

Activating academia for an era of colliding crises

Edited by

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Activating academia for an era of colliding crises

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Listen to the science! Which science? Regenerative research for times of planetary crises

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In situations where scientists disagree, which science should decision-makers listen to? This article argues that we should listen to “regenerative research”, that is, research (1) whose *objective* is to regenerate our relationship to the land and to each other (rather than dominating nature), (2) whose *worldview* acknowledges the interconnection between humans and non-humans (rather than assuming a separation between humanity and nature), and (3) whose *processes* are democratized (instead of including but a narrow circle of researchers). We should listen to regenerative science not because it is suited to the interests of politicians or activists, but because it is most likely to be beneficent, rigorous, and objective. In addition to granting scientists new responsibilities, such as engaging in public action, the climate and ecological crises therefore also require us to critically reflect on the core of our work: the knowledge we generate.

KEYWORDS

science, climate crisis, ecology, democracy, regenerative research

Introduction

In 1949, two of the first international scientific conferences on the environment were held in parallel on the shores of Lake Success, New York (Jundt, 2014). The UNSCCUR¹ focused on ensuring the effective exploitation of earth materials to safeguard a sustainable supply of resources for the economy. In stark contrast, the ITCPN² promoted the protection of nature understood as “the preservation of the entire world biotic community” (Jundt, 2014, p. 57). In 1983, the National Academy of Science report “Changing Climate” looked more like two reports than one. While climate scientists raised the alarm about rapid anthropogenic climate change, economists minimized the impact of raising emissions and promoted a “wait and see” approach (Oreskes and Conway, 2015, p. 177). Today, a broad scientific consensus on the urgency of acting to mitigate climate change has emerged. However, scientific recommendations on how to do so at times remain contradictory. The Sixth Assessment Report of the IPCC (2021) is a case in point. While Working Group II calls for transformational societal and economic changes and recognizes the value of indigenous and local forms of knowledge, Working Group III promotes the large-scale deployment of yet-unavailable carbon removal technologies.

In cases where scientists disagree, what does it mean to “listen to the Science”? Quite often, like in the examples above, policy-makers’ approach has been cherry-picking the most

1 UN Scientific Conference on Conservation and Utilization of Natural Resources.

2 International Technical Conference on the Protection of Nature.

convenient science—often instrumentalizing it to serve ideological preferences and interests. In the current climate and ecological emergency (CEE), this approach makes us run the unacceptable risk of failing to limit the increase of global temperatures or the continuous collapse of ecosystems. Building on the literature on the philosophy, history, and sociology of science, this article provides a framework for deciding which voice to listen to when scientists disagree.³

The article argues that decision-makers should listen to *regenerative research*. That is, science (1) whose objective is to regenerate our relationship to the land and to each other (rather than dominating nature), (2) whose worldview acknowledges the interconnection between all earthly beings (rather than assuming the separation of humanity and nature), and (3) whose processes are democratized (instead of including but a narrow circle of researchers). We should listen to regenerative science not because it is more suited to the interests of politicians or activists, but because it is the most likely to be benevolent, rigorous, and objective.

This analysis has implications for policy-makers, but also universities, funding bodies and researchers. While the reflection on the role of academia in a climate crisis has largely focused on adding new responsibilities to scholars—reducing their carbon footprints, refusing fossil fuel funding, or speaking up publicly about the inconvenient implications of their findings—this paper suggests that the CEE calls for a reflection on the core of the scientific endeavor: the type of knowledge we generate.

After reviewing the current discussion about research ethics in a climate crisis, the article moves toward discussing some issues in the dominant paradigm of modern science, and its alternative: regenerative research.

New ethical norms for scientists in the CEE

The question of what is “good” science—the science we should listen to—has traditionally been the object of research ethics. The main reflection on research ethics can be roughly summarized in three big principles: *respect*, *rigor*, and *responsibility* (UK Government Office for Science, 2007). According to these principles, scientific research is “good”, when it is (1) *benevolent* because it respects the “human subjects” involved in the research process, (2) *credible* because it is rigorous in its methods and data collection processes, and (3) *relevant* because it listens to societal needs and proposes solutions based on an objective analysis.

In recent years, some sectors of academia engaged in a reflection on the consequences of the CEE on research ethics. Three new norms are emerging from this reflection. They can be understood as the broadening of the three originals principles of research ethics. A first one is the imperative, for academia, to stop its own carbon emissions. Some examples of its application include: scholars aiming to fly less (e.g., Nevins, 2014), universities adopting “green campus” plans, or academics questioning the

energy consumption of scientific equipment, ranging from super-computers (Bender et al., 2021) to circular particle colliders (Janot and Blondel, 2022). The principle of respect is thus broadened to encompass a concern for the long-term and unintended consequences of the research on the environment (Gustafsson et al., 2021).

A second emerging norm aims to protect science from the undue influence of fossil fuel lobbies. In March 2022 more than 500 scholars signed an open letter asking universities to refuse funding from the fossil fuel industry⁴ — a demand relayed by student protests in various universities. The principle of rigor is thus broadened to include the concern that receiving funding from fossil fuel companies risks introducing biases in research, in particular in times when considerable efforts are deployed to sow doubt on science, engineer ignorance, or distort scientific findings to serve industrial interests (Oreskes and Conway, 2015).

Finally, a third axis of reflection regards the visibility of climate science. Many called for scientists to communicate their research findings and their consequences more vocally in the public debate (Oreskes and Conway, 2010), including by using civil disobedience (Gardner et al., 2021). This prescription implies a broadening of the principle of responsibility, demanding scholars to stand up for the societal implications of their findings—even (or especially) when those have particularly far-ranging political implications.

These new ethical norms are essential to ensure universities play a positive role in addressing the CEE. However, they focus on peripheral aspects of academic research and only marginally engage with the core of the scientific enterprise: the knowledge we generate. These principles are rooted in a vision of scientific knowledge as relatively unproblematic. This optimistic outlook overlooks a large critical literature in the history, sociology, and philosophy of science that shed light on the contribution of science and engineering in the historical process that led us to the CEE (Merchant, 1980). It also ignores the indigenous voices who criticized western science as an instrument for colonialism and imperialism (Ake, 1982; Smith, 2021).

To complement the three ethical principles that emerged in the literature, this article proposes a reflection on the ethical implications of the CEE for scientific knowledge itself. The starting point is acknowledging that, strictly speaking, there is not one *Science*, but multiple *sciences*—which have played and continue playing different roles in society (Latour, 2004; Stengers, 2018). From the pioneering work of Joseph Fourier (1786–1830), Eunice Newton Foote (1819–1888), John Tyndall (1820–1893), and Svante Arrhenius (1859–1927)—who identified and quantified the “greenhouse” effect of carbon dioxide—to the latest IPCC report, scientists have been and continue to be at the forefront of those raising the alarm on the CEE. Yet at the same time, science played a significant role in the constitution of the worldview, knowledge, and technologies, that led to an over-exploitation of the Earth and non-western populations (Merchant, 1980). If science is not one, which science should we listen to?

Next section reviews the critique of modern science, while the following identifies an alternative scientific tradition—regenerative research—that should be emphasized in the current context.

³ This research question implies that this article is specifically concerned with the interaction between science and society, rather than with the tradition of fundamental science and its objective to generate knowledge out of curiosity or a sense of aesthetics (e.g., abstract mathematics).

⁴ <https://fossilfreeresearch.com>

Modern science and the origins of the CEE

A relatively large literature in the history, philosophy, and sociology of science criticizes modern science for the role it plays in constituting the worldview, knowledge, and technologies that led us to and continue fueling the CEE. The critiques formulated in this literature focus on the objective, worldview, and processes of modern science.

Progress as domination of nature

A first set of critiques focuses on the *objective* pursued by the modern scientific project. Modern science rests predominantly on a certain vision of progress, understood as improvement of human welfare through the domination of nature and the emancipation from its constraints (Charbonnier, 2021). Since Francis Bacon, science is understood as one of the main drivers of this idea of progress. The knowledge of the laws of nature allows humans to tame, control, subjugate, and engineer nature (Merchant, 1980). In this view, “scientific and technical expertise will benefit humankind by rendering the non-human world less threatening, more predictable, and more profitable” (Yao, 2022, p. 7). Science is thus understood as “an instrument of awesome power allowing its holder to improve reality” (Bauman, 1989, p. 70). And since non-Europeans, women, or indigenous and LGBTQ+ peoples are often excluded from the concept of humanity (Braidotti, 2019), the project of mastery and subjugation also feeds social domination and imperialism (Jahn, 1999; Gaard, 2001; Bowden, 2009; Sultana, 2022).

Based on this definition of progress, scientific and technological innovation is considered inherently good despite its destructive effects (Godin, 2015). Research on a variety of technologies that have damaging effects on the environment—such as the steam and the internal-combustion engines (Malm, 2016), agrochemicals (Carson, 1962) and GMOs (Muir and Howard, 1999), dam systems (Schmutz and Moog, 2018) or nuclear weapons (Higuchi, 2020)—is thus considered coherent with the principle of respect. The impulse to dominate nature and populations found perhaps its most radical realization in eugenics, the attempt to engineer human genetics (Micklos and Carlson, 2000). Today, it finds a new expression in “effective altruism” and “long-termism”, who attempt to redefine ethics based on an unlimited belief in the mathematical predictability of the world (Srinivasan, 2015). A perhaps even more problematic example is eco-modernism and its celebration of the “good Anthropocene,” based on a seemingly limitless faith in humanity’s ability to deliberately manipulate the climate *via* geoengineering to ensure optimal living conditions for humanity (Hamilton, 2016).

Faced with the daily reports of the destructive consequences of the CEE, we can no longer maintain our faith in the vision of progress as mastery of nature. While this project undeniably delivered large improvements in welfare for a section of humanity, it relied on the unsustainable (and unethical) exploitation of the earth and of non-western people (Krause, 2020). In light of this historical experience, it thus appears at best unlikely that a science

based on the objective of subjugation of nature can be truly benevolent and fulfill the ethical principle of respect.

A mechanistic worldview

A second focus of the critique against modern science concerns its *worldview*. Indeed, the objective of domination of the earth was made possible by the mechanistic worldview that underlies modern science. Nature is understood (in a Newtonian fashion) as a big machine, constituted of individual pieces which are connected by natural forces such as gravity or electro-magnetic forces. Because the interactions between these pieces are ruled by deterministic, universal, and objectively quantifiable laws of nature, this approach considers that the future can be predicted accurately (Best, 1991). This radical objectivism separates the observer from the observed, leading to the idea (associated with Descartes) of a disconnection of the subject from the object, the mind from the body, the conscious from the inert. This worldview thus leads to the idea of a stark separation between humanity and nature, that became a cornerstone of modernity (Latour, 1993).

The mechanistic worldview removed the ethical and intellectual obstacles to the ruthless exploitation of the Earth (Merchant, 1980). Indeed, the metaphor of nature as an automat leads to a conception of our planetary habitat as an inert resource, composed of dead matter, available for valorization by humans and amenable to engineering. Moreover, this worldview paves the way to a reductionist science that conceals important interactions and interconnections, because it assumes that some parts of the “machine” can be studied in isolation from others. Separating the (human) economy from the (natural) climate, neo-classical economists for example judge it to be reasonable to assume that “about 90% of GDP will be unaffected by climate change, because it happens indoors” (Keen, 2021). Systems of ecological valuation such as calculating “ecosystemic services” are criticized for reducing their object to economic assumptions, while dismissing other important ecological functions and interconnections (Norgaard, 2010). In the debate about intensive forestry in Sweden, stakeholders adopting a mechanistic worldview justify intensive forest exploitation by focusing on forests’ role as carbon sinks, while ignoring the carbon emissions of clearcutting or its effects on biodiversity (Lidskog et al., 2013).

As tropical storms leave thousands of people without electricity, floodings wreck entire cities, heatwaves take the life of our grandparents, and water scarcity threatens our agriculture (Gaspar et al., 2011), the idea of a disconnection between nature and humanity appears more and more like a dangerous fantasy. As Amitav Gosh puts it, “our earth is doing our thinking for us” (Malmuth, 2021): the mechanistic worldview is proven wrong by the unfolding of the CEE itself. Rather than separated, we realize that we are dependent on non-humans (Latour, 2017) and that “natural forces and human forces are so intertwined that the fate of one determines the fate of the other” (Zalasiewicz et al., 2010, p. 2231). Because it results in the dismissal of important variables and interconnections, that nowadays violently remind us of their existence, it is unlikely that the mechanistic worldview leads to a science that respects the ethical principle of rigor.

Absolute knowledge

A third axis of critique is focusing on the *process* of doing science. Modern science is built on the idea of a strong distinction between scientists as knowers and non-scientists as ignorant, restricted to the domain of opinion, irrationality, and superstition (Latour, 2004). By virtue of the scientific method—defined in terms of verification or falsifiability—scientists are deemed to produce the only form of valid, absolute knowledge. In this understanding, scientific knowledge is conceived of as a “view from nowhere” (Haraway, 1988), objective and value-neutral. The scientific process is thus viewed as an apolitical process, where what is researched and how the research is conducted is irrelevant as long as knowledge is accumulated. “Advances in science are taken to be the outcome of investments employing trained people to apply the scientific method to accumulating knowledge, which now can be equated with information, with metrics being developed to measure efficiency in its production” (Gare, 2022, p. 260).

Under its pretenses of neutrality, this vision of knowledge however risks hiding biases and conflicts of interest, making a particular perspective look universal. Against the predominant conception of scientists as objective knowledge producers, the feminist literature argued that, as any other humans, individual scientists do have a certain point of view, values, and assumptions. Consequently, a lack of diversity in the scientific community can lead to biases in the scientific outcomes (Harding, 1986). Such biases can take the form of sexism, racism or classism in scientific theories—as in the case of the “limited energy theory”, developed by Edward H. Clarke in 1873, according to which women should not engage in higher education as it would diminish their fertility (Oreskes, 2021, p. 76). Biases can also result from uneven coverage or selection bias. For example, women’s health issues have suffered from a chronic lack of funding in the US (Mirin, 2021). Similarly, the science of extreme weather event attribution has predominantly focused on the Global North, even though the severity of such events is higher in the Global South (Otto et al., 2020). More broadly, indigenous scholars formulated stark criticism of science’s role in contributing to the imperial project by imposing western concepts and ideologies to the colonized, and denying the legitimacy of indigenous knowledge, while appropriating it for the benefit of the colonizer (Ake, 1982; de Sousa Santos, 2015; Smith, 2021).

These critiques suggest that rooting the objectivity of science only in the scientific method carries the risk of invisibilizing biases, contributing to the production and reproduction of (environmental) racism, sexism and classism (Gaard, 2001). Such scientific biases can be exacerbated when there are close ties between researchers and the industry—as was for example documented in biomedical research (Krimsky, 2004) or in research on geoengineering (Hamilton, 2013). Since it listens to specific interests rather than the general interest, a science that is not sufficiently diverse and does not question its biases can only be relevant to a specific group of people rather than to society at large. As such, modern science cannot fully fulfill the ethical principle of responsibility in the CEE.

In summary, modern science has been criticized for pursuing an *objective* that cannot credibly result in a benevolent science,

based on a *worldview* that does not deliver rigorous analyses, and *via processes* that do not lead to objective and societally-relevant results.

Regenerative research

These critiques must be taken seriously. However, they are best understood as addressing one specific scientific tradition. As such, they do not demand abandoning the scientific project altogether. Rather, there has always been alternative tendencies within the scientific project itself, rooted in other objectives, worldviews, and processes that condone another relationship to the earth. These other approaches to science can be loosely grouped under the label “regenerative research”.

Progress as regeneration

Regenerative research preserves the *objective* of progress as improvement of human welfare, but sees the avenue toward this progress not in the domination of nature, but in the regeneration of the relationships between humans, and between humanity and the Earth. Where modernity sees itself as breaking with a past of vulnerability and ignorance, this alternative conception sees progress as a break with a period where a relatively small group of humans’ extractivist relationship to the world led us on the verge of catastrophe. Regeneration does not imply a return to an idealized past where humanity would have lived in a state of harmony with nature. Nor does it involve the restoration of a “pure” nature, untouched by human activities. Rather, it means healing the strained *relationships* between humans and non-humans and between humans themselves; it consists in inventing new relationships that are conducive to the mutual flourishing and the self-realization of both humans and non-humans, as individuals and collectives (Martinez, 2017; Blanco-Wells, 2021). This objective is rooted in the acknowledgment that human wellbeing is inextricably interconnected to the wellbeing of other humans and of the land. Regenerative science is thus based on an ethics of care and of reciprocity: the researcher endorses the role of a healer (Chilisa, 2007), taking care of those who take care of us (Kimmerer, 2013a).

This objective of regeneration is guiding a diversity of existing research, only a handful of which can be provided here as examples.

- *Restoration ecology* aims to revitalize ecosystems that were damaged by human exploitation, such as natural forests or peatland. While rooted in an understanding of the history of place, restorative ecology acknowledges that ecosystems are always changing. It therefore does not aim to reconstitute the original ecosystem, but rather to heal the relationship between species, restoring the function and interactions in ecosystems, and rebuilding self-standing and self-reinforcing ecosystems (Higgs, 2003; Jackson and Hobbs, 2009; Kimmerer, 2011).
- *Regenerative agriculture, agroforestry, permaculture, or urban agriculture* explore ways to produce food while fostering

biodiversity, building healthy soils, increasing water quality, and capturing carbon (Rhodes, 2017).

- *Regenerative design and agriculture* studies how to construct buildings integrated in place, that not only aim to reduce the environmental harm caused by construction (sustainability) but also seek to actively improve the health of ecosystems (Todd and Todd, 1994; Van Der Ryn and Cowan, 1996; McDonough and Braungart, 2002). The field “uses the millions of years of engineering and evolution as the foundation for a regenerative structure”, designing dwellings *with* rather than *on* the landscape (Littman, 2009, p. 1).
- Research on *language revitalization* aims to revive the use of languages endangered by globalization or colonization. From this perspective, language is understood as one factor contributing to the wellbeing of a community, embedded in a broader network of relationships connecting humans to their habitat (Grenoble and Whaley, 2021).
- *Ecological economics* moves beyond the dominant orthodoxy to envision an economy that serves the common good and fulfills essential needs, while respecting planetary boundaries (Herman and Cobb, 1994; Raworth, 2017).
- Research on various forms of conflict resolution, such as the diverse field of *environmental peace and conflict research*, provides insights in the multiple ways peace in human societies is connected to the health of their environment (Ide et al., 2023).
- In the social sciences more broadly, the field of *transformative research* proposes a methodology for research to contribute to the elimination of exploitation based on ethnic, gender, or age-group; formulating research questions and conducting the research in partnership with the researched communities (Mertens, 2008).

Regenerative science preserves the objective of progress as improvement in human welfare, but proposes another way to attain it—the regeneration of the relationships between humans and non-humans. Since it preserves the main objective of improving human welfare, but rectifies the strategy to attain it, regenerative research is neither more, nor less value-laden than the dominant modern science. While very different, the forms of research it encompasses can be complementary in a broadened process of reciprocal restoration understood as “the mutually reinforcing restoration of land and culture such that repair of ecosystem services contributes to cultural revitalization, and renewal of culture promotes restoration of ecological integrity” (Kimmerer, 2011, p. 258). By its existence and its practice, regenerative research signals the possibility of positive relationships between humans and non-humans, where scientific knowledge serves the process of healing and regeneration (Higgs, 2003). This change of strategy—from domination to mutual restoration—makes regenerative research more likely to be truly benevolent and respectful in the context of the CEE.

An interconnected world

Regenerative research is rooted in a processual and relational *worldview* that acknowledges the interconnection of humanity

and nature. In this processual worldview, reality is understood as constantly in a process of emergence and becoming (Whitehead, 1987; Bergson, 2023). The world is seen not as stable and harmonious, but as inherently chaotic and complex (Best, 1991). Change can be non-linear, where small causes can lead to big effects. Matter is no longer inert, but becomes active, vibrant (Bennett, 2010; DeLanda, 2015). The world is no longer finite and predictable, but open and self-creating. In this relational worldview, the part is not conceived in isolation from the whole; the individual is not understood separately from the community (Deleuze and Guattari, 1987). Descartes’ adage “I think, therefore I am” is replaced by the Bantu concept of *Ubuntu*, sometimes translated as “I am because we are” (Chilisa, 2019, p. 99). Humans are seen as dependent on the land for subsistence, livelihood, and health; but the land is also seen as in movement, shaping humans and shaped by them (Latour, 2017). The boundaries of the community relevant for our ethics are enlarged “to include soils, water, plants, and animals, or collectively: the land. [...] The role of Homo sapiens [is redefined] from conqueror of the land-community to plain member and citizen of it” (Leopold, 1987, p. 204).

Such a worldview results in a science that is more holistic, or emergent, in the sense that it seeks to understand complex systems where the properties of the whole cannot be reduced to those of the parts. Some examples of the emergence of such a post-dualist worldview in various disciplines include the following:

- In *physics*, this alternative tradition emerged with Joseph Fourier’s thermodynamics (Prigogine and Stengers, 2018) and Niels Bohr’s quantum mechanics (Best, 1991), which marked the shift from a deterministic to a more probabilistic science.
- In *biology*, Darwin’s evolutionary theory similarly introduced an understanding of reality as open, self-organizing, and with emerging complexity; and contributed to relocate humans within nature (Hodgson, 2002).
- In *mathematics and computer science*, chaos theory and complexity theory study the behavior of complex systems, sensitive to initial conditions (Morcol, 2001).
- *Ecology*—often called the “subversive science” for it displaces the focus of analysis toward the interrelations between beings and their environment (Hardin, 1985)—is perhaps the most important scientific realization of an interconnected worldview.
- Some branches of *Earth system science*, such as research on planetary boundaries, challenge the mechanistic worldview by conceiving of the earth as a “system with complex, vulnerably interrelated parts” (Warde et al., 2018, p. 154–158) and by taking into account non-linearity, in the form of tipping points and feedback loops (Steffen et al., 2015).
- In *social sciences and humanities*, a variety of new approaches seek to move past the dualism between humanity and nature. These include, amongst others, actor-network-theory (ANT) (Latour, 2007), new materialism (DeLanda, 2015), object-oriented-ontology (OOO) (Harman, 2018), environmental humanities (Sörlin, 2012), and ecosemiotics (Maran, 2020).
- Finally, this worldview is predominant in forms of *indigenous and southern epistemologies* that gain increasing recognition in various academic disciplines (de Sousa Santos, 2015; Escobar, 2016; Chilisa, 2019).

