate education. Quality chemistry education goes beyond knowledge, understanding and scientific literacy to include emotional, ethical, psychosocial, political and action education such that chemistry and chemistry education can enable the transition towards a more sustainable society. This is in alignment with the 2030 agenda for sustainable development and associated United Nations Sustainable Development Goals framework3. The virtual special issue will publish reviews and explorations of the scope of climate education in chemistry as well as research and practice oriented by an understanding of the causes, consequences and impacts of climate change that can drive innovation at all levels of chemistry education.

Analysis of different countries’ UNFCCC (United Nations Framework Convention on Climate Change) submissions found that approaches prioritising cognitive knowledge gain over affective and action-oriented approaches dominated4. Yet recent research demonstrates that teaching chemistry through climate change and service learning can help non-specialists become competent in chemistry and nature of science5. Article 12 of the Paris Agreement and Article 6 of the UNFCCC action for climate empowerment call for enhanced climate education and communication, and for diverse, innovative and resource-efficient approaches to education at all stages of the lifecourse. In this call for papers, the Journal of Chemical Education is interested in contributions from teachers, university tutors, researchers and other practitioners at all levels of chemistry education, including those co-authored by young people. Contributions are welcomed from related fields where there is clear relevance for chemistry and climate education. The editorial team is particularly interested in papers which go beyond knowledge gain as an outcome of climate education in chemistry, and which illustrate socio-scientific strategies, emotional engagement and various forms of action. Articles should be relevant to people working in the field of chemistry education, including those teaching in middle and high schools, academic researchers and practitioners, and those working in government and industry.

## Virtual Special Issue Scope and Content

A recent international survey by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) identified a global demand for climate education from young people, with seventy per cent of young people surveyed reporting that they cannot explain climate change, or can only explain its broad principles6. Similarly, a survey of professional chemists by the UK’s Royal Society of Chemistry (RSC) identified a demand for students to learn about the scientific consensus on climate change by the end of compulsory education, with many also reporting that teachers should support students to understand the wider political and social context of climate change7. It is our intention that this themed issue will respond to these demands and make a contribution to understanding the contribution that chemistry education can make to a societal response to climate change.

Contributions are invited in the following areas:

* Reviews of action for climate empowerment through chemistry education.
* Articles or communications which examine chemistry education for climate action, for example developing concepts such as climate justice or post-truth, in the chemistry education context.
* Relevant demonstrations, laboratory experiments, models, interactive tools, simulations, activities and technological innovations that support curriculum planning and teaching of climate change in chemistry
* Examples of industrial applications of green chemistry principles for climate change mitigation including case studies
* Methodological approaches to climate change education research which draw on cognitive, psycho-social, political and action outcomes contributing to climate empowerment.
* Theoretical perspectives on education relating to the nature of chemistry and chemical knowledge creation in connection with climate change.
* Empirical studies, for example, evaluations of effective innovative practice in the teaching of climate change in chemistry - either discipline-based or interdisciplinary approaches such as Planetary Boundaries8 where chemistry plays a central role - in educational settings.
* Commentary consisting of a scholarly discussion and opinion on the contribution of chemistry education to action for climate empowerment. Commentary should contain sufficient information for readers to understand the topic and formulate their own opinions.

Articles should:

* Focus on teaching and learning chemistry, including but not limited to, pedagogy, laboratory learning, conceptual change, assessment, achievement, field studies, technologies (broadly defined), and curriculum development.
* Communicate novel, high quality, discipline-specific research on the contribution of chemistry education to action for climate empowerment.
* Include questions or hypotheses applicable to chemistry education and present theoretically or conceptually framed research relating to both education and chemistry.
* Add to knowledge about the role of chemistry education in responding to the climate crisis, and identify implications of knowledge for practice.

See <https://pubs.acs.org/page/jceda8/submission/authors.html> for more information on the scope and purpose of the journal.

## Submission, Review and Publication Process

Manuscripts should align with the principles outlined in the Author Guidelines for the Journal of Chemical Education ([https://publish.acs.org/publish/author\_guidelines?coden=jceda8 (accessed 2021-09-26](https://publish.acs.org/publish/author_guidelines?coden=jceda8)) and can be submitted using these manuscript types: Activity, Article, Chemical Education Research, Commentary, Communication, Demonstration, Laboratory Experiment, and Technology Report. Authors are strongly encouraged to use the JCE-specific manuscript template9 which contains prompts for required manuscript components; using the manuscript template aids in creating documents that are easier to review and publish.