Because it breaks with the idea of separation between humanity and nature, and instead accounts for the entanglement of destinies of all earthly beings, rendered painfully visible by the Anthropocene (Zalasiewicz et al., 2010), regenerative science is likely to be less reductive than modern science. This approach restitutes the complexity, historicity, contingency, politics, and agencies at play in any phenomena. While mathematical models and simulations are still elaborated and useful, these are not confused with faultless descriptions of reality (Cartwright, 1984; Thompson and Smith, 2019). For these various reasons, a regenerative science based on a relational worldview is more likely than modern science to respect the ethical principle of rigor.

A democratized science

Regenerative research is also characterized by a scientific process that is democratized. While it does not hold that scientists should abandon their ambition to reach objective scientific facts, regenerative research is based on a social understanding of objectivity—which Harding (1986) called “strong objectivity.” This perspective recognizes that scientists always occupy a specific social position, which comes with specific values, biases, and blind-spots. Knowledge is always situated, scientists always see the world from somewhere (Haraway, 1988). Scientific knowledge gains its objectivity through the formation of a scientific consensus: a long process of contradiction during which “competent colleagues” formulate objections to a scientist’s claims until everyone is convinced (Stengers, 2018). Thus, the greater the diversity of colleagues formulating objections, the most likely it is that potential biases will be corrected and a greater degree of objectivity will be achieved (Longino, 1990/2020). As Merleau-Ponty (2013) puts it, the most objective account of a house is not that of the house *seen from nowhere*, but rather that of house *seen from everywhere*.

This more expensive understanding of objectivity is realized in various ways.

- First, regenerative research seeks to achieve a consensus in a broad and diverse *community of researchers*. Diversity in disciplines, departments, and laboratories is thus essential. The IPCC constitutes perhaps the most ambitious attempt at formalizing the emergence and formulation of a global scientific consensus on a given object of study (i.e., climate change).
- Second, because it abandons the premise that scientific knowledge is the only valid form of knowledge, regenerative research is also open to *other relevant forms of knowledge*. One such form of knowledge is indigenous knowledge, accumulated by indigenous communities through centuries of close contact with the land, and which can enter in a dialogue with scientific knowledge—for example in the fields of regenerative ecology (Kimmerer, 2013b) or sustainable food systems (Antonelli, 2023). Another form of relevant knowledge is the expertise of competent practitioners, such as farmers, fishermen, nurses, peacebuilders, or activists, whose first-hand, daily experience can complement the more distant

perspective of scientific knowledge (Finlayson, 1994; Wynne, 1996; Escobar, 2016).

- Finally, regenerative research also seeks to consult those—human and non-humans⁵—that are *most affected by the phenomena under study* or the technologies under development, and who are therefore in the best position to assess the consequences of the research or its societal relevance (Silvertown, 2009; Garlick and Levine, 2017; Fornstedt, 2021; Pamuk, 2021). This is realized in Participatory Action Research or in Citizen Science, consulting for example patients in medical research or indigenous communities in research on Aids (Epstein, 1996; Chilisa, 2019).

The integration of this multiplicity of situated knowledges serves to build a “more adequate, richer, better account of a world, in order to live in it well and in critical, reflexive relation to our own as well as others’ practices of domination and the unequal parts of privilege and oppression that make up all positions” (Haraway, 1988, p. 579). In this sense, regenerative research is likely to be more objective and thus societally responsible than a science that is unaware of the role values might play in the formulation of its findings.

Implications

In situations where scientists disagree, which science should decision-makers listen to? After reviewing the critiques of modern science, this article identified an alternative tradition that should be privileged: “regenerative research.” Regenerative research rests on (1) a vision of progress understood as improvement in human welfare through the regeneration of our relationship with the land and with each other, (2) a worldview that takes into account the complex web of interconnections between humans and non-humans, and (3) a process that aims at the formation of a broad-based consensus between a diverse group of scientists, in dialogue with other forms of relevant knowledge (such as indigenous knowledge) and in consultation with those most affected by the research.

The analysis suggested that regenerative research should be listened to not because it satisfies the interests of particular groups, but rather because it is more likely to be benevolent, rigorous, and responsible. When faced with a scientific proposition, decision-makers should therefore ask questions such as: What is the vision of progress that underlies this piece of research? (Dominative or regenerative?) In what worldview is this research rooted? (Mechanistic or relational?) Who was consulted in the research process and who supports these findings? (A single scientist, a narrow community supported by industrialists, or a large and diverse epistemic community?).

The article contributes to the recent reflection on the ethical responsibilities for scientists by paying attention to the implications of the CEE for the core of academic research: the knowledge we generate. While regenerative research is perhaps more needed than ever in the CEE, many obstacles persist to its realization.

⁵ Scientists can represent non-humans in this consultation process by playing the role of “spokesperson” for their object of study (Latour, 2004).

These obstacles include, amongst others: the lack of recognition and funding of regenerative research; the commodification of knowledge; the rise of private research funding, corporate sponsorships, and university partnerships with the industry; the resistance to interdisciplinary work; the fragmentation of research in hyper-specialized disciplines; the reluctance to acknowledge issues relative to values in science; and the enduring skepticism toward non-scientific forms of knowledge.

As such, the argument also carries implications for universities, research funding bodies, and scholars themselves. These actors should ask themselves: Which research questions do we prioritize? Who decides what research is pursued? What are the mechanistic foundations of our theories and how can these be re-rooted in a non-mechanistic worldview?⁶ Is our scientific community diverse enough? And which forms of knowledge are consulted in the research process? Importantly, these reflections should not be pursued only on research on environmental issues, but rather throughout the academy.⁷ While the vision of regenerative research is presented here in broad strokes, scholars should think about how to implement it in their own specialized disciplines.

Alfred North Whitehead described the role of universities as “creating the future” (Gare, 2022). In the world of modern science, the question of which future we create is not open for deliberation. Because reality is conceived as predictable, the future appears already written, inevitable, closed (Hulme, 2011). Because it reduces the world to laws of nature, market mechanisms, or technological issues to be solved by technological means, modern science depoliticizes the objects it studies (Swyngedouw, 2013; Malm and Hornborg, 2014). In this context, invoking science serves to close the political debate. Decision-makers are asked to simply follow the absolute knowledge of scientists. The relationship between science and democracy is thus strained (Pamuk, 2021; Rovelli, 2021).

By contrast, regenerative research makes the creation of our shared future thinkable. Its processual and relational worldview opens the possibility of the emergence of a variety of futures, and sheds light on the power relations that permeate the decisions leading to one or the other. Regenerative research thus cannot be invoked to bring the political debate to an early closure. Rather, it always opens the debate, brings new issues to the political agenda, and gives voice to different (human and non-human)

actors. If regenerative science is not a politicized (in the sense of value-laden) science, it is a science that politicizes the issues it studies. This creates the potential for a more symbiotic relationship between science and democracy.

Regenerative science can play three different roles in this process of democratic decision-making. First, scientists can act as *spokespersons* for humans and non-humans. By carefully describing reality, regenerative research can give voice to the voiceless, bringing unnoticed problems or disregarded issues to the political agenda. Second, science can *broaden policy-makers’ imagination* by providing comparative knowledge and a menu of options available to deal with a specified issue, or by inventing new solutions to existing problems. Third, scientific research can guide the political decision-making by *assessing the likely consequences of different policies*, visualizing the multiplicity of possible future that we have to collectively decide to pursue or avoid. Because these models and simulations are understood as mere simplifications of reality, not reality itself, they can only serve as guides for decision-making (see Latour, 2004).

“Listen to the science” should thus not be understood as “obey the scientists”, but rather: “hear their warnings,” “consider the solutions they propose,” and “use their assessments as guides”. Scientists are no longer above the political debate. Their voice is one voice amongst others (Stengers, 2018). But as we enter a period of great instability and uncertainty, this voice is perhaps more needed than ever in the broader debate about the future we decide to create in common.

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The author confirms being the sole contributor of this work and has approved it for publication.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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⁶ Such efforts have been pursued in fields such philosophy (Charbonnier, 2021), international relations (Yao, 2022), international law (Natarajan and Khoday, 2014), political science (Mitchell, 2011) or agriculture (Kazic, 2019).

⁷ While the focus is here placed on academic research, the same issues are also pressing—indeed perhaps more pressing—for research conducted outside of academia (e.g., in think-tanks or in the military).

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Agents of (un)sustainability: democratising universities for the planetary crisis

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As producers and gatekeepers of knowledge, and as providers of education and training, our universities play a key role in the reproduction of unsustainability. This article finds that they are, as currently organised, therefore complicit in frustrating and delaying action to address the planetary crisis. However, as highly resourced and influential institutions, they have an inherently transformative potential, should their resources and activities be redirected towards progressive social and ecological ends, which challenge rather than support the unsustainable status quo. This means that, as workers within these institutions, academics and researchers are faced with a choice: to be agents of this reproduction or to be advocates and activists for change. We argue for the latter. In doing so, we seek to build on the analysis and demands of emergent movements such as Fossil Free Research, Faculty for a Future and Scientist Rebellion in making the case for universities to show leadership on listening to the very science they produce on the planetary emergency, and act accordingly. Employing a green political economy critical analysis, the article suggests that, if they are to contribute to societal transformation, universities themselves must undergo transformations that explicitly and systematically reorient academic practices around social and ecological protection and priorities. Building on these findings, it lays out a series of normative and practical arguments for a broad programme of democratisation around three pillars of academic practise: (1) Research, (2) Education and (3) Outreach and engagement. However, any such processes will of course be difficult, especially given the wider neoliberal political and political economy context within which universities operate, as well as a conservative institutional culture which disincentivises dissent from “business as usual”. In the discussion that follows, we therefore anticipate and argue that advancing such transformative and innovative changes will initially involve individuals or small groups of academics willing to go beyond “academia as usual”.

KEYWORDS

neoliberal university, green political economy, climate action, planetary crisis, academic activism, democratisation, climate activism, post-growth

1. Introduction

As key public and social institutions, universities play a major role in shaping society. Whether it is through preparing students for life beyond education, conducting and disseminating research, informing the development of policy and industrial strategies, engaging with the media and so on, they are widely (if not universally) viewed as trustworthy sources of information and expertise. Given that position of authority, as well as the

resources and expertise available to them, universities have a crucial leadership role to play in shaping responses to and acting on the climate and ecological emergency. However, rather than breaking pathways into a sustainable and just future, this article finds that, as they are currently constituted, universities are complicit in reproducing unsustainability and inequality in ways that undermine and frustrate concerted and effective action on the planetary crisis. It is on this basis that we argue that universities themselves must first or simultaneously undergo radical transformations if they are to step up to this challenge.

Taking a green political economy perspective, we propose that to realise and maximise their potential as “agents of sustainability”, universities must be subjected to pervasive processes of democratisation to unsettle the status quo ways in which they operate, including the ecocidal imperatives and interests of neoliberal capitalism to which they have become overwhelmingly captive. To this end, we identify three areas of high impact where this democratisation could and should take place as: (1) *Research*, (2) *Education* and (3) *Outreach and engagement*. However, we also recognise the difficulties associated with any such transformations, where the conservative institutional culture of universities and their constitutive links to the wider economic bias of neoliberal society and the state, means they actively disincentivise practises which do not align with or actively support those imperatives and interests (Barry, 2011). This is especially the case in the UK, where universities are increasingly run as businesses, elevating the values and processes of profit maximisation, economic efficiency, accumulation and growth over ethical and even educational standards, in ways that reduce students to “consumers” and academics to interchangeable workers requiring strict (if often subtle) disciplinary measures and incentive structures to keep them in line. Despite these constraints (or because of them), we find that, rather than wait for top-down reforms from university management or state regulation which may come too late (if ever), such transformations will most likely only be possible if more academics and students become willing to follow the leadership shown by groups such as Scientist Rebellion, Faculty for a Future and End Fossil, to organise and engage in radical and disruptive activism.

2. Green political economy

In applying the normative cornerstones of green political theory to economic relations, a green political economy (GPE) perspective focuses on the realisation of biophysical sustainability, intersectional equality and democratisation as the interrelated foundations of a just and sustainable system of production and consumption (Barry, 2016). Upholding these principles as a critical framework of analysis problematises the current neoliberal capitalist mode of production (including knowledge production) on each of these fronts. It highlights, challenges and advocates struggle against the varied processes of social and ecological exploitation treated in neoclassical economics as the necessary or acceptable consequences of capitalist system-maintenance and growth (Barry, 2012, 2016; Paterson and P-Laberge, 2018), wherein even “[t]he nicest capitalist still has to exploit labour and promote ecocidal consumerism to survive” (Wall, 2005, p. 174). Central

to this is a critique of unlimited growth in Gross Domestic Product (GDP) as a permanent fixture and structural imperative of the capitalist economy. Building on the “limits to growth” thesis developed by Meadows et al. (1972), this is the scientifically informed understanding that not only is the systematic extraction of finite natural resources required to sustain the ever-greater levels of production and consumption needed to fuel that growth a biophysical impossibility in the longer-term, but that doing so is already degrading the ecological integrity of the planetary systems on which all life on earth depends (Daly and Farley, 2010; Barry, 2012, 2015, 2016; Daly, 2014; Dobson, 2014, 2016; Jackson, 2017, 2021; Hickel, 2020). Beside this, however, these points of GPE critique also include, but are not limited to, the emission of climate-destabilising levels of greenhouse gases from overproduction in the fossil economy; the commodification of essential goods and services (e.g., housing, transport, energy, food, water and healthcare), which forces individuals into formal employment to earn the wages needed to purchase them; and unsustainable levels of individualised consumption, which in turn create huge inequalities in material wealth and wellbeing. Informed by its normative commitments, a critical GPE perspective should therefore lead us to interrogate the role that key institutions (such as universities) play in mainstreaming and reproducing norms, values and practises that prioritise and normalise—to the point of becoming the dominant “commonsense” or just “the way the world is”—those ecocidal and exploitative processes, and the growth-based system of private wealth accumulation they sustain and support.

As a macro-political concern, this “commonsense” normalisation is most apparent in the way neoliberal fiscal policy is predominantly shaped around the logic that maximising economic growth in a capitalist “free market” economy is necessary for generating public funds, collected through taxation, from the privatised profits that growth generates. This supports, and is in turn supported by, the dominant neoclassical economics perspective that private enterprises and entrepreneurs are, when driven by competition in the market and incentivised by the ability to make profits and accumulate private wealth, “naturally” and axiomatically assumed to be more innovative and efficient than not-for-profit public entities (i.e., the state) in producing the goods and services that society needs and wants. Taken together, these have been instrumental in creating the political legitimacy for neoliberalism’s systematic deregulation of the market, to encourage profiteering as the principal driver of growth and a perceived social “good” (Barry, 2012), and then advancing it as a project of structural reform. In many ways, it therefore represents the socialisation of the ideal, put forth by Friedrich Hayek in his proclamation on the virtues of free market capitalism, that “the general licence of politicians to grant special benefits to those whose support they need still must destroy that self-forming order of the market *which serves the general good*” (Hayek, 1979, p. 151, emphasis added). Critically, this ideology of non-intervention has had significant implications for the higher education sector, which has simultaneously experienced systematic cuts in public funding from a neoliberal state in retreat whilst being held to its “entrepreneurial” standards of profitability, growth and “economic impact” as the markers of success (Barry, 2011).

However, market deregulation was only part of a wider programme of neoliberalisation that increased private ownership of and consolidated control over the economy, including through its financialisation (e.g., of assets such as housing and the increase of financial products as a share of economic activity, such as loans and insurance products) and direct state transfers of public goods and services to private interests (e.g., including railways and the Royal Mail postal service in the UK). These reforms might be variously read as a purely economic project driven by Hayekian fetishisation of the free market or as a political project concerned to dismantle class compromises made under the post-war settlement and expansion of the welfare state, to reimpose and re-empower the dominant classes. Either way, they sought to further expand and incentivise privatised profiteering and wealth accumulation and generate high levels of orthodox measured (i.e., undifferentiated) GDP economic growth in the economy. Higher education has not been spared this fate either, which Schulze-Cleven et al. (2017, p. 800) note as having become increasingly dominated by financial mechanisms for generating income and shaping spending strategies since the late 1970s, including “universities’ borrowing and investment based on endowments, student loans and interest payments, and profits from commercial higher education.”

Despite the “commonsense” perception of exponential economic growth as intrinsically good for social prosperity and development, this is however shaped by an ideological perspective (a very successful one) rather than the empirical analysis of an objective “truth” (Barry, 2020a). Nonetheless, under neoliberal political economy arrangements—where governments’ spending on projects and policies not left solely to the whims and wants of “the market” (including on climate action) is in large part determined by the total amount of taxable revenue available from economic activity (i.e., GDP)—economic growth has become neoliberalism’s “only one true and fundamental social policy” (Foucault, 2008, p. 144). As such, it might be said that capitalist society has been overwhelmingly captured by the “tyranny of growth”, whereby all other social, economic and environmental concerns are subordinated to growth in ways that place stringent limits on the “what is possible” imaginaries of alternative social, environmental, political and economic futures (Barry, 2019, 2020b; McIlroy et al., 2022). For instance, under this capitalist imperative, climate action is constrained by the fact that any climate policy should not or cannot undermine continued economic growth as a perceived fundamental social “good”; hence the dominance of “green growth” and “ecological modernisation” strategies and ideas within mainstream state and business thinking and acting on climate policy (Barry, 2021). In this regard, it is not mere coincidence that powerful (over)developed states in the neoliberal Global North have proved incapable of tackling the planetary emergency but is instead principally due to the playing out of this contradictory attachment to unsustainable and exploitative indefinite economic expansion. Neither is it surprising that universities and the academy in general—as institutions that exist at the interface of civil society, the state and the economy, and which therefore play a key role in the reproduction of dominant ideology in neoliberal capitalist society—have been captured and restructured by this tyrannical and *ecocidal* ideology of growth.

3. Academia and the ideology of growth

Climate breakdown is predominantly framed in mainstream policy and political discourse, informed by academic scholarship, as a technical problem requiring technological solutions that enable (if not accelerate) further exponential (“green”) growth, rather than as the inevitable consequence of an inherently unsustainable economic system. This was enshrined in the 2015 Paris Agreement (widely perceived as the biggest success of international climate negotiations to date), which states that, “Accelerating, encouraging and enabling innovation is critical for an effective, long-term global response to climate change and promoting economic growth” (UNFCCC, 2015, p. 15). More than a mere sentiment, however, the priority given to growth over urgent and radical decarbonisation was written into the agreement’s proposed pathway for limiting global heating to $<2^{\circ}\text{C}$, which was predicated on the deployment of Negative Emissions Technologies (NETs)—tasked with removing previously emitted greenhouse gases from the atmosphere—that are both undeveloped and unproven (EASAC, 2018). This is not an isolated example. In fact, Keary (2016, p. 8) observed this trend across influential past modelling of climate scenarios from the Intergovernmental Panel on Climate Change (IPCC) as well, where “so much of the necessary emissions reduction is achieved painlessly through technological developments that what remains to be done can be accomplished without major changes in patterns of production and consumption.” Moreover, as Garcia Freitas and Jones (2021, p. 4) find regarding the prominence (and promise) of Carbon Capture and Storage (CCS) technologies in many climate scenarios, strategies and mitigation targets, which are supposed to “fix” carbon at the point of production to avoid it being emitted in the first place, “the current trend of CCS deployment worldwide has yet to reach the pace of development necessary for these scenarios to be realised”.

Not only is the prevalence of this “techno-optimism” a concern from a perspective on society’s actual material ability to decarbonise the (capitalist) economy as it currently is (Barry, 2017; Alexander and Rutherford, 2019; Marquardt and Nasiritoussi, 2022; Ribeiro and Soromenho-Marques, 2022), but it also feeds into the *ecocidal* “ideology of growth” through the implication that a “robust” economy with “strong” growth is needed to incentivise entrepreneurs to innovate, develop and produce these “saviour” technologies, so that economic “business as usual” may continue unabated and unharmed. Underpinning this is the supposition that capitalism—as an economic system that encourages innovation as a matter of necessity for enterprises to remain competitive and maintain or increase their share of the market—will deliver the solutions to the planetary crisis through the very mechanisms of growth that caused it. For instance, while the International Energy Agency’s strategic vision for *Net Zero by 2050* admits the “widespread use of technologies that are not on the market yet” (IEA, 2021, p. 15), their inclusion is justified so long as “major innovation” takes place throughout the current decade “in order to bring these new technologies to market in time” (IEA, 2021, p. 15). Meanwhile, the academy colludes in all this by both supporting this extremely risky strategy and not calling it out for the “mythic thinking” that it is.

Crucially, then, in the current absence of any feasible technological means through which capitalist economic growth can be decoupled from carbon emissions and the use of finite natural resources in absolute terms, the untrammelled pursuit of growth will remain the principal driver of climate breakdown and ecological collapse (Hickel and Kallis, 2019; Parrique et al., 2019). This is especially the case given the short timeframe remaining for taking necessarily radical actions that transcend the economic status quo. The IPCC articulated this in no uncertain terms, stating that, “Any further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a liveable and sustainable future for all” (IPCC, 2022, p. 33). However, while technology can undoubtedly play a central role both in mitigating climate breakdown in the immediate term and in a sustainable future generally (not least in the development, production and deployment of the renewable energy infrastructure needed to satisfy essential energy needs, such as spatial heating, cooking, electrified public transport, etc.), this demands transcending the unfounded and risky optimism that there is a technological solution to the planetary crisis to be found that leaves its political and political-economic causes unquestioned, uncontested and untouched. It means that, from a GPE perspective, planetary sustainability (and the social and ecological justice it implies) is inseparable from a post-growth (and post-capitalist) imperative that seeks to restructure politics and the political economy around norms, values and practises that prioritise climate stability, ecological integrity and social equality over economic growth, rather than subordinate them to it (Jackson, 2017, 2021; Raworth, 2017; Barry, 2019).

Considering this, we therefore need to ask why is there considerably less scholarship and support for scholarship that moves beyond “green growth” and “techno-optimism” to propose structural and systemic socio-economic transformations as opposed to modest and system-maintaining reforms and transitions? Given the scale of the challenge, failing to even ask these questions, never mind fund and platform the research and researchers to provide answers to them, amounts to little more than a dereliction of duty on existential issues of universal concern. Moreover, where those transformations imply nothing short of a fundamental restructuring of social, material-economic and socio-ecological relations, appealing to any sense of justice means ensuring that common interests (not least that of a safe and liveable future for all) are elevated over and above the privatised accumulation of wealth.

Installing this capability means that social and economic decisions regarding both short and longer-term trajectories should be democratised as much as possible, and that such democratising solutions must include popular ownership, control and scrutiny in and of the processes and institutions that shape those decisions. Given the authoritative position that academics occupy in public and political spheres, and the influence that university research, education and public engagement activities have over social outcomes, the institutions of academia cannot be overlooked with respect to these imperatives. However, such democratisation is not only generally unwelcomed and unavailable but structurally and actively disabled under the neoliberal status quo, and certainly of marginal interest at best within our universities. This is because, under the ideologically

driven processes of neoliberalisation outlined above, which have been overwhelmingly successful in vigorously implementing social, economic and environmental conditions favourable to accumulation and unsustainable consumption under the guise of growth-based material “prosperity”, common social, economic and environmental goods or assets have been largely placed either directly into private ownership and control or otherwise subjected to the same competitive capitalist logic of maximising productivity, efficiency, innovation, accumulation and growth. These include our universities, as well as our schools, factories, energy infrastructure, offices, homes, trains and buses, arable land, forests, lakes and so on.

All this amounts to intensive systemic and systematic processes of de-democratisation, where increasing levels of private ownership and control in the economy creates powerful monopolies and oligopolies, and where the more general subjugation of social and environmental assets to the capitalist economic growth imperative marginalises all other concerns and objectives. Again, and as will be explored in more detail below, higher education has not been spared in this respect. This is apparent in the degree to which headline reports on university performance are overwhelmingly equated with “economic impact”. For example, a 2022 report commissioned by Queen’s University Belfast (where both co-authors are currently based) boasted of its competitive performance in these terms:

Compared to Queen’s University Belfast’s total operational costs of approximately £373 million in 2020–21, the total impact of Queen’s University Belfast’s activities on the UK economy was estimated at £3.041 billion, which corresponds to a benefit to cost ratio of 8.2:1. This compares to an average benefit-to-cost ratio among Russell Group institutions of approximately 5.5:1 and corresponds to a 12% increase in Queen’s University Belfast’s impact of since 2015–16 (on a comparable basis, in real terms).

Cannings et al. (2022), p. iii

What these headline figures *do not* show is that this economic impact is predicated, in part at least, on the systematic exploitation of staff and the planet. It does not speak to the fact that academic staff at Queen’s have throughout this period been engaged in industrial dispute, alongside many other University and College Union (UCU) members based at other UK institutions, over low pay and poor working conditions, including unsustainable workloads and the proliferate use of precarious contracts. Moreover, despite making assurances to disinvest financial resources from the fossil fuel industry following a successful student-led campaign in 2017 (BBC, 2017), the university is yet to do so. And although its economic performance might be the envy of other institutions, a comparative report by the student campaigns group People & Planet ranked Queen’s at 94 out of 150 UK universities on sustainability criteria (People and Planet, 2022).

4. Democratisation as transformation

A full critique of the limitations of the institutions of liberal democracy in addressing these political economy issues is beyond

the scope of this article. However, it is nevertheless essential to make the point that, from a GPE perspective on power in society as inherently linked to the ownership and control of the means of production (i.e., who determines how and to what ends those means are used), the democratisation of social and environmental assets must be structural in focus. That generally means redistributing the material and institutional means of production in radically democratic ways that empower workers, citizens and consumers, and not simply voting for the party or candidate that advocates more socially or environmentally “friendly” management of the economy and the institutions that shape it. It means seeking to dismantle the imbalances of power over society, the more-than-human world and our collective future on an (un)liveable planet which emerge and are reproduced through capitalist ownership and the private consolidation of control of those assets.

This might be broadly conceived as an eco-socialist project, which at an institutional or organisational level implies that all stakeholders, including workers and the wider communities they impact or are sited in, should have more direct control of (or at very least voice and influence over) the ways in which their resources and capabilities are distributed, and in the pursuit of what values and ends they are utilised. This could mean the systemic proliferation of worker and democratic cooperative models of ownership, for example. However, for larger public institutions like universities, as well as local authorities, healthcare trusts, housing associations, etc., processes of democratisation may be more wide-ranging. As “anchor” institutions with key stakes and influence in (and beyond) a locality, which boast “significant levels of spend and numbers of jobs” and which are “extremely unlikely to leave [that place] due to market forces” (Jackson and McInroy, 2015, p. 5), the potentialities of their democratisation spreads across the many activities they engage in, resources they control (including supply chains) and partnerships they establish. Importantly, their social and material influence means that whatever imperatives those institutions are subjected to may make substantial contributions to the wider socialisation and reproduction of norms, values, practises and outputs.

Critically, where those imperatives are of a neoliberal capitalist character, those institutions can (and do) play a fundamental role in reproducing *unsustainability* and *multiple inequalities*, rather than their opposites (as per the example of Queen’s University Belfast given above). But this does not need to be the case. Transforming them to reorient their influence, resources and capabilities to the more democratic pursuit and (re)production of sustainability could instead place them at the centre of the struggle for a liveable future for all. This is especially true of universities, given their role as fundamental public (i.e., social, economic and political) institutions that play a significant part in shaping society through research and knowledge production (and the authoritative status that comes with it), as well as through education and training; employment; public engagement; policy development; technological, cultural and intellectual innovation and development; procurement; investment; and control of material assets, including buildings and land. Given the extent to which they have become captured by an operational logic that prioritises “economic impact” (i.e., growth and profit-making) at an institutional/managerial level, as well as the various norms

and practises associated with unsustainability that exist across research, education and public outreach and engagement activities, this means that if universities (and the academics, students and support staff that populate them) are to be activated as “agents of sustainability” capable of making interventions in the unsustainable status quo, then they must also undergo processes of radical transformation.

5. “Agents of unsustainability”

As knowledge producers and sites of education, universities have always played an integral role in the reproduction of class society, acting as an ideological apparatus for dominant or orthodox ideas and ideals, through “a condensation of practises and rituals that has to do with social reproduction” (Sotiris, 2012, p. 118). This they have done in different ways, for example from their early constitution in England as sites for socialising elites and preparing them for “high positions in the church, the law and government” (Rustin, 2016, p. 149) to the more expansive and inclusive reform of higher education and the relative “democratisation” of universities from the 1960s as part of the “post-war “welfare” or “class” settlements, in which an idea of enhanced opportunities and shared entitlements became part of the dominant ideology of common sense of the age” (Rustin, 2016, p. 150), thus “allowing access to social fractions which had hitherto been excluded” (Rustin, 2016, p. 151). As Rustin notes, however, “as the overall post war settlement began to unravel, the “democratic educatory” conception of education began to be marginalised, as the neoliberal regime imposed radical changes” (Rustin, 2016, p. 153). This backslide to inequality and the reimposition of dominant class interests through the marketisation of university education (where admission is predicated more on ability to pay than academic ability) has not been universal. Countries with more enduring social democratic political and political economy formations, such as Germany and Sweden, have more closely maintained the ideal of access to university education as a basic right (Rustin, 2016; Cattaneo et al., 2020). However, as Cattaneo et al. note, “Around the world, public undergraduate higher education is still provided free to “home” students in only a handful of countries, such as Argentina, Austria, Denmark, Finland, Norway, Qatar and the United Arab Emirates” (Cattaneo et al., 2020, p. 12).

It is perhaps unsurprising that the Anglo-American progenitors of neoliberalism’s individualised, competitive entrepreneurial and “small state” free market thinking, typified by Margaret Thatcher’s infamous “there is no alternative” to capitalism, have led the way in the marketisation and commodification of higher education. The stage was set in Britain by cuts to public spending implemented by Thatcher’s Conservative government in 1981, after which “the pattern was to squeeze more out of universities for less, reducing costs and increasing productivity” (Vernon, 2018, p. 272). This allowed successive governments to readjust caps on fees through an upwards trajectory, so that a year’s study at undergraduate level currently costs up to £9,250 in English institutions for UK citizens (and considerably more for international students). It consequently led to the evolution of what some have called “academic capitalism” (Barry, 2011; Jessop, 2018; Münch, 2020),

where universities have been forced into competition with each other to maximise income through the marketisation of education (which treats degree programmes as commodities delivered by academic “service providers” to student “customers”), as well as commercialisation of research and “the general trend in research funding which allocates fewer resources to fundamental research in favour of supporting and boosting research which has an industrial or economic application” (Barry, 2011, p. 17).

Ultimately, the ongoing and systemic pressure to secure funding and minimise costs means that universities are increasingly run as businesses rather than foundational social institutions that value and conduct research and education as fundamental goods in their own right. As such, the neoliberal university acts as a privatised body despite its status as a public institution (Cornelius-Bell and Bell, 2020). Moreover, though this hyper-marketised neoliberal model of higher education has not been universally implemented, it nevertheless sets a dangerous precedent. This incorporates immediate concerns over the accessibility of university education to all but should also alert us to the possibility of more systematic privatisation within the sector. That is, it should be of concern that it is not one’s academic ability, but one’s ability to pay, that determines who goes to university. Indeed, by excluding individuals who cannot afford to attend university, and therefore excluding potentially critical working-class perspectives which are otherwise underrepresented, academia functions as an active site for the reproduction of dominant class interests. This should be of particular concern in the context of the planetary emergency, given the increasing prevalence of research agendas around socio-technical solutions and debates on “just transition” which will have enduring impacts on future social relations. Crucially, then, in considering their role in the context of the planetary emergency, the extent to which universities have been, and are increasingly becoming, (re)constituted according to the productivity- and profit-maximising operational logic and ideological “commonsense” of neoliberal capitalism means that they act as *barriers* to sustainability, climate action and a just transition beyond carbon in significant ways (McGeown and Taylor, 2022; McGeown et al., 2022). Transcending these barriers therefore depends on identifying these processes of neoliberalisation and challenging them.

This is where GPE is instructive as a critical perspective. For instance, in recognising neoliberal capitalism’s economic growth imperative as the principal driver of the planetary crisis, we might identify the various (if not definitive) ways in which universities promote or otherwise conform to this “commonsense” (but to our minds ecocidal) imperative as actively reproducing unsustainability, and therefore frustrating efforts to take radical actions that are necessarily disruptive to the political and political-economic status quo. This manifests in a range of ways, including the uncritical teaching of neoclassical economics centred on the pursuit of growth as an “objective” fundamental good, the uncritical promotion of “entrepreneurship” within degree programmes, and the disproportionate levels of resources allocated to research projects which offer the potential of lucrative partnerships with private industry (or which otherwise raise the university’s “economic impact” profile and status) in the development of scientific research or technologies to be

applied, with little-to-no public oversight or accountability, to advancing capitalist economic “development”. It can take the form of more direct support for ecocidal interests, through institutional investment portfolios that fund fossil energy and other extractive industries on the basis of generating profitable financial returns or through careers departments that funnel graduate talent into employment in highly paid jobs in those industries. Moreover, throughout their period of study, students are encouraged to adopt individualist entrepreneurial mindsets and approaches to interpersonal competition by building their personal “brand” to “sell” to potential employers.

Meanwhile, methods of management have been imported from the private sector as part of the constant competitive pursuit of maximum productivity and profitability (Sotiris, 2012), whether through the exploitation of academic workers overburdened with unmanageable workloads or the drive to increase overall student numbers and internationalise universities as a means of attracting high fee-paying students from abroad. Importing this CEO mindset from the world of business—of the need for “managerial excellence” and the practise of financial incentivisation to attract “managerial talent” to senior positions—has similarly plagued universities with gross disparities in pay. For instance, while Vice-chancellors in English universities earned on average £269,000 in 2019/20 (Office for Students, 2021) the University and College Union (UCU) has, as noted above, been engaged in a nationwide industrial dispute resulting in strike action over real term pay cuts for academic staff, as well as over the gutting of pensions and the proliferation of precarious contracts in the sector.

All of this (and much more besides) has the effect of reproducing unsustainability and inaction on the planetary crisis in both direct and indirect ways. Though less apparent than the direct provisioning of interests actively engaged in ecocidal activities such as producing fossil energy, whether with financial investment, technological development or the supply of human resources, the indirect reproduction of unsustainability is no less pervasive or problematic. After all, while it could not be reasonably argued that universities teach materials or actively promote research that determinably undermines the sustainability agenda—indeed, it is from university departments that much of the science on the planetary emergency is developed, taught and communicated—they are nonetheless complicit in reproducing the very neoliberal “commonsense” that fetishises economic growth and valorises competitive individualism to the ultimate detriment of environmental concerns, which in turn reproduces economic entrepreneurialism as a celebrated characteristic of capitalist social relations. For instance, students compete for places in distinguished institutions and degree programmes that will make them more competitive in the graduate jobs market; academics compete for limited research funds, compete (and oftentimes pay) to publish “innovative” research in eminent journals and present at reputable conferences to build their personal “academic profile” in the pursuit of vanishingly few full-time or tenure-track positions. This may seem incidental from a perspective on planetary sustainability. However, breaking with the material seductions of neoliberalism (including its financial incentives), as well as the neoliberalisation of universities and academia in general, is, in the context of addressing issues of systemic unsustainability and inequality as

matters of *emancipation*, a necessary process “that speaks to the urgent need to struggle with and for aggrieved, oppressed, and exploited communities” (Osuna, 2017, p. 24) (not least with regards to the planetary crisis) and which “challenges the petit bourgeois intellectual and scholar to disinvest from their social positions” (Osuna, 2017, p. 24).

This speaks to the need to push back against the professionalisation of academic research in particular, which is especially important from a sustainability perspective on the need for much more critical research and heterodox thinking around the many and intersecting challenges faced by society, as opposed to prioritising research on the basis that it has lucrative commercial potential or will otherwise help attract funding from private sector partners. The same goes for education: universities that fail to prepare students for the realities of the planetary crisis, as well as the inevitable disruption to the economic status quo (whether by design or not), are simply failing to prepare them for the world within which they will live. As the trade union slogan goes, there will be “no jobs on a dead planet”. Certainly, there will be no jobs in a fossil fuel industry once halting the production of carbon-based energy ultimately becomes an inescapable reality in a climate-changed world.

This failure might be perceived in terms of the general neglect of a duty of responsibility for universities to disinvest from an unsustainable future and give students, staff and wider society the tools and knowledge for imagining and planning for more sustainable futures; the implications of which would be significant and widespread if they were to establish a normative and practical commitment to that duty. This could include changing the very way in which degree programmes are constructed, around processes of co-creation with students on the issues they care about, as well as a greater interdisciplinary focus that engages them with a wide range of issues and ideas, rather than the dominant siloed and top-down approaches that leave little room for critical reflection and exposure to alternative or challenging perspectives. For example, exposing STEM students to Humanities disciplines could better equip them for considering the social, political and cultural impacts or implications of the phenomena they study, and vice versa.

Moreover, with respect to their extensive influence on society and its shape and trajectory, which goes far beyond the individuals they educate and employ, we argue that extending this “duty of responsibility” to wider communities (up to a global level) would likewise have significant implications for how universities are constituted and managed, as well as for the various research, education and outreach and engagement activities they engage in. This means asking how, as public institutions, do universities (best) serve their publics? If in their current form they are complicit in the reproduction of unsustainability in various ways, and so undermine any sense of obligation to the long-term interests of their students, staff and the wider community by continuing to operate as such, what then are the transformations they must undergo to be active reproducers and facilitators of sustainability instead? If universities are at the forefront of the production of knowledge on the planetary crisis, we argue they cannot legitimately expect to continue engaging in and profiting from practises, norms and activities that undermine efforts to tackle it.

6. Horizons of transformation

What this analysis suggests is that to realise and then maximise the potential role that universities, academics and students could play as “agents of sustainability” in the context of the planetary crisis is not simply a case of changing syllabuses or conducting the “right” research (necessary as these are). Instead, they must themselves first or simultaneously undergo radical transformations to break the hegemonic hold that the ecocidal imperatives of neoliberal capitalism and its socioeconomic “commonsense” and encompassing “ideology of growth” have over them. They must be reconstituted, repurposed and redirected to provide space and support for agitators and disruptors and not only the reproducers of the status quo. Ultimately, this will necessitate fundamental changes to reorient the norms they subscribe to, practises they engage in and imperatives they pursue, towards a radically different vision of the university and its duty of responsibility to current and future societies.

As was implied above, and as we argue below, the nature of these transformations must be such that they accommodate democratically determined common interests, to ensure that universities answer to the needs of students, staff and the wider communities they are sited in and (nominally) serve, rather than to “the capitalist economy” and the relative minority within it that enjoy the benefits of ownership, control and wealth accumulation. With respect to the planetary crisis and the radical action it demands, this must in the first instance mean listening to and being guided by the very scientific knowledge they themselves produce. In the following subsections, we identify three horizons of struggle where these democratic transformations can and should take place. These we perceive as broadly aligning to universities’ means of production, incorporating (1) *Research*, (2) *Education* and (3) *Outreach and engagement*.

Before moving on, however, it must be noted that as valid (and indeed necessary) as these struggles are from a GPE perspective, such processes of democratisation will be neither straightforward nor easily won. Given their subjection to decades of neoliberal policy (as well as the institutionalisation of its “commonsense” operational logic and “ideology of growth”) and given their conservative institutional culture generally (including the professionalised pro-status quo incentive structure academics face in terms of research funding, status and progression and promotion), fierce resistance to such transformations of universities can be expected—and should therefore be anticipated. Indeed, institutional and sectoral resistance to the comparatively meagre demands being made by the UCU in its ongoing fight for higher pay, better working conditions and the restoration of pensions in UK universities can be taken as indicative of the scale of the challenge this represents. This is not to mention inevitable external pressures from vested interests, whether from politicians, economic elites or the establishment media, for example. However, as with the broader struggle for transformative action on the planetary crisis, the scale of the challenge does not negate its necessity.

Like the current state of radical climate activism, we therefore anticipate that any movement mobilised around these struggles will initially be populated by individuals or small groups of academics

and students willing to counter the structural incentives and institutional cultures of universities (and wider society) in seeking such transformative and innovative changes (even where it may undermine their own status or progression within them). In fact, this is already happening, with the increased mobilisation of groups such as Scientist Rebellion, Faculty for a Future and the student-led End Fossil—as well as the emergence of a critical body of academic work such as this Research Topic represents—leading the way in contesting, reimagining and attempting to reshape the role and responsibility that universities, academics and students should take in the planetary crisis.

These mobilisations provide a crucial foundation to build on. However, in looking forward, we argue that a GPE perspective on the changes required can help these movements organise around a more comprehensive (if radical) strategy and set of aspirations that could have transformative consequences both within and beyond academia. It is worth noting that radicalism is certainly not alien to or without precedent on university campuses, which were key sites of radical (if not revolutionary) movement building and activism during, for example, the US Antiwar movement and civil rights struggle of the 1960s and 70s (Fendrich, 2003). Moreover, in much the same way that universities might be said to have a “duty of responsibility” to society, we argue that to build on these existing movements means acknowledging academics as having a similar duty (especially those in more senior and secure positions)—as knowledge workers within those institutions who are closest to and active within their means of production—to engage in or otherwise proactively support these disruptive struggles. We perceive taking this labour-centric perspective on (activating) the potential for collective agency and action within the academic workforce as a different, but related and complimentary, dynamic and imperative of academic activism on the planetary crisis to what others identify as the authoritative benefits of “both a trusted position within society and a platform for sharing their views, both of which can be seen to confer even greater responsibility to act in accordance with their knowledge” (Gardner et al., 2021, p. 2).

6.1. Research

As the principal means of discovery, elucidation, interpretation, synthesis or innovation through which knowledge is produced, research is fundamental to academia and its authoritative role in contributing to the shaping of social norms, values, trajectories and practises. It therefore matters a great deal what and how research is designed, funded and conducted (or not). And while not all universities engage in research activities equally (some institutions are much more “research intensive” than others), it is nonetheless fundamental to “academic capitalism” and the neoliberalisation of universities in the value(s) ascribed to it. For instance, given that potential private funders or industry interest groups with the deepest pockets may also have a vested interest in maintaining the political-economic status quo they have benefitted from in generating that wealth in the first place, forging partnerships with researchers, research institutes and universities represents a significant opportunity to influence what kind of research is conducted, if not shape its findings, recommendations or societal

implications. In turn, accessing new or maintaining existing sources of private funding will be attractive to universities concerned to maximise their income and “economic impact”. But when the source of funding is public, we find “system maintaining” rather than disruptive research as prioritised and incentivised (as a brief examining of UKRI calls and funded research illustrates in terms of the sheer amount of funding for research that supports “economic growth” and allied outcomes such as “green growth”, “local growth”, “sustainable growth” and “levelling up”).