Manuscripts should be submitted to the Journal of Chemical Education through the online manuscript submission portal ACS Paragon Plus by 22nd April, 2024 to receive full consideration for publication in the virtual special issue. Please consider using descriptive titles to maximise findability of your article. Publication of the virtual special issue is expected in April 2025.

When submitting your manuscript in the Paragon system, select “Action for Climate Empowerment in Chemistry Education” under the Special Issue Selection during “Step 1: Type, Title, & Abstract”. Authors should also indicate in the cover letter during “Step 6: Details & Comments” that the manuscript is submitted for publication in the Virtual Special Issue: *Action for Climate Empowerment in Chemistry Education.*

As with all ACS journals, papers intended for the virtual special issue will be available ASAP (as soon as publishable) online as soon as they are accepted and proofs have been checked, ahead of publication in a regular issue and then the virtual special issue itself.

See <https://pubsapp.acs.org/paragonplus/submission/jceda8/jceda8_CER_Guide.pdf> for content requirements for chemical education research manuscripts.

Questions about the suitability of a manuscript topic can be directed to Lynda Dunlop at lynda.dunlop@york.ac.uk. Questions regarding the submission process can be directed to eic@jce.acs.org.

## Guest Editors

The special virtual issue will be curated by Lynda Dunlop, Glenn Adam Hurst, Denise Quiroz-Martinez and Jane Wissinger.

Lynda Dunlop is Senior Lecturer in Science Education at the University of York and Director of Education for Environmental Sustainability at York (ESAY). Her research focuses on climate and environmental sustainability education, interdisciplinary approaches to education and youth participation in environmental decision-making.

Glenn Adam Hurst is Senior Lecturer (Associate Professor) of Chemistry Education in the Department of Chemistry at the University of York. His research interests lie within chemistry education, specialising in adopting systems-thinking approaches within all levels of green and sustainable chemistry education, which forms part of his work in the Green Chemistry Centre of Excellence.

Denise Quiroz-Martinez is Lecturer in Science Education and Education for Sustainability and Director of Bachelor Programme of Pedagogy in Biology and Chemistry at Faculty of Education Sciences, Universidad de Talca, Campus Linares, Chile. Her research focuses on education for sustainability, science education and teacher initial and professional development.

Jane E. Wissinger is Professor and Organic Chemistry Laboratory Director Emeritus at the University of Minnesota in the Department of Chemistry. Her research focuses on the development of curriculum materials that exemplify modern green chemistry methodology, advances in sustainable polymers, and guided-inquiry pedagogy, as well as promote systems thinking and the UN Sustainable Development Goals.

## Author Information

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## References

1 American Chemical Society (2023). Global Climate Change ACS Position Statement <https://www.acs.org/policy/publicpolicies/sustainability/globalclimatechange.html> (accessed July 2023)

2 Versprille, A. N., & Towns, M. H. General chemistry students’ understanding of climate change and the chemistry related to climate change. *J. Chem. Educ***. 2015**,*92(*4), 603-609.

3 UN, n.d. The 17 Goals. <https://sdgs.un.org/goals> (accessed July 2023)

4 McKenzie, M. Climate change education and communication in global review: Tracking progress through national submissions to the UNFCCC Secretariat. Environmental Education Research, **2021**, 27(5), 631-651. <https://doi.org/10.1080/13504622.2021.1903838>

5 Flener-Lovitt, C.; Using the Socioscientific Context of Climate Change to Teach Chemical Content and the Nature of Science *J. Chem. Educ***. 2014**, *91*, 1587−1593. <https://pubs.acs.org/doi/pdf/10.1021/ed4006985>

6 UNESCO, 2022. Youth demands for quality climate change education. <https://unesdoc.unesco.org/ark:/48223/pf0000383615> (accessed July 2023)

7 RSC, 2022. Green shoots part 2 – Sustainability and the chemistry curriculum. The view from chemists in academia and industry <https://www.rsc.org/globalassets/22-new-perspectives/sustainability/sustainability-curriculum/rsc-green-shoots-report-part-2.pdf> (accessed July 2023)

8 Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin III, F. S., Lambin, E., ... & Foley, J. Planetary boundaries: exploring the safe operating space for humanity. Ecology and Society, **2009**, 14(2). <https://www.jstor.org/stable/26268316>

9 Journal of Chemical Education Document Templates <https://pubs.acs.org/page/jceda8/submission/jceda8_templates.html> (accessed July 2023)