Where this indeed influences what research is conducted, its effect is to de-democratise research, which may be chosen according to commercial viability for funders and/or financial value for universities and researchers, rather than on intellectual merit and wider “public interest” considerations. As an issue of concern for academia generally, and academic or student activism specifically, this itself has recent historical precedent in how the tobacco industry manipulated research to protect its interests in the face of mounting criticism from a public health perspective. In an analysis of this manipulation, Bero (2005) identified a series of strategies that were used by the tobacco industry, as including funding and publishing research that supported its position and interests, suppressing and criticising research that did not and disseminating favourable data or interpretations to the lay press and policy makers. Thacker (2022) has identified parallels in how the fossil fuel industry has sought to protect its interests, including financing elite American universities and funding CCS research in particular as a system-maintaining technological “fix” to the problem of emissions from burning fossil resources.

A movement has already begun to take shape around these concerns as they relate to the climate crisis specifically. Fossil Free Research, which emerged as a campaigning coalition in the United States “including student and academic activists from Harvard, George Washington, Cambridge, Oxford, Brown Universities, and more” (Fossil Free Research, n.d.a) has been coordinating efforts “to dismantle Big Oil’s toxic influence on the research process across institutions and borders” (Fossil Free Research, n.d.a) by exerting public pressure on “all U.K. and U.S. universities to institute a ban on accepting fossil fuel industry funding for climate change, environmental, and energy policy research” (Fossil Free Research, n.d.b). There have already been successes, with Princeton committing in September 2022 to rejecting “gifts and grants from 90 companies involved in the coal and tar sands sectors of the fossil fuel industry, including current research funders ExxonMobil, Syncrude, and Total E&P” along with a wider commitment to disinvest \$1.7 billion from fossil fuels (Gilchrist and Kaufman, 2022). This represents an important win and milestone for the Fossil Free Research movement, given that Princeton had received \$26 million in research funding from fossil fuel companies in the previous 5 years (Gilchrist and Kaufman, 2022).

This manipulation should be recognised as part of a wider strategy in which fossil capital has fought to ensure its hegemony in the global economy and energy sector, by downplaying the severity of climate breakdown while shifting responsibility for emissions onto individual consumers and away from the industry that has a financial stake in sustaining the carbon energy system (Supran and Oreskes, 2021). However, as outright climate denial

becomes less persuasive, with increasing sequences of extreme weather events around the world being linked more authoritatively to climate breakdown (Clarke et al., 2022), Sekera and Goodwin (2021) find that the industry is changing tack by instead presenting itself as the source of solutions. This it can do through research partnerships; for instance, by funding CCS research, the fossil fuel industry is shaping a techno-optimistic narrative that not only leaves the political-economic status quo unchallenged (i.e., if indefinite fossil fuelled economic growth can be made possible with CCS technologies, then Big Oil and Gas can maintain its monopolistic grip over the energy means of production) but also gives the appearance that fossil capitalists are invested in a low-carbon future, by literally investing in the (as yet unproven at scale) technologies that will “save” us (Sekera and Goodwin, 2021; Thacker, 2022)—or rather “save” the capitalist status quo.

Removing the ability of companies, lobby organisations or individuals with vested interests in sustaining ecocidal industries (e.g., whether in the production of fossil fuels or other extractive practises that despoil natural environments and degrade their ecological integrity, such as industrial mining) to influence research activities in universities should be an obvious first step to (re)democratising research. However, it should not or cannot be the last. It is one thing to exclude powerful vested interests from processes that help shape our collective social, political, economic, technological and planetary futures, but another to welcome and integrate those that have been historically excluded from them. We argue that this is important not only to counter the role that (fossil) capital has played in de-democratising research (especially under the neoliberalisation of higher education) but also because of the inevitable disruption that climate breakdown and responses and adaptations to it will cause across society, as new notions of the “good life” that break with the “commonsense” individualised and growth-based consumerism of neoliberal capitalism become necessary. If universities are to play any role in a “just transformation” beyond the ecocidal “ideology of growth” and the carbon energy it depends on, they must therefore be prepared to shape research imperatives and methodologies around the needs of the communities and individuals who are, or stand to be, most impacted by it. This is what the campaign organisation Faculty for a Future frame as the need for “co-developing disruptive solutions” between academics, affected community representatives and practitioners (Faculty for a Future, n.d.).

As Bell and Pahl put it, forging co-productive relationships with affected communities is a way of “bringing air into the closed system” of academia in ways that “empower “communities” to collectively construct new lifeworlds” (Bell and Pahl, 2018, p. 108). It is on this basis that co-produced research “understands that useful and critical knowledge is dispersed throughout society and seeks to activate, expand and apply this knowledge” (Bell and Pahl, 2018, p. 107) to effect transformation at different scales and in various places, where its “methods can empower co-producers to shape the world in which they live” (Bell and Pahl, 2018, p. 107). This is especially important from an emancipatory perspective on the need to respond to the planetary crisis in ways that promote, generate and secure greater levels of equality. However, as Bell and Pahl caution, neoliberalism has through the marketisation of universities and commodification of academic knowledge already

opened their closed systems in ways that undermine the radical and democratising potentialities of co-production. In other words, it matters to whom, what and around what interests and aims those systems are opened. As discussed above, giving powerful vested interests a foothold in academia only serves to further de-democratise it. As a truly democratising force, it must instead be opened to voices, identities and interests that have been otherwise marginalised (e.g., because the knowledge they hold or value is from a research perspective of little “economic impact”).

In this sense, democratising research must therefore also mean rethinking the role and responsibility of the researcher: What research is being designed, why and by whom? In whose interest is it being conducted? What need does it address, if any? Who will or might the research process or findings impact? Centring these questions as research directives, and not simply as ethics form checkboxes when direct engagement of research subjects or participants is proposed, could reshape the research process and landscape generally. After all, determining those needs and interests as part of a “duty of responsibility” implies much greater, if not systemic, involvement of non-academic communities, for example in “participatory” and “action research” methodologies that seek to instate “purpose” over “professionalism” or “commercialism” in research. As Osuna notes, “Interventions from radical scholarship that identify the root causes and structural conditions of exploitation and oppression and that prioritise the interests of aggrieved communities are vital, and will occur only if scholars and intellectuals are in conversation with these communities” (Osuna, 2017, p. 22).

In relation to research, academics have much to learn from other workers’ democratic experiences and experiments, such as the 1976 “Lucas Plan”; a trade union initiative in the UK located within the Lucas Aerospace firm that asked and empowered workers to explore how the existing means of production could be repurposed and designed to create “socially useful” products. In January 1976, workers published their Alternative Corporate Plan for the future of the company, in response to announcements that thousands of jobs were to be cut in the face of restructuring, globalisation and technological change. Instead of redundancy, the workers argued their right to socially useful production (Smith, 2014). As a result of this initiative, the Lucas Trades Union Combine proposed approximately 150 products, including “proposals for the development of heat pumps, solar cell technology, wind turbines and fuel cell technology”. As such, the Lucas Plan stands as an unprecedented and inspiring intervention in the politics of climate change and a “just transition” to a green and sustainable future (Ridley, 2018), as well as highlighting the sustainable and life-enhancing possibilities from democratically produced socially useful technological innovation (Cooley, 2017). As Ridley (2018) notes, academics and other workers in higher education have much to learn from the democratic way the Lucas Plan was developed, and how workers can, when given the opportunity and collective support, reimagine workplaces and what and how they produce, not least in engaging with local communities as to the types of knowledge and activities they think the university should be delivering. Such democratic workplace proposals hold much promise in enabling universities to become part of the solution as opposed to part of the problem in reproducing “actually existing

unsustainability” via reorienting themselves towards “socially useful production”.

6.2. Education

Unsurprisingly, there are similar concerns with education in universities as a major force for the reproduction of unsustainability, and therefore similar ways through which it might be countered, reshaped and reoriented. From a GPE perspective, this begins with the need to critique the content of modules and degree programmes generally (e.g., do they at least provide opportunities for thinking about the economy and the “good life” in heterodox ways or do they offer no alternative to capitalism?). Besides the examples given above, such as encouraging greater levels of critical thinking and interdisciplinarity across all degree pathways, we argue that engaging students with some form of compulsory *critical* content on the climate and ecological emergency should be considered a bare minimum with respect to universities’ responsibility to both prepare students for life after higher education and also expose them to the full range of explanations and knowledge bases in relation to the causes, consequences and solutions to the planetary crisis. This would mean including but going way beyond “carbon literacy” courses for all students.

Again, there are already examples of this that movements for the transformation of universities and academia could build upon. As of the 2024 academic year, all 14,000 undergraduate and postgraduate students at the University of Barcelona will have to take a mandatory module on the climate crisis (Burgen, 2022). Thought to be the first of its kind, this commitment was won as a key demand of the international youth-led group End Fossil, who staged a multi-day occupation at the university (Burgen, 2022). This is significant on two levels. *First*, it demonstrates the potential for change when students organise in radical ways with support from staff members, which should act as a motivating factor for the numerous other End Fossil movement-building efforts and occupations happening on university campuses across Europe (End Fossil, n.d.) as well as inspire other campuses into action. It implies that building this power to determine their education will only come when students reject the passive role assigned to them as “customers” by the neoliberal university and actively mobilise for change. *Second*, much like ending research funding partnerships with the fossil fuel industry, making a commitment to educate all students (regardless of discipline) on the climate crisis represents a progressive step towards sustainability by working to introduce new or alternative ideas and issues, and therefore potentially counteract the reproduction of neoliberal “commonsense” as it relates to the planetary crisis.

However, as with the issue of research funding, these counterhegemonic potentialities can only be realised if accompanied with more structural democratising transformations that actually empower students in determining the education they receive. Indeed, we could reasonably speculate that doing so could be consequential from a sustainability perspective, given that the prevalence of youth activists in the climate movement (such as the many around the world who participated in global school strikes)

indicates that current and incoming students care deeply about the climate and ecological crisis (Hymer and Knights, 2022). Yet, while implementing mandatory education on the climate crisis is progressive in the sense that it better reflects its all-encompassing severity, if it is not suitably critical of and divorced from neoliberal “commonsense” perspectives that espouse unfounded techno-optimism or individualise the responsibility of action (i.e., as a matter of consumers choosing “green”, “ethical”, “eco” or “sustainable” options, rather than transcending the inherently unsustainable capitalist mode of production), then it risks becoming yet another platform for reproducing unsustainability and rendering invisible the substantive and structural underlying issues of political economy and unlimited growth that drive climate-destabilising levels of emissions in the first place.

In this sense, empowering students with some level of agency and control over the education they receive therefore necessitates deconstructing the hierarchy of expertise, which again assigns students a passive role as the “receivers” of expert wisdom (Cornelius-Bell and Bell, 2020). In action, this hierarchy amounts to what Paolo Freire calls the “banking” concept of education, in which “knowledge is a gift bestowed by those who consider themselves knowledgeable upon those whom they consider to know nothing” (Freire, 2017, p. 45). This model for disseminating knowledge not only impedes the development of students’ critical capabilities but should also be recognised as contradictory to the cyclical processes of enquiry through which that knowledge is produced, tested, contested and further developed in light of new evidence or insights. Critically, it is in diminishing the capacity for and opportunities to debate, challenge and generally enter dialogue about a subject or issue that certain forms of knowledge can become reified and (re)produced as “objective” truths and “commonsense”. Conversely, as Freire notes, realising and maximising the emancipatory potential of education depends on entering critical dialogue *with* the oppressed (Freire, 2017). This has universal application for the many intersections of injustice experienced under capitalism. But it has specific relevance to how students and academics engage with issues relating to the climate and ecological crisis and its implications for younger and future generations’ capacities to survive and thrive under conditions that, one way or other, will look very different to those of today.

All this implies subjecting education in universities to the same co-production ideals necessary for mobilising academic research as an emancipatory force for underrepresented, exploited, oppressed or otherwise marginalised communities. It necessitates educators forging co-productive relations with students to build models of education or processes of learning capable of reflecting on and responding to students’ interests and the challenges they are faced with, as well as those of the wider community. It would by necessity form the basis of more democratic (and we would add “problem-based” and interdisciplinary) approaches to learning, which at its most foundational requires understanding the contexts from which relevant needs, interests and capabilities emerge. For instance, it would require asking what the challenges are that students face or foresee within (and beyond) the parameters of the issues, problems or subjects they are concerned with, and what expertise is available (or not) within the institution to help them engage with those challenges in comprehensively critical, innovative, creative, ethical and practical ways.

While this all paints a very different role for university educators than is currently the norm, it is important to note that we do not wish to burden them with the full onus of responsibility in this regard, which clearly goes beyond the current contractual obligations of an already overburdened workforce. However, given that institutional resistance to any substantive reform to how education is approached can be expected where it threatens to undermine the efficiency and profitability of the neoliberal “degree factory” model, it follows that disrupting it will again require protagonist *disruptors*. The only way this can be achieved is if both the educator and student parties are invested in such transformations as to mount pressure on their institutions to force change. In this sense, they might forge relations for change that prefigure the kinds of co-productive relations required, for example to identify where those changes in the university must be made and how they could or should be implemented. Building such movements could take any number of forms. It could involve occupations of university buildings to build the profile of the demands being made and attract public pressure to the institution to better serve the needs of students and their communities, such as the End Fossil student groups in Barcelona and elsewhere have been engaged in. It might include students organising to collectively withhold fees in protest that they are not receiving the education they need to equip them to face the challenges of the future (not least those of climate breakdown and ecological collapse). In the prefigurative sense, it could involve collaborating to actively construct new educatory processes, working with sympathetic academics and educators to forge these relations and processes *despite* institutional norms of top-down “service provision”. Ultimately, it necessitates building movements for change that incorporate both faculty and student bodies.

6.3. Outreach and engagement

Given the central role that universities play in shaping society through the various academic and education activities they engage in, their real and potential impact on wider non-academic and non-student communities must be considered in any application of a revised “duty of responsibility” as publicly funded institutions, and therefore part of their “public good” mission. As discussed above, this means opening universities to a plurality of public interests, concerns and accountability in a process of democratisation that counters the disproportionate influence that the capitalist economy and its vested “agents of unsustainability” currently enjoy. This in turn means rethinking the role of universities and academics as “outward facing” public rather than only or mainly self-interested professional(ised) institutions and knowledge workers. From a perspective on the planetary emergency, this must begin with engaging the wider public on the severe reality of the climate and ecological crisis and the necessarily disruptive transformations required to tackle it, which will ultimately pervade almost all aspects of life, whether in work, study, relationships, health, wellbeing, material aspirations and so on.

The conservative culture of professionalised academia and the profit-seeking character of the neoliberal university means that fully engaging with these imperatives under the status quo

could threaten the profitability and “economic impact” model of success they are overwhelmingly captured by. As an anecdotal example, this might be seen as reflected in the co-authors’ current institution’s reluctance to follow others in taking the admittedly symbolic step of declaring a climate and ecological emergency (Latter and Capstick, 2021), not to mention the lack of action on it. While there are examples of institutions taking this duty of responsibility more seriously, this is nevertheless representative of a failure that is endemic to the higher education sector. In this respect, where suitable institutional mechanisms are not in place, it again falls to the relatively small number of academics willing to “go beyond” their contractual obligations (or indeed “step out of line”) to communicate the realities of the planetary crisis and its social, economic, political and cultural implications. On this, we agree with Racimo et al. (2022, p. 6), that in the context of our planetary emergency, “outreach must go beyond conventional ways of making scientific knowledge available to the public” so that “scientists [and academics] must actively participate in movements that are openly engaging with the emergency, via effective forms of direct action that can garner media attention”. By way of example, the academic-activist group Scientist Rebellion has mobilised around just these imperatives. In its open letter, the group states,

We are scientists and academics who believe we should expose the reality and severity of the climate and ecological emergency by engaging in non-violent civil disobedience. Unless those best placed to understand behave as if this is an emergency, we cannot expect the public to do so. Some believe that appearing “alarmist” is detrimental—but we are terrified by what we see, and believe it is both vital and right to express our fears openly.

Scientist Rebellion (n.d.)

As with the End Fossil student occupation discussed above, and the wider use of civil disobedience by groups such as Extinction Rebellion, Just Stop Oil and Insulate Britain in the broader climate movement, this can be seen as drawing from an understanding of the deliberative communicative function of civil disobedience as a contestatory form of dissent that serves to highlight ongoing injustice (and unsustainability) (Brownlee, 2007; Atilgan, 2020). For Scientist Rebellion activists frustrated by the lack of action on the knowledge of the planetary crisis that they have been instrumental in producing, their actions have thus far included risking arrest by blocking roads during COP26 in Glasgow (Thompson, 2021) and chaining themselves to the doors of fossil fuel funders JP Morgan Chase (Kalmus, 2022). The group have also targeted specific institutions, including universities and the scientific journal *Nature*, by pasting copies of IPCC reports and climate-related articles to administrative buildings, as well as staging occupations, to highlight their continued inaction on the planetary crisis.

However, in the same way that a Freirean conception of the dialogic aspect of emancipatory pedagogy requires reflexive processes that integrate the knowledge, expertise and concerns of oppressed individuals and communities, we argue that democratising public outreach and engagement means creating spaces for non-hierarchical deliberation as a form of collective

learning. Examples of this include public, free and open lectures and other opportunities for citizens to learn more about the planetary crisis and its solutions, as well as having the opportunity to both ask questions but also ideally co-determine the topics of such extramural learning opportunities. As an example, we offer the 2022–23 “What is to be done?: Responding to Our Multiple Crises” weekly public lecture series within the co-authors’ current institution, but note that this is “extra” to the normal duties of the academics and students involved in coordinating and managing it. As yet, there are few examples of such public engagement being part of the “Work Allocation Model” of a member of staff.

7. Conclusion

The examples given here are meant to be indicative rather than definitive. They show that there is already work happening in these areas that can be built upon. Moreover, in doing so we argue for taking a GPE perspective which is capable of connecting these movements and issues in a comprehensive analysis of the role that universities currently play in reproducing unsustainability but also recognising their capabilities for doing the opposite.

Questions that both motivated this paper and to which we hope to have provided some indicative but incomplete answers include the following: If we are in a planetary crisis (as all available scientific evidence suggests), why do we not witness academia and academics acting as if it is a crisis? How do we explain and understand how and why we, as academics and academic institutions, continue with a more or less “business as usual” approach? What would academic work across teaching, research, outreach and engagement look like if our profession was to rise to the challenge and opportunity of addressing the planetary and related socio-economic and socio-ecological crises we face? Is badging university research with one of the 17 Sustainable Development Goals and a university corporate “sustainability plan” the best we can do? Such questions should help answer perhaps the biggest and most complex one that faces not just universities and university workers but all sectors of society: namely, “what it to be done?”

This article has offered some reflections on how academia should transform itself, indeed remake and reimagine itself in the context of the planetary crisis and the intersections of the climate and biodiversity emergency, with growing inequality and injustice within and between societies. However, we view this as a preliminary analysis in an emergent area of study and research requiring much greater and urgent input and development. Due to its encompassing nature, both in terms of the planetary emergency and of the role of academia in its entirety in addressing it, this future work should be interdisciplinary in focus. Indeed, it should be taken as an opportunity to prefigure the kinds of norms and

practices required of academia in responding to the planetary crisis. To this end, we offer some further questions that might guide future investigations: What is our responsibility as trusted sources of knowledge production and dissemination? Do concerned and engaged academics have a “theory of change”? Should universities become more activist oriented and more engaged in informing the public about the causes, consequences and solutions to our worsening predicament, as groups like Scientist Rebellion and Faculty for Future suggest? And if so, how? How do we transform academia starting from the difficult assessment that, as currently constituted, universities play a key role in the reproduction of unsustainability?

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

CM and JB contributed equally to the conceptual development, planning, and writing of this article.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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"Beyond being analysts of doom": scientists on the frontlines of climate action

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What happens when scientists become activists? In this paper, we discuss the principles, commitments and experiences of Scientist Rebellion (SR), a movement of scientists, academics, and researchers committed to activism, advocacy and non-violent civil disobedience against the (in)actions of governments, corporations and other institutions, including academic ones. In sharing experiences from the frontlines of direct actions with SR along with the perspectives from individual scientists, coming from a variety of geographical locations, and a range of academic levels and disciplines, we reflect on the need to transgress the boundaries of a system of knowledge production and education that is effectively reproducing the very structures that have led us into climate and ecological crises. This article provides a reflective and critical engagement with Scientist Rebellion, drawing on a range of interviews with activists, as well as material from and about Scientist Rebellion. We conclude with a reflection on the relation between scientists and their institutions, as well as a mobilizing plea to the scientific community to take action.

KEYWORDS

activism, advocacy, transformative change, civil disobedience, climate change, ecological crisis

Introduction

Scientist Rebellion (SR) is a movement of scientists, academics, and researchers committed to activism and advocacy, spanning from non-disruptive forms of activism all the way to non-violent civil disobedience. SR is one of the many grassroots organizations that developed as a response to the global inactivity of governments despite our scientific understanding of the severity of the climate and ecological crises. While the world's governments are well-aware of the issues, measures to halt practices contributing to climate change and biodiversity loss have been inadequate. Political institutions are still entangled in endless debates around the topic. Rather than focusing on strategies to prevent or mitigate the ongoing and impending changes to our climate, political actors more often than not prioritize economic interests. This politicization has largely led to gridlock, with hard-to-pass legislation, while business as usual continues to push us beyond our planetary boundaries (Rockström et al., 2009; Steffen et al., 2018; Persson et al., 2022).

The crisis has led scientists to take up a more frontline role in making the public and governments aware of how inaction could lead to a “ghastly future” (Bradshaw et al., 2021) for our planet and human societies. Scientists across disciplines have joined forces in this endeavor, using a combined collective understanding of social behaviors, ecological principles, health impacts, and even economic solutions to make the public aware while also remaining inclusive to all (Gardner et al., 2021; Capstick et al., 2022).

In this Perspective article for the *Activating Academia for an Era of Colliding Crises* collection, we provide views from the frontline of transformative change among scientists, through interview material as well as documentation of past actions and activities from all around the world. SR has held multiple non-violent actions across the globe. Many actions taken by scientists are largely intended to raise awareness among the public, as targeted disruptions against a specific field, or to give a largely underrepresented group means to amplify their message. SR and its members use practices championed by other movements and improve upon them in order to get government entities to take concrete, decisive and radical action against the effects of climate change and ecological destruction.

Academic activism and direct action—Structures, principles, practices

Scientist Rebellion follows the framework, principles and values of Extinction Rebellion.¹ First and foremost, SR enables action. SR principles include the right to (non-violent) action and horizontal organization. The “right to act” enables action by encouraging any form of non-violent protest aimed at making the public aware of political inaction against climate failure. SR actions support the demands and the methods of other grassroots non-violent climate movements (*Last Generation*, *Debt For Climate*, *Extinction Rebellion*, and *Fridays For Future* among them); numerous collaborations with such groups are currently active. It is important to underline that SR does not see its role as a vanguard in this collective push for change; rather SR acts as an organic part of the rich landscape of climate activism.

The term horizontal organization refers to the global group operating in a self-organized manner, with no hierarchy or leadership. Although members are predominantly academics, researchers and scientists with academic titles, SR does not emulate academic hierarchies. SR members assemble in different formations to discuss and plan different activities, spanning from public petitions,² teach-ins (Videnskab, 2021), strikes (Under Dusken, 2022) to direct, non-violent civil disobedience (Thompson, 2021). Importantly, there are no predefined ways of performing these: all activities stem from the ideas and interests of the people organizing them.

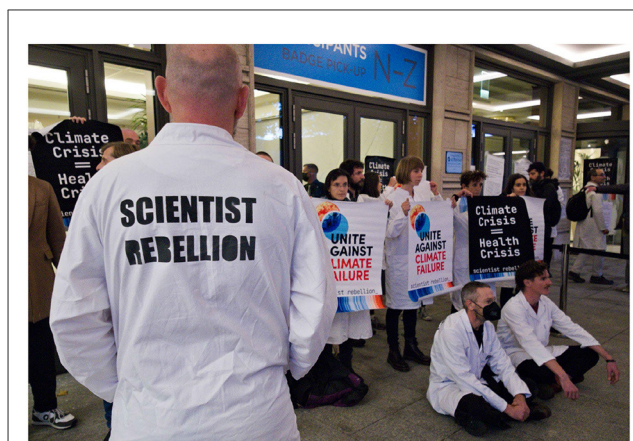


FIGURE 1
Scientist Rebellion activists disrupting the World Health Summit in Berlin, Germany, 16 October 2022.

SR began its activity in September 2020, when two activists targeted the UK’s Royal Society with a paint-throwing and paper-pasting action (the activists have recently gone to trial and have been acquitted [see e.g., (Pressenza, 2023)]). Through other actions the group has quickly grown, and less than a year later, over 100 scientists from 15 countries joined the first global action with educational disobedience projects, paper pasting and hunger strikes.³

In summer 2021 SR leaked the IPCC WG3 report (Hartz, 2022).⁴ The watering down of the report by policymakers before the final publication led to the second global rebellion in April 2022 (El Salto, 2022; Euronews, 2022; Scientific American, 2022). The series of global actions from November 2021 (linked to COP26), April 2022 and October 2022 represent the largest mass arrest of scientists in recent history (Thompson, 2021; Democracy Now!, 2022; DW, 2022; El Tiempo, 2022; Infobae, 2022; The Guardian, 2022; see Figure 1 for an image from a SR action). Currently, SR has active members in around 30 countries.

Perspectives and reflections

What happens when scientists step out of the lane of conventions, norms, and institutional expectations and pressures, to join a growing number of researchers, scientists, academics and citizens in direct action?

For this article, we conducted a number of exploratory, semi-structured interviews with activists in Scientist Rebellion. Our sampling was necessarily small ($n = 8$), given the scope of this piece, but purposive in covering scientists in different countries (e.g., Italy, Germany, Uganda, Sweden, Tanzania), different roles (high-risk/frontline, back office), different levels of academic seniority (full professor, post-doc, doctoral student) and different positioning

¹ Extinction Rebellion Principles. Available online at: <https://rebellion.global/about-us/> (accessed April 6, 2022).

² Scientist Rebellion Positions and Demands. Available online at: <https://scientistrebellion.com/our-positions-and-demands/>.

³ Scientist Rebellion Past Actions. Available online at: <https://scientistrebellion.com/past-actions/>.

⁴ Scientist Rebellion IPCC Report Leak. Available online at: <https://scientistrebellion.com/we-leaked-the-upcoming-ipcc-report/>.

(e.g., full-time university employee, full-time activist). The list of respondents, as well as the questions, are available upon request. The interviews were transcribed and then processed with an open thematic coding approach. To protect respondents' privacy, their names have been changed to common names in their respective contexts. In addition, we included reflections from the group of authors, all activists themselves. We recognize the possible bias this positioning might bring, but insist on the value added of demystifying academic activism by sharing these perspectives.

These interviews shed light on the concrete, embodied practices, experiences, and contradictions of academic activism, giving voice to people who have engaged in them. While these are of course idiosyncratic for each respondent, a range of core themes emerged throughout the interviews. In the following, we cluster these along the broader lines of *becoming*, *belonging*, and *boundaries*; that is motivation and pathway to becoming part of SR, reflections on roles and practices in it, as well as external/internal boundaries and contradictions of academic activism highlighted in the interviews.

Becoming academic activists

Many scientists have expressed a shared sense of urgency as one of the initial motivations to join SR. As Marco puts it, "I was desperate to find something in which I could contribute". While the drivers and barriers to academic activism are multi-layered, a deep-seated frustration with the roles of scientists in the climate and ecological emergency propels individuals to action. Hannah explains: "I was seeing all these other academics saying, yes, they are supporting Fridays for Future and they will provide data and analysis and, you know, science communication as usual. [...] But I don't want to be just a data analyst of the Doom". Marie shares a similar feeling: "I published papers on sustainability in the health care sector and on record with health, but I think the awareness of the public is higher since I did some civil disobedience actions". While several respondents had been participating in or at least been in contact with Extinction Rebellion before, there are also people who have never been active in any social movement prior to SR. Often, establishing contact with others in SR has come about through actions or personal connections. Overall, there is still a certain threshold of reaching out to activists, even just to get more information. To facilitate contact, Scientist Rebellion is holding online induction meetings and personal meetings for interested people in some contexts. For several respondents, from the moment they joined meetings, that first action opened up an important process of going beyond the "isolation," "frustration," and "despair" many had increasingly felt in their respective academic environment. Engaging with the predominantly horizontal practices and dynamics of an activist group that connects across disciplines, countries and academic hierarchies can initially be a confounding or even challenging experience, in particular as scientists are increasingly socialized and disciplined into atomized, competitive social and academic practices. Importantly, the term "activist" here is one of self-identification, rather than external recognition or stigmatization. For Scientist Rebellion, the question of how academic subjectivity is constituted is also predominantly resolved on the basis of self-identification, although for some

actions or initiatives there is a deliberate mobilization of "professional" academics.

Belonging and participating

Academic activism unfolds on a spectrum of roles, practices and commitments. Our respondents take very different positions within this spectrum. Highlighting these multiple roles within Scientist Rebellion is crucial for discussing academic activism, as most media, and also most observers within academia, tend to focus exclusively on the frontline activists and high-risk, arrestable actions. This is perhaps inevitable, given the civil disobedience commitment at the core of SR. As Marco puts it, "it's not enough that we put our papers, our articles on the way of the climate breakdown. We also need to put our bodies in the way". At the same time, not all bodies can be on the streets, and not all scientists can be on the frontline. Acknowledging the range of roles, contributions and responsibilities is an important process for participating in organized academic activism. Distinctions such as back and front office, and low and high risk actions help clarify levels of involvement. For academic activists like Leon, who says "I basically take part in actions, but I'm not an organizer", others take on tasks to facilitate these actions, including care and regenerative practices within the movement itself. Writing and disseminating statements, letters, and press releases in support of actions; maintaining communication channels; social media work; giving interviews or talks; developing visual material; managing financial structures; these are all essential tasks that people in Scientist Rebellion take on, more often than not on top of their scientific/academic employment. Lina's summary of her roles is a university's wishlist of upskilling for academic impact: "So I did social media work. I did press work. I wrote press releases, I did interviews, I planned actions, I executed actions. I set up different teams. I hosted a gazillion meetings. I wrote letters. I gave talks. I prepared talks. I developed talks, communications, you know, stuff like this". There are people who decide to reduce their scientific work time e.g., during actions, and there are several SR activists who have decided to significantly reduce, or altogether leave their paid employment to concentrate on activism, with the possibility to receive volunteer living expenses. It cannot be overstated though that most people in Scientist Rebellion indeed do their activism next to and also often intertwined with their own research. Activism does not *replace* research—if anything, it enhances it with a stubbornly realistic reflection on what science and knowledge production can mean.

The collective sense of community, organization and actions is a vital part of organized academic activism. Amaya states this very clearly, highlighting the "feeling that there are people really willing to do a lot for the cause and that we can actually pull things off, even with difficulties and even if we were fewer than we initially wanted to be and all that. I think that was a very positive experience for me and that gave me a feeling of *yes we can do things*". This sense of belonging with a group, as well as agency beyond academic/scientific conventions is repeatedly echoed by the activists, regardless of context and beyond one's immediate positioning. For Aadila, scientist and activist from an African context, "the most important part to me as a scientist, rebellious activist, was [...] the whole support that I was getting from the global

team, you know, you feel like, yes, I got this and I have people behind me". Leon, full professor in a European context, reinforces her statement: "You meet the best people out there in Scientist Rebellion. They are the best people that we have. And it's great to collaborate with them, to meet them, to do things with them. This is really extremely rewarding".

Activism is more often than not the consequence of an intensive reflection process on the structures and institutions of knowledge production. The pathologies of the modern, "hopeless" (Hall, 2020) university are well-known, in particular to early career scholars faced with precarity, competitiveness and a shrinking job market. The processes of individualization that are endemic to neoliberal academic institutions are openly questioned in SR activism which is instead based on what anthropologist Graeber (2014) calls "prefigurative politics". Like other activists and movements in a horizontal tradition, SR activists "strive to create social relations and decision-making processes that at least approximate those that might exist in the kind of society we would like to bring about" (2014, p. 85). In openly refusing certain institutional norms, SR activists take a variety of different roles: from participating in actions to pushing for sustainable practices within their institutions and using SR platforms to question scientific financing structures.

With their activism, members of SR explore different ways of pushing academia beyond its current harmful limits. There are many ongoing conversations with different positions on institutions and systems of knowledge production (see e.g., Oreskes, 2019; Maxwell, 2021; Urai and Kelly, 2023). SR also mobilizes academic repertoires for actions; Racimo et al. (2022) here offer a helpful overview with examples of practices embracing advocacy and activism in academia. In particular teach-ins have been important tools for outreach (for example see e.g., Videnskab, 2021).⁵ Ultimately, academic activists reject the assumed binaries between systems and tools of knowledge production and education, and the social and economic power relations on which they are based. As Lina highlights: "[it is] frustrating that we should be leading the way as academics or as universities, and we are not doing that, I mean we are going in the other direction in many ways, collaborating with companies that are destroying the planet basically like big oil companies or mining companies or weapon industry, it is just crazy". Through active defiance of institutional, neoliberalized structures and practices, SR members seek to build alternative ways of shaping the scientific community, ways which build upon solidarity and horizontal structures.

Boundaries

With all the headlines created by Scientist Rebellion, with all the successful acts of challenging norms about the roles of scientists, the most obvious boundary to be transgressed by academic activists in Scientist Rebellion might well be considered civil disobedience and concomitant legal, professional and political consequences.

And yet it is rather fundamental to acknowledge that for the people who decide to engage in activism, one of the main

boundaries is the trade-off between having time for their scientific work, and the time required for activism. As Leon puts it: "the biggest obstacle and frustration for me is that activism eats up so much time". Even before considering other consequences, it seems many scientists simply struggle to find time for activism. A question of prioritizing, one might think—and given the climate and ecological emergency destroying livelihoods and lives, these priorities might need to be reevaluated. At the same time, just as not everybody can take to the streets, not every scientist can afford to spend precious time and emotional/psychological resources on activism. In SR we acknowledge the boundaries that each person carries, and the different levels of risk individuals can bear. In keeping with the theme for this research topic section, we highlight the need for inclusion in SR practices. For actions, this e.g., means reflecting on risks, intended and unintended, and which consequences they can have for different individuals. Scientist Rebellion seeks to indeed *activate academia*; at the same time, we need to recognize *colliding crises* also in the different ways in which people can contribute, and the intersecting power relations in which they act. Centring equity is a fundamental principle for the movement.

There is a very real risk of backlash against academic activists from their institution and/or academic community. Not that this inevitably takes place; many of our respondents also received support from colleagues, albeit mostly unofficially. But as, e.g., the case of Rose Abramoff (New York Times, 2023), who was fired from her position as a researcher at a public laboratory due to an action where she unfurled a banner at an academic conference in an act of disobedience, shows, academic activists face the possibility of significant consequences to their careers, their reputation, and their legal and personal situation. For Marco, for instance, this meant that "the director of my institute decided to do all of what they could to prevent me from taking civil action, civil disobedience". Navigating this choice between rewarding, meaningful engagement in activism, and backlash in different forms is a recurrent theme in discussions with academic activists.

Managing group dynamics as well as the fluidity and openness of horizontal organizing constitutes another boundary, if not contradiction of academic activism, in particular in a cross-cutting, multi-layered group such as Scientist Rebellion. More often than not, scientists are not socialized into solidaristic, communal practices. Like in all social movements, dynamics and power relations have to be reconciled with one's sense of agency, belonging and personal interests—in particular for people who have internalized personal narratives of excellence and individual intellectual merit. Aadila here highlights "the lack of unity among scientists because everybody wants to be seen as them above the other person". Scientific disagreements, strategic differences, personal dislikes and communicative misunderstandings exist among academic activist groups, and managing them while under intensive pressure for time and resources can be challenging.

The fluctuation of activist engagement among scientists and researchers can be understood against this background. In particular for Scientist Rebellion, with a strong outward focus on civil disobedience, activist retention and activist burnout are challenges. Despite the enormously successful mobilization since its establishment, whether outreach to and recruitment of more scientists can be sustained remains to be seen. As Marco suggests,

⁵ Bard College 2023 teach-in website (2023). Available online at: https://gps.bard.edu/world-wide-teach-in-2023?utm_campaign=World-Wide-Teach-In&utm_source=Custom-URL.



FIGURE 2
Scientist Rebellion activists in a demonstration on the streets of Dar es Salaam, Tanzania, 23 October 2022.

“We need to change the way we approach academics. We must be much more open to academics joining as they are without doing any civil disobedience”. The question of strategy and tactics, in the short and medium term but also with a long-term perspective, looms large for academic activists, just as it does for any social group engaging in direct action.

Moreover, for a global and horizontal movement, Scientist Rebellion is navigating power relations that risk reproducing the inequalities in access, funding and safety between activists in the Global South and Global North. As Afiya points out with regard to actions taking place, e.g., in the relative political safety of Europe, “Scientists should not do it from where they are. Let them go down and really visit those affected regions” (see e.g. Figure 2). Reflecting on one’s own privilege and positioning within global systems of knowledge production could be considered challenging by some. For academic activists in MAPA communities, the pathways to and consequences of activism are very differently constituted.

Concluding reflections

One of the fundamental contradictions of contemporary systems of knowledge production in academia is that those people who possess privileged access to cutting-edge science on the ecological, climate and social consequences of anthropogenic practices are expected to remain bound by those same norms and institutions that have not been able to make any decisive interventions in the global ecological crisis. In this article, we have offered perspectives and background on a group of academics, *Scientist Rebellion*, who seek to break with this essentially tragic situation. Using SR as a focal group, we have explored how academic activists reflect on their own uncomfortable position within institutions that are more preoccupied with maintaining the status quo than acting on the basis of the mounting scientific evidence. We have also traced their progression to

activism, their struggles and what sense of belonging activism has brought them.

As the climate crisis unfolds, we expect and hope to see more and more scientists joining the ranks of activism, embracing its whole spectrum. We also hope that more and more academics will come to see the division between activism and research as ultimately untenable. While we focus on actions that will produce more immediate results given the urgency of the situation, we also recognize the need to transform our institutions of knowledge to better advocate for such action. Both emerge from hope, curiosity and passion for the world we inhabit. The same world that, as philosopher Merleau-Ponty wrote (Merleau-Ponty, 1962), “is the homeland of our thoughts,” and the source of all our wondrous science, now needs every single one of us.

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The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Written informed consent was obtained from the individual(s) for the publication of any identifiable images or data included in this article.

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All authors receive equal credits for the article. We have worked on this text collectively in our shared sense of urgency in the climate and ecological emergency.

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The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Changing the landscape of mental health among college students: a community case study of a course on learning sustainable well-being

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Our society is facing an unprecedented mental health crisis, with nearly one in two people being affected by mental health issues over their lifespan. This trend is especially noticeable among college students, who undergo significant shifts in social, familial, and academic responsibilities. Exacerbating the mental health crisis is the fact that students are facing other societal crises (e.g., climate change). And, in a reciprocal fashion, students experiencing poor mental health are less likely to feel resilient enough to tackle these other crises. In response to these colliding societal crises, we need a comprehensive solution that goes beyond the current models of college mental health services. We propose an alternative *preventative mental health* approach, which aims to prevent the onset of mental health concerns and build resilience in the face of colliding crises. Specifically, we argue that colleges can aid in building mental health resilience by creating for-credit courses that teach students the skills they need to be conscious, responsible, and resilient human beings. Toward this end, we created an experiential, workshop-style, 1 unit, P/NP course, entitled “Learning Sustainable well-being” (LSW), which guides students to explore, improve, and sustain their mental health. The principles taught in this course combine the wisdoms of several disciplines, including mindfulness, psychology, neuroscience, philosophy, religion, poetry, and cinema. The following community case study reflects on the journey of our “LSW initiative,” starting from the creation of the course in 2014 to the current mission of scaling up the offering as part of an institution-wide LSW program. To this end, we describe the LSW course modules/content, our pedagogical approach, potential limitations, and then provide data demonstrating its efficacy in improving student well-being. As a final note, we present the challenges we have faced, and the lessons learned, while on this journey. We hope that presenting this community case study will facilitate the growing dialogue across colleges about creating (and perhaps requiring) courses like LSW in order to improve students’ mental health and resilience in the context of other colliding crises.

KEYWORDS

mental health, mindfulness, compassion, student well-being, resilience, sustainability

1. Introduction

We are amid an unprecedented mental health crisis. Almost half of the people living in the US deal with mental health issues at some point in their lives (1–4). Although this trend is visible across all populations, college students represent an especially vulnerable community. During the college years, many young adults undergo significant shifts in their social, familial, and academic responsibilities. Such increases in social and academic demands introduce new stressors that carry the potential to burden students' mental health. As such, the onset and prevalence of mental health disorders has been reported to peak during the college years (5–7). Moreover, college students report high levels of sub-clinical mental health symptoms. For example, a survey from 102 universities across the US ($n = 103,748$) revealed that a substantial proportion of students report high levels of loneliness (28%), anxiety (34%), depression (41%), and suicidal thoughts (13%). Additionally, 50% would like help with their mental health, whereas only 38% believe they are currently flourishing (8).

The recognition that colleges should provide students with any services beyond academic development started in the US about 150 years ago. In the early 1800s, colleges focused on promoting *physical* health, speculating that this had direct effects on academic performance. Many colleges implemented health courses, focusing largely on hygiene in an effort to prevent diseases and public health outbreaks, and by 1861, Amherst College had developed the first comprehensive health program [for a review, see (9)]. Since then, most colleges offer several services/resources for maintaining good physical health, both in terms of prevention (e.g., fitness facilities, physical education courses, and wellness programs) and treatment of disease (e.g., student health centers).

Approximately 50 years after the introduction of physical health services, colleges considered the importance of providing resources for student *mental* health [for a review, see (10)]. In 1910, Princeton began offering mental health services after observing that many well-qualified students were withdrawing from their studies citing “emotional problems.” While a movement arose to institute these mental health services, only a handful of other prestigious colleges followed suit over the next 10–15 years. During this time, university administration considered having a few part-time psychiatrists or counselors on staff to be sufficient. Shortly thereafter, World War II shed light on the impact of mental health. WWII soldiers returned to civilian life with “combat exhaustion,” which spurred a new category of diagnoses known as posttraumatic stress disorders and highlighted the need for a more wide-spread and comprehensive mental health movement. By the 1950s, mental health services and resources emerged throughout the US, including within most colleges (11). Today, colleges recognize the need to provide services and resources for student mental health, though the size and scope of these offerings varies by budget and resources (12).

While it is encouraging that most colleges in the US provide mental health services, these programs have several limitations. *First*, they are often under-staffed and over-burdened with administrative responsibilities, and therefore under-resourced to meet the high demand of students in need of treatment (13, 14). *Second*, mental health services tend to focus on treating concerns that meet DSM criteria, and as such, are utilized by students when problems have already become overwhelming. *Third*, and related to the last point, there are many students experiencing poor mental

health (e.g., depression, anxiety, and loneliness) who do not consider themselves in need of mental health services and/or do not realize the benefits of partaking in practices that improve well-being. These students often report feeling that their problems are “not severe enough” to seek mental health services (8). *Fourth*, many students may choose to not seek help from mental health services for either practical reasons (e.g., lack of insurance coverage or perceived lack of time) or the fear of being labeled (or thinking of themselves) as having a mental “disorder.” This can be particularly salient for *underrepresented* students [see (15)], who sometimes report feeling that they do not belong and/or that their mental health symptoms will not be believed by staff (16).

All these limitations are compounded by the fact that we are amid other societal crises, with one example being climate change. A recent study conducted by Cambridge Global Perspectives (17) surveyed over 11,000 young people (ages 13–19) in multiple countries and found that over a quarter of them (26%) believe the climate crisis is the biggest issue facing the world today (39% of the US sample). Furthermore, the majority of the sample (92%) report having already changed their behavior because of the climate crisis. With the rise of the youth climate movement (18) it is clear that concerns about the climate crisis are an *additional* mental health burden for college students. While it is encouraging that college students have a heightened awareness of the climate crisis, this concern can lead to feelings of depression and helplessness. In fact, two recent studies have reported that exposure to direct outcomes of the climate crisis (e.g., extreme weather events) as well as indirect exposure through media reports, elevates risk of depressive, anxious, and posttraumatic stress symptoms (19, 20). Not only does this “climate-anxiety” add to the already existing mental health crisis, in a reciprocal fashion, people experiencing mental health challenges are less likely to feel resilient enough to tackle the climate crisis. Therefore, enhancing mental well-being among college students is necessary—not only to change the landscape of the mental health crisis but to also bolster students' psychological aptitude to address other societal problems.

To address the compounding issues that threaten student mental health, some colleges have attempted to *expand* their mental health resources, for example, by offering group therapy and workshops, creating websites containing internal and external mental health resources, and providing free access to self-help and/or meditation apps (e.g., Headspace) [see (21, 22) for further examples]. Still, there is a growing gap between the needs of students and the resources being provided to them (12). As an example, students at our university often report that the decentralized nature of these varied resources leaves them feeling overwhelmed, a phenomenon referred to as the “tyranny of choice” (23).

In this paper, we propose a *different type* of resource for student mental health, which is *integrated* within their (very familiar) college experience of enrolling in courses. Specifically, we argue that colleges should offer for-credit “sustainable well-being” courses, where students learn the skills they need to be conscious, responsible, and resilient human beings. This for-credit course approach targeting mental well-being overcomes many of the limitations of the existing mental health services (outlined above), as well as providing additional benefits. *First* (and most importantly), well-being courses take a *preventative* mental health approach; rather than waiting for situations to reach a point where they are overwhelming, students can learn the skills to prevent those situations from escalating. *Second*, well-being

courses can reach many students, as well as a diverse range of students. This includes students who: (1) currently feel that they are not facing challenging situations, (2) believe their problems are not severe enough to seek mental health services, (3) belong to minority groups that are typically underserved by mental health services. As an added benefit, taking a well-being course along with peers is likely to lower the stigmatization of mental health issues, as students get to see that almost everyone suffers from time to time. *Third*, because well-being courses are able to reach many students at once, the likely long-term consequence will be to lower the burden on student counseling centers, with the added benefit of being cost-effective for the institution. *Finally*, because these well-being courses are taught by professors, connection and community is built between professors and students, which will likely enhance the campus culture.

2. Providing context: a comprehensive solution for well-being courses at UCSD

To pave the path for academia to address colliding crises through for-credit course offerings, it is worthwhile to start by providing a bit of history about this journey at our own institution: the University of California, San Diego (UCSD). In 2003, the University of California system adopted a freshman seminar program, in which faculty are incentivized (with \$1,000) to teach a small (20-person), low workload (1-unit, P/NP, 1 h/week), fun/engaging course on any topic to incoming freshman. The program, which is now popular on colleges across the country, was created in response to a growing student need to experience a more *intimate* learning environment, in contrast to most of their other courses where the large enrollments (300–400 students) can be de-personalizing and overwhelming. In 2014, the first author (Dobkins, a professor of psychology) created a freshman seminar, entitled “Learning Sustainable Well-being” (LSW), taught in an experiential, work-shop style format, with the goal of teaching students how to build healthy relationships with oneself and others.

After receiving feedback from many students that this was the most important course they had ever taken, it became clear that this course had the potential to change lives. In response to this, in 2019, the first author started a grass roots “LSW initiative” at UCSD, with the goal of expanding the LSW offering to more students. As such, the course was expanded to accommodate 100 students across all year levels and bring in four to five undergraduates (who had previously taken the course) to assist in facilitation of the exercises. (In addition, the weekly meeting time was increased from 60 to 80 min). In 2021, the second author (Dickenson, also a psychology professor) joined the LSW initiative, teaching her own section of the course as she and the first author worked together to improve the curriculum. Survey data collected since 2019 provides evidence that the course improves well-being, and testimonials reveal themes that emerged after taking the course (see “Data Showing Efficacy of the LSW Course,” *below*). In addition, many students report spreading the lessons from the course to their roommates and friends, which enhanced connections and improved campus culture.

Given the impact of the LSW course, it is now our long-term goal to create an official, and integrated, LSW *program* at our college. Our vision for this is twofold. *First*, we plan to recruit faculty from

other departments to be trained in, and then teach, the LSW course. Faculty will be incentivized with monetary compensation as this 1-unit course is taught above current teaching load (current load being anywhere between 12 and 16 units/year, depending on the department). It is our hope that compensation will come from the institution, as is the case for freshman seminars, although we recognize the potential need to apply for outside funding. Recruiting professors from other departments is not only necessary to expand the course beyond our psychology department, but it also allows the teaching of the curriculum through other lenses, e.g., whereas psychologists might teach about anxiety in terms of the body’s fight or flight mechanisms, historians might reference time periods where a society was challenged with, and had to overcome, disasters (e.g., the creation of the Truth and Reconciliation Commission after the end of Apartheid).

Second, we plan for the LSW program to provide a *series* of course offerings, each focusing on a certain aspect of the human experience (and being subtitled accordingly). The current LSW course taught by Dobkins/Dickenson is subtitled: “Compassion for Self and Others,” as it is designed to help students explore, improve, and sustain their relationship with self and others. Next, the plan is to develop a course that helps students improve their relationship with the *environment*, with a particular emphasis on the climate crisis. Such efforts are currently underway at our college, spearheaded by Dr. Adam Aron. In sum, in response to the growing mental health crisis and the impact of other societal crises, we need a comprehensive solution; an LSW program that provides experiential learning on compassion and mental well-being, as well as courses on other colliding crises, for example: climate change, racial sensitivity, health disparities, or any other challenge facing society. Below, we discuss the elements of the current LSW course, which is focused exclusively on enhancing well-being through compassion for self and others.

3. Elements of the current LSW course headings

Below we provide information about A) the LSW course itself (description, pedagogical approach, and modules/content); B) potential limitations of the course; and C) data showing its efficacy in improving well-being.

3.1. Course description, pedagogical approach, modules, and limitations

3.1.1. Course description

The principles taught in the current “LSW: Compassion for Self and Others” course combine the wisdoms of several disciplines, including mindfulness, psychology, neuroscience, philosophy, religion, poetry, and cinema, which are drawn from a large time span (500 BC to the present day). Each week, there is a short lecture on a given topic, combined with workshop-style exercises. The exercises include: (1) private reflection; (2) group discussion; (3) didactic discourse between the instructor and students; and (4) partnering up (students taking turns facilitating each other on an exercise). After each class, students are sent follow-up announcements with additional resources such as

podcasts, blogs, and vlogs. Passing the course requires simply (1) attending the course in person (students are allowed to miss 1 of the 10 meetings and can make-up any missed class by attending office a hours); (2) submitting a weekly reflection essay describing what they got most out of the class for that week; and (3) a final reflection video summarizing their overall experience in the course.

3.1.2. Pedagogical approach

The course was designed with the philosophy that students learn best through demonstrations. As such, the course was designed to be taught in a *demonstrative* fashion, with the instructor “acting” out vignettes of human life, from own or others’ lived experiences. Here, the word “demonstrative” is meant to have two different, but related, meanings. In the conventional sense, demonstrative means to openly show one’s emotions, with the effect that the instructor self-discloses in front of the students (while maintaining healthy boundaries). In a less conventional sense, the word demonstrative refers to the act of demonstrating, with the goal of others then being able to mimic the process, much like a yoga teacher demonstrating a pose for participants to follow.

3.1.3. Course modules/content

The course has 10 modules (each 80 min), one for each week of the quarter. This translates to 13.33 h of class time. In addition, weekly reflections (approximately 15 min/week) and optional material for students (approximately 15 min/week) may add another 5 h of outside class time over the quarter. For each module, we provide a brief outline of the concepts taught, and one or two examples of in-class exercises.

Week 1: Practicing Psychological Well-being: Insights from Eastern and Western Philosophies.

Concepts:

- How humans evolved into beings who suffer psychologically
- Practices/wisdoms for alleviating suffering, based on both Eastern and Western approaches

Exercises:

- “Share your Voice”—Randomly pop up and say “why I am taking this course”
- “Wiggle it Out”—Leave the class dancing to music

PART 1: SELF-COMPASSION: RELATIONSHIP WITH SELF.

Week 2: Exploration of the Self, and How to Live a Life with Heart.

Concepts:

- Historical perspective of the “Self” from philosophers, old and new, (from John Locke, William James, Alan Watts and Sam Harris)
- Gaining awareness of negative self-talk, and changing your relationship to it
- Learning to honor the layers of self, from the core (innermost) to the persona (outermost) layer
- Behaving in alignment with core values and following a path with heart
- Learning to succeed means learning from, and being okay with, your failures

Exercises:

- “Mindfulness Meditation”—Practice two different types of meditation, and write down what you heard your mind say
- “Core Values Journaling”—Write down your core values, and notice what aspects of persona you are attached to

Week 3: Accepting All of Your Personality Traits: the Good, the Bad and the Ugly.

Concepts:

- Connecting to our highest selves (i.e., desirable traits) while learning to forgive our lowest selves (i.e., undesirable traits)
- The shadow side of humans (from Carl Jung); a result of our creatureliness (from Sigmund Freud) and a need to make oneself important in the uncertainty of death (from Soren Kierkegaard)
- How to understand, and be gentle with, the shadow side of yourself, so that it does not lead to hurtful behaviors

Exercises:

- “Self-Love Meditation”—Holding oneself in the highest positive regard (from Carl Rogers)
- “Diffuse and Understand Negative Traits”—How is your negative trait a gift, or how does it *think* it’s serving you?

Week 4: Building Emotional Resilience by Challenging Your Thoughts and Changing Behaviors.

Concepts:

- What is emotional resilience? Perspectives from Mindfulness, Positive Psychology and Cognitive Therapy
- Learning to question what your “gremlins” are saying, and how to talk to your anxiety
- How to stop pretending and get in touch with the truth inside yourself

Exercises:

- “I Cannot Mind-Read”—Journal about a challenging time when you assumed you knew what someone was thinking/intending.
- “Discover the Raw Truth”—Go from the complicated story of something that troubles you to a one-line statement of the basic thought or emotion underlying it (e.g., “My friend getting married makes me sad because it reminds me that I am still single and not even close to getting married,” an example from the show “Friends”)

Week 5: Building Emotional Resilience by Accepting All of Your Emotions.

Concepts:

- Learning to notice, allow and accept, emotions in the body (from Tara Brach)
- Distinguishing unhealthy vs. healthy negative emotions (from Albert Ellis)

Exercises:

- “Body Scan” (Yoga Nidra)—A meditation on body parts.

- “RAIN”—Recognize, Allow, Investigate in a Non-judgmental and Nurturing way. Meditating on joy and pain in the body (from Tara Brach)

COMPASSION FOR OTHERS: RELATIONSHIP WITH OTHERS.

Week 6: Compassion for Others alongside Healthy Boundaries.

Concepts:

- “Being” with others, without trying to fix or change them (from Brené Brown, Marina Abramovic)
- Seeing the ways we separate from others through judgments, comparisons, and assumptions
- Setting healthy boundaries with others—you are not a mind reader, it's not your job to fix people, everyone has their own reality

Exercises:

- “Just Like Me Meditation”—This person wishes to be happy, just like me
- “Are We Really That Different?” Think of a negative trait you do not like in others. What defense would you come up with to convince someone that—even though you might have this trait “a little bit”—it does not *really count*?

Week 7: Putting Compassion for Others into Practice.

Concepts:

- Shifting from judgment of, to compassion for, others
- Learning to see the “bully” as someone who needs help, not punishment (from Thích Nhất Hạnh)
- How to not take things personally

Exercises:

- “Eye Contact Exercise”—a joint meditation with another
- “Shifting from Judgment to Compassion”—Tell a story about someone who did something you did not like. First, from a position of judgment, then from a position of compassion (not pity) because you can relate to this person's behavior.

Week 8: Approaching Conflict with Others from a “Needs” Perspective.

Concepts:

- Communicating needs without blaming others (from Abraham Maslow, Marshall Rosenberg)
- Learning to listen without defensiveness
- Shifting out of victim mode

Exercises:

- “Rumi Meditation”—Out beyond ideas of wrongdoing and rightdoing, there is a field, I will meet you there.
- “Knowing your Needs.” How can you ask for a need to be met (a) without labeling/making assumptions about the other person; and (b) without asking the other person to *feel* a certain way.

Week 9: Taking Responsibility for Conflict with Others.

Concepts:

- Taking responsibility for contribution to a conflict, no matter how small
- How to apologize and mean it!
- How to get honest with yourself about why another person triggers you

Exercises:

- “Shifting from Blame to Responsibility”—Tell a story about someone who you are having conflict with. First, from a position of blame, then from a position of taking responsibility (without putting yourself in the “doghouse”)
- “What is Actually Bothering You?”—When another person's behavior has upset you, ask yourself (a) what story do you have about its significance? and (b) what are your actual concerns?

Week 10: Summary, Tips for Practicing.

Exercises:

- Participants come up and share their experiences and breakthroughs

3.1.4. Limitations

Due to the nature of the LSW course, there is potential concern that students might enroll believing that the course will “fix their problems.” It is important to make clear to students (when they first enroll and throughout) that the course is not about fixing any specific problem, but rather, about learning a set of skills that can be applied to challenging situations, current and future. More specifically, the LSW course is not meant to address mental health *disorders*, acute concerns, or traumatic events, as these situations typically require a therapeutic approach. As such, if they are needed, students must be provided the resources on campus that provide such therapeutic assistance.

3.2. Data showing the need for, and efficacy of, the LSW course

Beginning in 2019, we started collecting data to (1) assess students' need for an LSW course and (2) investigate whether students in the LSW course improve on several self-report measures of well-being. With regard to needs assessment, data collected across a wide swath of students who have not taken LSW ($n = 6,051$) show that when asked “how interested would you be in taking a well-being class if it counted toward your college requirements,” over 90% of students reported being interested, with the mode response being “extremely interested.”

With regard to improvements in well-being as a result of taking the LSW course, we collected measures right before the start of the quarter in which they took the course (referred to as the “pre-course” data) and then again at the beginning of the following quarter (referred to as the “post-course” data). Note that providing pre-course data was a requirement of the LSW course, whereas providing post-course data was voluntary yet incentivized with course credit in whatever course they were taking the following quarter (and thus, we were not able to obtain post-course data from all students). Collecting both the pre- and post-course data at the *beginning* of a quarter hopes to remove the effects of variation in well-being across

TABLE 1 Themes (and their descriptions) that appeared in >30% of the students' testimonials, for *Improvements* (i.e., ways in which the course improved well-being) and *Thoughts on the Course* (i.e., general thoughts on the content, design, and structure of the course).

Themes	Description	%
<i>Improvements</i>		
1. Increased feelings of empowerment	Felt better equipped to handle future life challenges	70%
2. Increase in introspection	Learned the practice of examining and reflecting on emotional reactions	60%
3. Intention to continue with practices taught in class	Planned to keep utilizing mindfulness and compassion practices after the course	53%
4. Increase compassion for self and others	Gained a deeper appreciation for others and own emotional experiences	47%
5. Improved interpersonal relationship skills	Put communication and conflict resolution skills into practice in interpersonal relationships with a result of greater connection, understanding, and trust.	43%
6. Greater connection with community	Developed more connections with other students and felt a greater sense of connection within the UCSD community	40%
7. Awareness of personal values	Learned how to identify and act in line with one's core values	40%
<i>Thoughts on Course</i>		
1. Highly applicable course material	Implemented lessons in everyday situations	80%
2. Meaningfully interactive class	Got opportunities to engage with other students and professor	70%
3. Extremely impactful class	Felt the course had stronger influence than other courses	63%
4. Timely class for college students	Expressed that the lessons were valuable to what was being experienced at this stage in life	47%
5. Desire for improved course accessibility	Expressed that the course would have been helpful at a prior time of life and expressed desire for their peers to also experience the course	40%
6. Promotion of relevant conversations outside of class	Course prompted discussion about the material with others outside class	37%
7. Inspired further engagement with mental health	Lessons expanded thinking beyond the curriculum leading to steps toward greater well-being (i.e., seeking therapy, practicing mindfulness, journaling, etc.)	33%

the quarter (due to midterms, finals, etc.). However, because student well-being can change *between* quarters, it is important to have a control group as a comparison. Ideally, this control group would be a “wait-list” control, comprised of people who have signed up for the course, but are put on a wait-list to take the course later. This was not possible because, although the current LSW course always fills to capacity (currently, $n = 65$) with a wait-list, the number of students on the wait-list is typically small (15) because most students do not continue to add their name to a wait-list once that list is more than 25% of the course maximum. Instead, we took a different approach for recruiting control samples: other professors in our department who are teaching a psychology course in the same quarter as LSW were approached to recruit their students as a control sample. For those recruited students to be included in our control sample, they had to respond positively to a question that asks whether they would be interested in taking a well-being course at UCSD (as well as respond negatively to having previously taken LSW), and in this way, the control sample was matched in “interest in taking a well-being class” to the LSW sample.

To date, we have pre- and post-course data from 133 LSW students and 222 control students, collected over six academic quarters between 2019 and 2022. The sample was largely skewed toward women (80%), as is typically the case in Psychology departments. In addition, in three of the six quarters, the course was taught over Zoom, instead of in-person, because of COVID-19, with the result that 63.1% of the sample experienced the course in-person. In testing the effectiveness of the course on well-being, we additionally asked whether these demographics (gender or modality) affected the findings.

3.2.1. Students' overall experience

In post-course data, when LSW participants were asked about their overall experience, 97% percent said they either agreed or strongly agreed that the LSW course improved their well-being (noting that not all students provided post-course data, *see above*). We also collected 30 testimonials from LSW students who later were chosen to be class facilitators. These responses were qualitatively coded (by two raters) and fell into two main themes: *Improvements* (i.e., ways in which the course improved well-being) and *Thoughts on the Course* (i.e., general thoughts on the content, design, and structure of the course). A full list of themes that appeared in >30% of the sample is provided in [Table 1](#). The most frequent themes were as follows. For *Improvements*, students reported increased feelings of empowerment (70%); introspection of their emotional reaction (60%); and 53% intended to continue practicing the material outside of class. For *Thoughts on the Course*, students felt that the course material was highly applicable in everyday life (80%); that the course allowed for meaningful interactions with peers and the professor (70%); and that this class was overall extremely impactful (63%).

3.2.2. Quantitative data showing improvements in student well-being

Mean improvement scores, calculated by subtracting pre-course from post-course data, are presented in [Figure 1](#). Results are shown for seven different constructs of self-reported well-being, six of which were standardized measures. The seventh measure of well-being was developed to test the main constructs of the LSW course. In addition to presenting the total score data for this “in-house” measure, we present

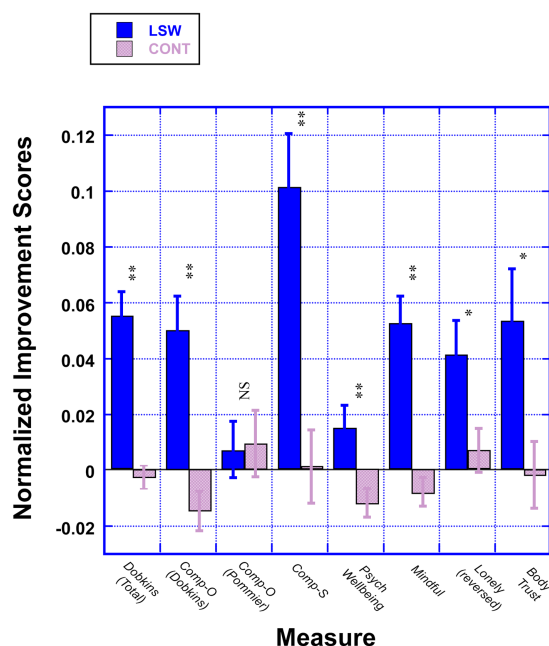


FIGURE 1

Improvement scores (and standard errors) are shown for LSW students (solid blue) and controls (hashed purple) for different constructs of self-reported well-being (** $p < 0.001$, * $p < 0.01$). Note that the improvement scores are “normed” by dividing the mean difference score by the total number of possible points for each measure, so that all measures can be presented, and compared, on the same plot. List of outcome measures: (1) Dobkins Scale: (A) Dobkins (Total): An in-house measure with 25 items that tests the main constructs of the LSW course. (B) Compassion for Others—Dobkins (“Comp-O, Dobkins”): 5 items from the Dobkins Scale. (2) Compassion for Others Scale—Pommier (“Comp-O, Pommier”): 16 items (24). (3) Self-Compassion Scale (“Comp-S”): 12 items (25). (4) Psychological Well-being (“Psych Well-being”): 18 items (26). (5) Five-Facet Mindfulness Questionnaire (“Mindful”): 20 items (27). (6) UCLA Loneliness Scale, V3 (“Lonely”): 20 items (28). (Reverse scored so that positive values reflect a decrease in loneliness). (7) Body Trust: 3 items from the MAIA Interception Scale (29).

the data from one of its subscales (“Compassion for Others”) to help understand the insignificant result we observed for Pommier’s measure of this construct. The results of our analyses show that, with the exception of the Pommier scale, all improvement scores were significant, even after a Bonferroni correction (all p -values < 0.007), with effective sizes ranging from small (0.27, for UCLA Loneliness) to large (0.75 for Self-Compassion, see Table 2 for full statistical results).

Because we were surprised by the insignificant result for the Pommier Compassion for Others scale, we conducted further investigation of all our measures. What became immediately obvious was that the measures that showed the largest effect sizes were the ones where participants started out low in the pre-course score, and this relationship had a large effect size with an r -value of -0.90 (see Figure 2). For example, on the Compassion for Others Scale (24), LSW students started out at 80% of the maximum possible on that measure (i.e., near ceiling), and this is the measure that showed the smallest (and non-significant) effect size when looking at improvement scores. For this reason, it is important to use measures where students are not starting out near ceiling (or near floor if the measure is a negative construct, like loneliness).

Upon further reflection, we are not surprised that students at our college are near ceiling on the Pommier et al. measure of Compassion for Others, as it taps into caring about other people’s suffering in situations where there is *no personal conflict* in helping someone in need. By contrast, in the LSW course, we specifically focus on what students (and people in general) really struggle with—which is how to be compassionate in *difficult situations*. We were therefore happy to see that the Compassion for Others subscale of the “Dobkins” measure—which focuses on compassion for difficult people/situations, showed significant ($p < 0.001$) and moderate (effect size = 0.56) improvement (see Figure 1). Thus, the LSW course reveals clear efficacy in improving compassion for others.

In a final analysis, we asked whether any of the observed effects of group (LSW vs. controls) differed by gender or the modality in which the class was taught. To this end, we conducted two-way ANOVAs for Gender (Group: LSW vs. Control $\times$ Gender: Female vs. Male) and Modality (Group: LSW vs. Control $\times$ Modality: In-Person vs. Zoom), for each of the well-being measures (16 total ANOVAs) and found no significant interactions (all $p > 0.09$). Although these null findings suggest that the beneficial effects of taking the LSW course did not vary across gender and modality, they should be interpreted with caution as our sample size is likely too small to observe interactions. This is particularly important for the Modality question; if it truly is the case that Zoom teaching is as effective as in-person, this could have important implications regarding scalability.

4. Practical implications and lessons learned

While many US colleges provide mental health services/resources, it is our belief that the most effective way to bring experiential well-being to students is to create for-credit Learning Sustainable Well-being (LSW) courses that provide the needed skills. As the Dalai Lama pointed out in his 2017 commencement speech at UC San Diego, colleges were once religious institutions, which provided *both* academic and spiritual guidance, but with the secularization of universities, that spiritual guidance is painfully missing. A solution is for colleges to implement a comprehensive system of guidance so that students can flourish academically and emotionally and be ready for an uncertain future that inevitably includes the ramifications of other societal crises, such as the climate crisis. Offering students LSW courses that focus on building resilience in the face of adversity can provide them the skills they need to deal with whatever future lies ahead.

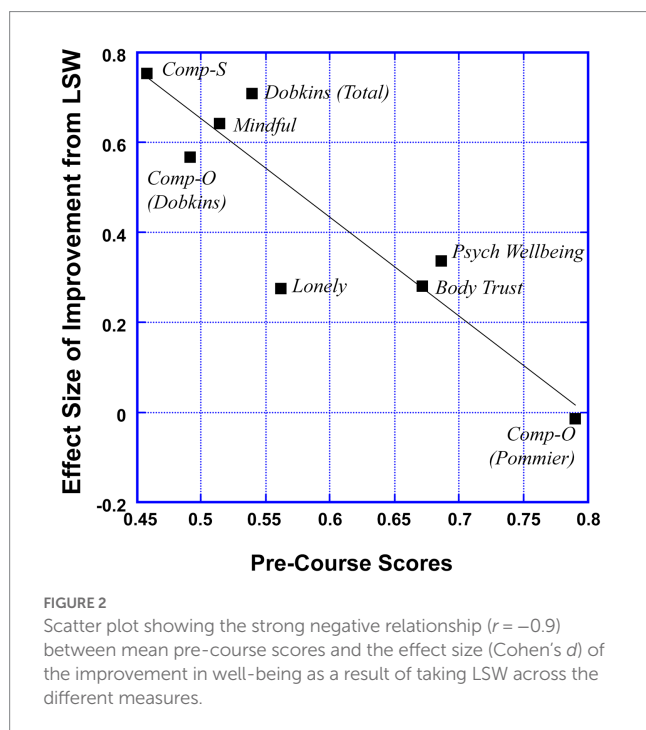
The question we have grappled with is how best to create and scale up these LSW courses on college campuses. Should we take a *bottom-up* approach, recruiting other faculty to teach these LSW classes until there is a critical mass on campus, or a *top-down* approach, convincing the administration to oversee, and encourage participation in, an official LSW “program”? The top-down approach inevitably means meeting with top administrators, not only to get their “buy in,” but to figure out what administrative policy needs to change to make things happen. In our experience, we have found that the top-down and bottom-up approaches go hand in hand, which we experienced as follows.

In the Spring of 2019, we met with the Chancellor (and other top administrators) asking for their support of an official LSW program

TABLE 2 Statistical results comparing improvement scores of students enrolled in LSW compared to control.

Outcome measures	LSW		Control		<i>t</i>	<i>df</i>	<i>p</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
Dobkins (Total)	0.055	0.105	−0.003	0.062	6.470	353	<0.001	0.709
Compassion for Others (Dobkins)	0.050	0.135	−0.015	0.100	5.116	353	<0.001	0.561
Compassion for Others (Pommier)	0.007	0.090	0.009	0.093	−0.083	131	0.470	−0.014
Compassion for Self	0.101	0.168	0.001	0.099	4.310	131	<0.001	0.754
Psychological Well-being	0.015	0.089	−0.012	0.078	3.056	353	<0.001	0.335
Mindfulness	0.052	0.112	−0.008	0.079	5.861	353	<0.001	0.643
Loneliness (reversed)	0.041	0.141	0.007	0.114	2.499	353	0.006	0.274
Body Trust	0.053	0.215	−0.002	0.183	2.562	353	0.005	0.281

Note that the Compassion for Others (Dobkins) measure is a subscale of the Dobkins (Total) measure. Also note the Compassion for Others (Pommier) and Compassion for Self-scales have a smaller sample size than the other measures because we started collecting data for them later, in Spring 2021.



at our university. We argued that all students, even those who are not currently experiencing severe mental health concerns, are in need of a course that teaches them to have compassion for self and others. We also reported that the current LSW course was filling to capacity, with a waitlist, and that students were reporting that the course was “changing their lives.” Although administrators were sympathetic, they were clearly not signing on the bottom line. This seemed baffling at first; why would not the administration adopt this “no-brainer” idea? Over the next few years, it started to become clear that what might win them over would be to provide evidence that (1) the course improves student well-being (which we now have, see above) and (2) a sufficient number of faculty could be recruited to teach an LSW course.

Our bottom-up approach for faculty recruitment involved asking various faculty if they would be willing to teach our already-created curriculum (as opposed to creating their own well-being curriculum).

We thought this “adopt our curriculum” approach would be best as it would ensure some quality assurance as well as make it easier to measure the efficacy of the course in improving well-being across a diverse sample of faculty. Because we already had two of us (the first and second authors) in the Psychology department successfully teaching the LSW course, in 2021, we started asking our psychology colleagues if they would join in. Although many were sympathetic to our cause, we were met with two obstacles. *First*, some faculty members reported not feeling well equipped to teach an experiential LSW course, having never themselves adopted a well-being practice. We believe this obstacle can be overcome by creating/offering workshops in which faculty get trained to teach the LSW course during the summer months. The goal is to secure funds to pay them for their training time, noting that, in addition to the financial benefit, partaking faculty should experience a psychological benefit of learning the course material—just like the students who take the course!

A *second* obstacle we experienced concerns teaching load; many faculty reported that they did not have enough time in their schedule to take on another class. To address this obstacle, we spent a lot of time with departmental and university-level administrators to discuss potential solutions: Could the class be converted to a 2- or 4-unit (rather than the current 1-unit) class? How best could the course fulfill student requirements for graduating? Could the experiential spirit of the course be maintained if it were changed to a 2- or 4-unit course, which would then require a letter grade? Could faculty teach the LSW course by being offered release from another course? After much deliberation, we decided it best to keep the LSW course as a 1-unit P/NP, taught above current teaching load and compensated with \$1 K (that can be applied toward the faculty's research funds).

Once these obstacles seemed sufficiently resolved, we then launched our bottom-up campaign to recruit faculty from *other* departments on campus. In Winter 2023, we reached out to the chairs of several departments on campus, asking if they would circulate a recruitment letter to their faculty. To our pleasant surprise, all the chairs agreed, and within a few weeks, we had a coalition of 6 faculty interested in getting trained in and teaching the LSW course (from Biology, Cognitive Science, History, Sociology and Political Science). All these faculty members immediately recognized the need for such courses at our university, which was quite encouraging.

Now that we have a growing coalition of faculty who are interested in teaching LSW, as well data showing the efficacy of the LSW course, we are resuming discussions with the administration, in the hope that all of our bottom-up achievements will be met with top-down endorsement of an official “LSW program.” This stamp of approval from the administration will make it much easier to: (1) get the necessary resources to recruit LSW faculty, (2) expedite the approval of these LSW courses in different departments, (3) document the implementation of the LSW course across departments (e.g., asking well it works for faculty from different disciplines to teach the course through their own lens), (4) fund the collection and analysis of data investigating the efficacy of the LSW course in different departments, and (5) bridge the cultural gap between faculty and students, thereby building campus community.

On a final note, we end with a call to action for all college administrators. Institutions like to position themselves as preparing young people for the future, however, they are currently neglecting some of the most crucial tools needed to be human: empathy, compassion, resilience, even listening. To make matters worse, we are sending them out into a world of colliding crises, which they are not equipped to tackle. The idea of for-credit LSW courses offers a creative solution, and it is up to the administration to acknowledge this, to act as if we are in crisis mode. Because we are.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by the University of California, San Diego Office of IRB Administration. The patients/participants provided their written informed consent to participate in this study.

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Author contributions

KD conceived of the idea. KD, JD, and DL wrote the manuscript together. KD and TB analyzed the quantitative data. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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"No research on a dead planet": preserving the socio-ecological conditions for academia

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Despite thousands of higher education institutions (HEIs) having issued Climate Emergency declarations, most academics continue to operate according to 'business-as-usual'. However, such passivity increases the risk of climate impacts so severe as to threaten the persistence of organized society, and thus HEIs themselves. This paper explores why a maladaptive cognitive-practice gap persists and asks what steps could be taken by members of HEIs to activate the academy. Drawing on insights from climate psychology and sociology, we argue that a process of 'socially organized denial' currently exists within universities, leading academics to experience a state of 'double reality' that inhibits feelings of accountability and agency, and this is self-reinforcing through the production of 'pluralistic ignorance.' We further argue that these processes serve to uphold the cultural hegemony of 'business-as-usual' and that this is worsened by the increasing neo-liberalization of modern universities. Escaping these dynamics will require deliberate efforts to break taboos, through frank conversations about what responding to a climate emergency means for universities' – and individual academics' – core values and goals.

KEYWORDS

climate change, disavowal, higher education, institutional inertia, neoliberal university, socially organized denial, sustainability

Introduction

Barely a week goes by without a major new scientific report warning of impending catastrophe from our continued collective failure to address escalating planetary crises. Earth system scientists warn that we now exceed multiple planetary boundaries ([Rockström et al., 2023](#)) and that we are already perilously close to tipping points in the climate system ([McKay et al., 2022](#)). Current policies will lead to a projected global temperature increase of 3.2°C by the end of the century ([IPCC, 2023](#)), yet there is little basis for assuming that organized human society can persist through such rapid changes ([Richards et al., 2021](#); [Kemp et al., 2022](#); [Steel et al., 2022](#)). Unless climate change is rapidly and seriously addressed, we face the possibility of a future in which the complex societies that support higher education institutions (HEIs) will be so severely disrupted that scholarship as we know it will no longer be possible ([Urai and Kelly, 2023](#)).

Radical interventions are clearly necessary to accelerate a rapid social transformation to avoid the dire outcomes currently forecast ([McPhearson et al., 2021](#); [Morrison et al., 2022](#)).

Despite this, a hegemonic ‘business-as-usual’ largely prevails in our HEIs (Huckle and Wals, 2015; Fazey et al., 2021), as it does throughout wider society (Stoddard et al., 2021; Nyberg et al., 2022). Even though universities have been the fora where much of the vital knowledge warning us of avoidable disaster - and the massive injustices this entails - has been produced, there is little sign as yet of the transformational changes required in the HE sector (Latter and Capstick, 2021; O’Neill and Sinden, 2021). This holds true even for the thousands of HEIs that have publicly acknowledged the scale and urgency of the crisis through their declarations of climate emergency. In the UK, for example, 59% of universities have failed to meet sector wide carbon emissions reduction targets (Horton, 2022), while no university in the world appears to be currently offering mandatory climate education to all undergraduates (following student-led protests the University of Barcelona looks set to be the first HEI to pilot this from 2024; Burgen, 2022).

As for teaching, so for research, with scant attention given to the grand challenge of our age in flagship academic journals. For instance, the Quarterly Journal of Economics, a preeminent economics journal, did not publish a single paper on climate change prior to 2019 (Oswald and Stern, 2019; see also: Roos and Hoffart, 2021, p. 22–24). This pattern is repeated across numerous disciplines (Table 1). It’s as though the crisis is somehow deemed unworthy of the academy’s concerted attention; some have referred to this as ‘climate silence’ (Scoville and McCumber, 2023), in the humanities the phenomenon has been dubbed the ‘Great Derangement’ (Ghosh, 2016).

Nor are universities and academics simply passive by-standers, we are often active agents contributing to the destructive pathway we are currently locked in to. Many universities even continue to conduct research into new fossil fuel exploration and extraction, some of it directly funded by industry, despite the conflicts of interest such funding is known to cause (Franta and Supran, 2017; Corderoy, 2021; Almond et al., 2022). At worst our elite HEIs become the means through which cultural elites can cement hegemonic ideas and legitimize the continuation of business-as-usual (Nyberg and Wright, 2022; Kinol et al., 2023). Thus, McGeown and Barry (2023) point out; “as producers and gatekeepers of knowledge, and as providers of

education and training, our universities play a key role in the reproduction of unsustainability,” it follows that HEIs can currently be understood to be perpetuating climate injustice (Kinol et al., 2023).

This dissonance extends to the individual behavior of many academics. For example, the normalization of aviation-based hyper-mobility in academic work (Bjørkdahl and Franco Duharte, 2022). It is even the case that professors in climate science fly more than other researchers, despite the tremendous carbon emissions associated with such activities (Whitmarsh et al., 2020). On a day-to-day basis, most academic staff seem to be maintaining the semblance of normalcy and unconcern. So great is our apparent collective indifference that an onlooker could be forgiven for thinking that we do not believe our own institutions’ official warnings that an emergency is unfolding around us.

This “collective equanimity in the face of the unprecedented risk” (Hoggett, 2019, p. 8) forces us to confront a profound question as academics – given that planetary change threatens the socio-ecological conditions on which our institutions depend, why does this ‘cognitive-practice gap’ persist (O’Neill and Sinden, 2021)? And why aren’t many more of us engaging directly with the effort to push for transformative change within our institutions and across broader society?

Academics are a particularly important group of which to ask this question, given that our skills in critical analysis of information (and often our specialist knowledge) could be expected to give us particular appreciation of the extent of the emergency and effective pathways for addressing the crisis (Racimo et al., 2022; Urai and Kelly, 2023). Our standing in society makes us potentially powerful agents and catalysts of broader societal change (Gardner et al., 2021); conversely, if those with privileged knowledge about the crisis carry on as usual it adds an insincerity to our warnings and communicates a lack of grounds for genuine concern (Attari et al., 2016), how then can we expect others to act?

Here, we suggest that both academic institutions and academics as individuals largely exist in a state of ‘double reality,’ in which we are able to intellectually recognize the existence of the crisis without feeling a compulsion to act on it. We argue that such a response is maladaptive because passivity in the face of the planetary emergency

TABLE 1 Summary of bibliographic searches for papers related to climate change in a variety of academic disciplines.

Discipline	Dates	Number of papers examined	Number of papers related to climate change	Percentage of papers related to climate change	Reference
Business and Management	1970–2006	31,000	9	0.03%	Goodall (2008)
Economics	1970–2006	51,000	63	0.12%	Goodall (2008)
Sociology	1970–2006	25,000	40	0.16%	Goodall (2008)
Political science	1970–2006	30,000	11	0.04%	Goodall (2008)
Finance	1998–2015	20,725	12	0.06%	Diaz-Rainey et al. (2017)
Business	1998–2015	31,351	74	0.24%	Diaz-Rainey et al. (2017)
International Relations	1980 to 2012	5,306	124	2.34% *	Green and Hale (2017)
Economics	Up to 2019	77,000	57	0.07%	Oswald and Stern (2019)
International Relations	2015–2019	2,605	20	0.77%	Sending et al. (2019)
Sociology	2017	387	3	0.88%	Koehrsen et al. (2020)
Management	2007–2018	Approx. 12,000	24	0.2%	Nyberg and Wright (2022)

*This search was for papers on any topic under the theme of environmental issues.

hastens the breakdown of the social-ecological conditions that have allowed academia to thrive. In short, unless we additionally engage in efforts to avoid climate breakdown, we are training students for a future that will not come to pass and devoting our lives to research of limited future relevance or utility under what are projected to be drastically altered circumstances. Currently, we are striving to achieve professional success, but not our collective survival.

In this *Perspective* essay, we suggest that this ‘double reality’ may arise through a range of psycho-social phenomena, that are exacerbated by institutional inertia and the neo-liberalization of the higher education sector which constrain the possibilities for academic engagement in the crisis and in the quest for climate justice. We conclude by reflecting on the need to break cultural taboos through frank discussions in academic institutions about what it is we truly value, what it will take to build genuinely sustainable universities, and what this means for how we each view our professional priorities in these times.

The double reality of living in denial

Different psycho-social mechanisms have been proposed to explain the continued passivity of individuals despite our knowledge of the need for rapid change. For example, ‘Giddens’s Paradox’ suggests that, “since no previous generation has ever had to confront the problem of human-induced climate change before, it is hard for the public to accept it as a reality, let alone an urgent problem, when stacked up against the diversity of other problems the world has.” (Giddens, 2015, p. 158).

Alternatively, many climate psychologists argue that our lack of action stems not from a sense of apathy and lack of immediate concern, but from a surfeit of concern leading to the unconscious deployment of psychological defense mechanisms that involve mental states negating reality (Lertzman, 2013; Long, 2015). This can present as outright science denial, but more commonly it manifests as more subtle states of disavowal where “reality is more accepted, but its significance is minimized” (Weintrobe, 2013, p. 6). In an effort to continue as we are, we might try to deliberately put our concerns out of mind, or distance ourselves by saying it will be a problem for the far-future or comfort ourselves through magical thinking such as hopes of a techno-fix. A particular form of avoidance manifests as ‘implicatory disavowal,’ whereby individuals do not feel a moral responsibility to act despite being aware of the issue, allowing us to turn a blind eye, such that we do not feel accountable for our actions. Thus, individuals reject the need to address the climate crisis to avoid experiencing traumatic feelings such as anxiety, distress, and helplessness (Hoggett, 2013; Weintrobe, 2021).

Such passivity can spread between individuals, because perceiving an apparent lack of concern amongst our peers can lead to self-silencing and the emergence of a state of pluralistic ignorance (Geiger and Swim, 2016; Kjeldahl and Hendricks, 2018). Indeed, research into socially organized denial reveals how adept people are at managing emotional states by directing attention to other subjects and deliberately ignoring ‘taboo’ topics, creating social silences that prevent us from raising climate change as a subject of conversation and political concern (Norgaard, 2011, see also; Nyberg and Wright, 2022). This is reinforced through attacks by special interest lobby groups who specifically target outspoken academics to make an

example of them and intimidate others into silence (Mann, 2015; Jacquet, 2022). Social interactions are constructed in such a way that individuals come to inhabit a ‘double reality,’ a state of simultaneous knowing and not knowing, which allows us to go about our daily routines and fulfill our social roles, whilst managing situations around us to allow us to continue ignoring uncomfortable truths (Cohen, 2001; Zerubavel, 2006). In such situations, practices, norms, conventions and boundaries develop that serve to limit the scope for social change and maintain the status quo (Gramsci, 1971). For example, the emergence of ‘groupthink’ whereby individuals suppress disconfirming information for fear of being ostracized, ridiculed, punished or professionally harming oneself, and career prospects (Cohen, 2001, p. 66).

As a group whose status is privileged in the current system, academics might be especially prone to adopting these defense mechanisms to deflect the associated cognitive dissonance (Sullivan, 2021). However, there is increasing evidence that continuing with normal activities can lead many environmental researchers to suffer, either directly or vicariously, from traumatic stress in response to the subject matter of their work (Clayton, 2018; Pihkala, 2020).

Head and Harada (2017) suggest that emotional detachment is common among environmental scientists and that researchers may adopt coping strategies which bias the research questions we seek to answer or, how we communicate the findings. Hoggett and Randall (2018) further identify a variety of institutional defenses practiced within scientific culture that act as coping mechanisms, these include norms such as “ideas of scientific progress, scientific detachment, rationality and specialization, scientific excitement and normalization of overwork” (p. 252). However, these are not without consequence, as psychoanalyst Sally Gillespie observes “the notion of attempting to separate objective understanding from subjective understating is deeply problematic, as it can morph into a form of splitting or distancing that separates thinking from feeling” and that when such psychic-numbing happens it can “[hinder our] ability to respond fully or effectively” (Gillespie, 2020).

The university: institutional inertia, neoliberalism and cultural trauma

It is also important, however, to consider the ways our psychological responses to climate change are shaped by their contingent social-structural context (Schmitt et al., 2020) and the broader mechanisms responsible for institutional inertia (Boston and Lempp, 2011; Munckaf Rosenschöld et al., 2014). Universities are complex hierarchical organizations with many distinct constituencies and complicated bureaucracies that have traditionally operated on timescales not well suited to the urgency of the climate crisis (Gardner et al., 2021; Green, 2021). Furthermore, the psycho-social factors we have described above have been exacerbated by a contemporaneous shift towards an increasingly neoliberal political economy in the higher education system in many countries.

Since the 1980s, universities have been subject to a number of radical changes rooted in neoliberal ideology: a shift from public to private funding in the form of donations, investments and especially tuition fees, making students customers that need to be served (Brown, 2015); overall financialization both through investments in stockmarkets and borrowing, with some

universities now effectively run by accounting firms (Freedman, 2021); the corporatization of university management, all run now by a cadre of people themselves firmly committed to neoliberal ideology and corporate values and practices (Morley, 2023); the prioritization of spending on flashy infrastructure projects over salaries, on STEM subjects over arts, humanities and social sciences (Troiani and Dutson, 2021); universities being seen as employability factories and career investments rather than sites for genuine learning or creative and critical thinking; infused with a spirit of competition and efficiency permeating everything. All this means that universities have not only become highly precarious, stressful workplaces for academic staff, they are also themselves in danger of being little more than “cogs in a market-driven machine designed to perpetuate economic and political injustice” (Sen, 2023).

Urai and Kelly (2023) highlight that the climate crisis is unfolding just as our universities’ ability to respond have been weakened through bureaucratisation, inordinate competition and restrictions to academic freedom. Likewise, McCowan et al. (2021) note “competition for resources and students can also act against public good activities, including sustainability and climate change.” In consequence, academic staff face a lack of time and emotional support, intense hyper-competition and continuous economic precarity (Fochler et al., 2016; Lempiäinen, 2016; Pells, 2019; Albayrak-Aydemir and Gleibs, 2023). This environment denies us the time, energy and emotional resources necessary for reconfiguring curricula, redirecting research, engaging in civic discourse or other duties as an engaged member of academic community, all while universities fail to incentivize or adequately reward such initiatives. Many individuals in the ‘hopeless university’ experience a profound sense of alienation from their work, both academically/intellectually, as well as with regard to the social relations in which they are embedded (Hall, 2021). In short, the neo-liberalization of higher education, as elsewhere, has created a culture of uncare (Weintrobe, 2021).

Brulle and Norgaard (2019) combine the insights of psycho-social processes and institutional intransigence we discuss above, concluding that a more complete explanation for the social inertia is the “avoidance of cultural trauma.” We are witnessing, they suggest, the consequences of an organized information environment focused on the defense of the existing hegemonic culture and the preservation of an ideological framework favorable to the status quo (Brulle and Norgaard, 2019; c.f. Nyberg et al., 2022). When understood from this perspective, “climate change constitutes a profound challenge to established ways of life in Western nations and constitutes the emergence of an ongoing and expanding cultural trauma.” Ways of life ultimately deeply rooted in coloniality and notions of western dominance (Brand and Wissen, 2021; Sultana, 2022; McLaren and Corry, 2023).

Applying this lens, we can recognize that the organizational structures and incentives of modern universities are adapted to reproduce and uphold an extractivist growth economy, and this results in an inbuilt inertia against change, manifest in large part through the legitimating power of hegemonic cultural practices and conventions supporting the common sense of business-as-usual within the organization. This makes it hard for individuals within the organization to challenge the status quo: in other words, “when you expose a problem you pose a problem... [and the] *problem would*

go away if you would just stop talking about it or if you went away” (Ahmed, 2017). To avoid such confrontations and the psychological need to deny the implications of our inaction, we see the emergence of a ‘taboo’ and a climate of silence on issues relating to pathways for genuine sustainability. We also see displacement onto the fetishizing of non-transformatory solutions, such as individual responsibility for sustainability (Maniates, 2001; Lamb et al., 2020); the use of empty marketing discourses centered on a narrative of rhetorical ‘boosterism’ (O’Neill and Sinden, 2021); or the reframing of the emergency in terms of corporate risk-management (Wright and Nyberg, 2017).

Collapsing the ‘double reality’ through living in climate truth

It has been recently suggested that universities, as they currently exist, are not fit for purpose in a time of planetary emergency (Green, 2021; Maxwell, 2021; McGeown and Barry, 2023), and there is a desperate need to develop alternative approaches. This is not to belittle or deny that there are a growing number of individual as well as institutional attempts underway to center the climate emergency in higher education in both teaching and research. New courses on sustainability themes are being created and climate issues discussed in more and more modules. Often in response to growing pressure from students organizing in disciplines as diverse as law and medicine, to demand an education fit for these times (MS4SF, 2022; Hirschel-Burns et al., 2023). Ecology and climate are also increasingly mentioned in research strategies and funding calls. But these are still isolated rather than sector wide initiatives (with some notable exceptions, e.g., the Faculty for a Future, 2023), and often end up becoming part of institutional green-washing which bolsters rather than dismantles business-as-usual. There is also no end in sight for overwork, precarity and marketisation. We are still a long way off the genuine, complete transformation of academia we need.

Aligning HEIs with a path towards climate justice will require provision for the personal growth and transformation of academic staff, including supporting us to process our own eco-anxiety (Pihkala, 2020) and redefining the meaning of scholarly integrity for the Anthropocene (Raffoul et al., 2021; Sutoris, 2022). In this context, it is crucial to be attentive to the existing power relations in academia - the ‘double reality’ we point to is most pronounced in academics with the greatest privilege; those in permanent employment and in positions of institutional power. We cannot leave early career researchers, scholars in precarious positions and students to be the primary drivers for the change we so urgently need in our institutions. More fundamentally still, we need to rethink the power relations in which HEI and knowledge production take place, at a global scale characterized by profoundly unequal impact of the climate and ecological crisis. Tackling the persistence of Eurocentric perspectives and acknowledging climate (in)justice in teaching and research, as Sultana insists (Sultana, 2022, p. 8), requires that we ‘address knowledge production and epistemic underpinnings of climate coloniality.’ Even in academic climate activism, these power relations remain acute (Artico et al., 2023).

This will require setting out a new vision for what HEIs can be in this time, and an experimental approach toward establishing these alternatives (e.g., Lotz-Sisitka et al., 2015; Facer, 2020; Moser and Fazey,

2021; Kelly et al., 2022; Kinol et al., 2023; Urai and Kelly, 2023). Undoubtedly, this will necessarily involve collective organizing within and across our own institutions to effectively challenge dominant paradigms (Gardner et al., 2021; Racimo et al., 2022). None of this will be easy or comfortable – though we can have hope that it will be fulfilling.

In our view, a key initial step in facilitating such a transformation is to break the climate of silence on campus by making an active effort to push through the taboo and hold conversations with our colleagues about our concerns. Thinking with Ahmed (2023), we have to take on a ‘climate killjoy’ commitment: ‘if questioning an existing arrangement makes people unhappy, we are willing to make people unhappy’ (2023, p. 19). This would involve bringing up the topic as often as is possible in university committees or union branch meetings, in the classroom or even on grant review panels, learned associations and other research fora. We must also actively seek opportunities to speak about our collective response to the climate crisis in non-academic spaces through public outreach and engagement activities with citizens, businesses, policymakers, politicians, and through the media and cultural events. This allows concerned communities to form, discuss solutions, and begin to collectively organize for change. Through such efforts we can expect to burst the bubble of ‘pluralistic ignorance’, potentially precipitating a social-tipping point on campus and sparking a process of social contagion that could spread from institution to institution throughout the sector (Moser and Dilling, 2007; Otto et al., 2020; Winkelmann et al., 2022).

By deliberately striving to collapse our ‘double reality’ through aligning our words and our actions into something more congruous, we argue that we can end the paralyzing and distressing effects of cognitive dissonance and begin to effectively challenge the hegemonic culture protecting the status-quo. ‘Living in climate truth’ in this way can have liberatory consequences (Salamon, 2020): it frees us academics to lead by example and fulfil the Socratic virtue of parrhesia to which we are tasked – speaking truth for the public good; and where necessary upholding our duty to speak truth to power.

Conclusion

For too long we have allowed a culture of climate silence to dominate in our universities, leading to a misalignment of our priorities from our core purpose and values, thereby perpetuating a maladaptive response to the unfolding planetary emergency and undermining the very future of the higher education sector. Universities have in effect become ‘fraud bubbles’ (Weintrobe, 2021) in which staff and students must construct a ‘double reality’, in order to pursue a narrow social role, trapped in maladaptive incentive structures of increasingly neoliberal institutions. This ultimately serves to reproduce the hegemonic practices, norms and conventions driving socio-ecological collapse. As an academic community we must urgently learn to grapple with the role that universities can play as leaders in the necessary social transformation to come. Our dearest notions of progress, rooted in our desire for the beneficial accumulation and application of knowledge (Collini, 2012), are now both directly and indirectly threatened by the climate crisis.

We can no longer avoid the realization that as a sector we must engage directly with the *existential* questions about our collective purpose which are posed by the growing *existential* threat of unraveling socio-ecological systems (McGeown and Barry, 2023; Urai and Kelly, 2023). As individual academics and HEIs tasked with developing, holding, and passing on knowledge, we must ask ourselves how we ought to respond so as to preserve our core goals and values?

If we allow ourselves and our institutions to fully internalize such a threat, we are forced to accept that, unless urgent action is taken, we risk such disruption to the material circumstances necessary for the social conditions under which research and learning can flourish, that the research to which we currently devote our lives will be lost. In such circumstances our priorities and ambitions, both professional and personal, are forced to shift. Increasingly academics from all disciplines are recognizing that we must, therefore, devote a substantial fraction of our collective efforts as institutions to preserving such conditions (Gardner et al., 2021; Racimo et al., 2022). All academics, no matter their discipline, have a role in this, for there is no research on a dead planet.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

AT, LH, PV, and CG contributed to the concepts presented in this manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Conceptualising HE educators' capabilities to teach the crisis: towards critical and transformative environmental pedagogies

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This article aims to help conceptualise the capabilities that educators in higher education (HE) have to incorporate concerns about environmental breakdown in their day-to-day teaching. A common view amongst those in the academic literature is that Higher Education Institutions (HEIs) are failing to rise to the challenge presented by the unfolding environmental crisis. While agreeing that those in HE must do more, this article critically examines the assumption that such action can be easily enacted by HE educators. Our analysis employs the capabilities approach (CA) to illuminate the challenges surrounding HE educators' agency to teach the crisis in their day-to-day practice, and to consider what would be needed to provide them with genuine opportunities to do so. We argue that access to the growing number of teaching resources about the environmental crisis is a necessary but insufficient condition for supporting HE educators' capabilities to teach the crisis. For a fuller understanding of what is required to support the agency of HE educators, attention must be paid to the diverse combination of factors that shape HE educators' opportunities to develop and enact critical and transformative environmental pedagogies in their disciplinary and institutional contexts. Drawing on the extant academic literature and with reference to a fictionalised case study we examine how HE educators' agency is mediated by a range of personal, material and social factors. Our analysis focuses especially on the role played by social factors, including the influence of: dominant epistemological, methodological and disciplinary norms; prevailing institutional policies and practices, and; administrative and management cultures within and across HE. After discussing the importance that deliberation has in supporting educators' agency and the development of novel forms of critical and transformative environmental pedagogy, we conclude by suggesting that in many cases enacting such pedagogies will involve confronting dominant forms of power, culture, policy and practice, within the academy and beyond.

KEYWORDS

capabilities, climate, critical pedagogy, environmental education, higher education, pedagogy, sustainability, transformative pedagogy

1. Introduction

We face a profound environmental crisis that incorporates anthropogenic climate breakdown, the accelerating loss of biodiversity, and global material and social inequalities (IPCC, 2023). The ramifications of this crisis have the potential to be catastrophic for human societies and the natural world alike (Bradshaw et al., 2021). Mitigating its worst effects is possible by making rapid and deep changes to our societies, however the global response to date

is proving inadequate (IPCC, 2023). Despite our ever growing knowledge of the ecological dangers we face and our extraordinary capacity to subject the natural world to our will, human beings seem incapable of transforming our societies.

This article examines the question of what educators working across higher education (HE) disciplines and contexts can do to teach the environmental crisis in ways that support critical thinking and promote social transformation. It is primarily concerned with conceptualising the agency HE educators have (or may not have) to 'teach the crisis', that is, to develop and enact critical and transformative pedagogies that address the environmental crisis in their day-to-day practice. By 'critical environmental pedagogy' we mean education that supports students' understanding of the role of power in social life, and which fosters concern *for* (not simply *about*) the environment. By 'transformative environmental pedagogy' we mean forms of teaching that foster learners' attitudes and abilities to take action in response to the unfolding environmental crisis, and are not limited to simply providing knowledge of it. We take the HE sector in the United Kingdom as our starting point, but the globalised nature of contemporary Higher Education and the exportation of Western, and in particular anglophone, academic culture and practice means our findings will have resonance in many other international contexts (Altbach and Knight, 2007). We use philosophical analysis to clarify the nature and formation of the opportunities that HE educators have to teach the crisis, and draw on Amartya Sen's Capabilities Approach (CA) as a set of theoretical and methodological tools for supporting greater understanding in this area (Sen, 1999, 2009). We argue that greater attention must be paid to the social, cultural and institutional factors which govern the HE sector, and which shape the opportunities that educators have to develop and enact transformative forms of educational practice across the HE sector. Our analysis highlights the complex and open-ended nature of teaching the crisis across HE disciplines and contexts, as well as a more general need for reflection on the way power and culture operate within and across the HE sector to shape, for better or worse, the opportunities educators have to develop and enact critical and transformative pedagogical responses to the environmental crisis in their day-to-day work.

We begin by briefly sketching out the prevailing context and describing the dominant attitudes, discourses and approaches that higher education institutions (HEIs) take towards the environmental crisis. After introducing the CA, we then draw on the extant academic literature to examine the myriad factors which shape HE educators' capabilities to teach the crisis, before finally discussing the need for conditions across HE that foster greater deliberation, criticality and opportunities to identify and challenge forms of power which have contributed to the environmental crisis. We introduce a fictionalised vignette that considers the agency of Ali, a HE educator seeking to find ways of teaching the crisis in her own practice, as a case study to support the discussion and ground the analysis in context.

2. Higher education institutions and environmental education

The claim that academia *must* do more to address the environmental crisis is hard to resist. We believe HEIs are obliged to provide leadership in response to the unfolding crisis because as informed and influential actors they have a responsibility to promote forms of action that will mitigate future harms. HEIs' core activities of knowledge production,

education and service to their communities mean that they are uniquely positioned to lead the societal change required to address the unfolding environmental crisis (Facer, 2020). HEIs can and do shape public understanding and discourse, and are often well placed to influence other stakeholders, including through the development of educational practices in schools, colleges and other educational institutions. Many HEIs are situated within local communities while also having a global reach with students, alumni, staff and research as channels for generating influence and disseminating change. There is a strong case for saying that if a stakeholder has the ability to reduce future harm and mitigate injustice (by recognising their own and others' contributions to these harms and by working towards their amelioration) then they are obliged to do just this.¹ As influential stakeholders who have helped shape the status quo and have the potential to initiate forms of social change HEIs clearly hold such obligations.

In a broad sense, education has contributed to the crisis through the production and reproduction of the prevailing forms of knowledge, culture, discourse and social interaction that have led society to the current state of environmental emergency (Kinol et al., 2023; McGeown and Barry, 2023). Today's HE students will be amongst societies' leaders in the near future, so what they learn and how they think and act matters greatly. Changes to education are therefore essential to achieving the social transformation required to mitigate the worst forms of the crisis (Sterling, 2017). The anthropogenic causes of the environmental crisis means that wide scale social change must be underpinned by forms of critical reflection that challenge and disrupt the patterns of thought, behaviour and the broader social formations and arrangements (Stoddard et al., 2021). We are in urgent need of critical and transformative approaches to education that foster learners' attitudes and abilities to understand and take action in response to the interconnected problems of climate breakdown, the destruction of non-human species and ecosystems, as well as rising social and material inequalities.

While establishing the normative claim that HEIs have a collective responsibility to teach the crisis is important, questions about how and by what means this can be achieved have typically received less attention with their complexity overlooked. Indeed, the rhetoric of many HEIs, particularly across the Global North, would suggest that this task is already in hand, and that responding to the environmental crisis is already at the forefront of HEIs' agendas. Studying the pronouncements of HEIs in the United Kingdom, Latter and Capstick found 'universities do, on the face of it, appear to be firmly committed to action and to be pursuing this towards addressing sustainability', and their analysis identifies that 37 UK HEIs had made declarations of a climate emergency (Latter and Capstick, 2021: 6). The extent to which this commitment is shared across the globe is unclear, although to date 1,188 academic institutions are involved in the United Nations Environment Program's 'Race to Zero' campaign, including 165 from the United Kingdom and 337 from the United States.

For the most part, discourse about and action towards environmental leadership from HEIs is oriented towards reducing the environmental impact of their operations. This has typically involved

1 See for example Eckersley's social connection model of responsibility which sets out a notion of collective but differentiated obligations for members of societies that jointly re/produce environmental harms 'through recurrent social practices that are considered "normal" and therefore non-blameworthy' (Eckersley, 2016: 2).

initiatives that aim to divest institutional finances from fossil fuels, lower carbon emissions through changes to estate practices, the creation of sustainability portfolios, and the development and enactment of sustainability strategies (Leal Filho et al., 2019). For example, a recently published document produced by 15 UK HEIs described as a ‘sector-led proposal for action and connected thinking’ for the UK Tertiary Education Sector to meet its Net Zero ambitions (Royal Anniversary Trust, 2023: 1) has little to say about developing pedagogy, and instead prioritises measures around estates, travel and transport, supply chains, finance and investment, resources and the training and development of professional services staff working in estates and across strategic, financial, human resources. The absence of plans for developing educational policies and practices to teach the crisis is striking, and illustrates the marginal role that pedagogical innovation, and education more broadly, has within the HE sector’s response to the environmental crisis. The shortfall in planning has also been observed in practice, where research conducted in the United Kingdom by the Alliance for Sustainability Leadership in Education found that the concerns that HEIs’ students and staff have for implementing meaningful responses to the environmental crisis are unmatched by substantive actions within their institutions (EAUC, 2019). While operational changes across the sector are clearly important for reducing the direct impact HEIs have on the environment and should be welcomed, they represent just one of multiple areas of activity that are required (McCowan, 2020). Indeed, the effects of operational changes could be dwarfed by the potential indirect impacts of a broad-based programme of transformative education that successfully fosters societal change. It is therefore troubling that, as Stewart et al. (2022) and Sterling (2021) have argued, HEIs are largely failing to engage deeply with the unfolding crisis in and through their pedagogical policies and practices. Indeed, Green (2021: 1) goes further, suggesting that HEIs are ‘increasingly part of the problem, not the solution’ to the environmental crisis.

Where HEIs have developed new forms of teaching to respond to environmental concerns, these have often taken the form of stand-alone environmental education modules that are typically taught in a piecemeal fashion, as ‘add on’ stand-alone units (Hegarty et al., 2011). These initiatives are a start; however, they risk marginalising education that addresses the environmental crisis within the HE curriculum in the way that has occurred across secondary education (Glackin and King, 2018), and seem likely to preclude deep and critical forms of environmental education from becoming embedded across disciplinary contexts. Such stand-alone units can offer a ‘free pass’ to existing programmes, allowing them to continue teaching as usual, thereby preventing environmental questions and concerns from being integrated across the university (Hegarty et al., 2011). There are also concerns that stand-alone modules may not support deep and critical engagement that the crisis demands. Indeed, Alcántara-Rubio and colleagues found that where stand-alone modules are oriented towards ‘mere ‘image clean-up’ by including the SDGs in a superficial manner’ (Alcántara-Rubio et al., 2022: 1610) they risk trivialising the environmental crisis. Moreover, where these stand-alone units fail to examine the social, political and economic dimensions of the environmental crisis they can end up reproducing the epistemological and cultural structures which have contributed to it and preventing the development of more (urgently needed) critical and transformative approaches. For instance, the sustainable development paradigm which dominates many HEIs’ environmental initiatives (and indeed those of the United Nations Environment Project, including the Race to Zero campaign) is itself aligned to a global economic model – neoliberal

capitalism – that is committed to economic growth and anthropocentrism (Kopnina, 2020; Warlenius, 2022). This economic model continues to play a central role in the destruction of the natural world, de-centring more ecologically oriented agendas and suppressing more ambitious and transformative discourses (Bessant et al., 2015; Lele, 2017). Shallow approaches to environmental education that do not match the scale of the crisis (including appreciation of the extent of the risks faced, and the complex and multidimensional demands of justice), which neglect critical engagement with its causes and consequences, and which fail to offer the necessary transformative, action-oriented approach that is urgently required must therefore be seen as inadequate.

To summarise, HEIs are typically more interested in responding to the environmental crisis by greening their operations than developing their educational provision. Existing forms of environmental education seem not only piecemeal and inadequate, but may often prevent the development of critical and transformative pedagogical approaches that are required. Thus, there is a need and a demand for HEIs to develop and enact more ambitious pedagogies that will support critical engagement with and transformative responses to the environmental crisis.

Given the scale of the crisis faced and the action required it would be woefully insufficient to leave the task of developing and enacting transformative environmental education to the usual suspects in the ecological and geographical sciences, while allowing the rest of the arts and sciences to retain a ‘business as usual’ approach that is supplemented by access to an optional generic ‘sustainability’ module. Academic institutions around the globe, but particularly in the North, typically reproduce anthropocentric epistemologies and value judgements derived from Western modernity which construct and subjugate the ‘natural world’ as a separate class of being in the service and dominion of human societies (Bonnieuil and Fressoz, 2016; Kopnina, 2020; Machado de Oliveira, 2021; Sultana, 2022; McGeown and Barry, 2023; Nussbaum, 2023). It is therefore the responsibility of all educators from across the entire disciplinary spectrum to develop critical and transformative pedagogy within their subjects that deconstruct and address the values, discourses and practices which have contributed to the present crisis. This demands a fundamental re-evaluation of many deeply entrenched assumptions, including: who we, as human beings, are as a species; how we relate to non-human species and ecosystems; how we have arrived at this crisis point in history; where we as communities, societies and as a species are heading; what contribution existing forms of knowledge, discourse, organisation and technology have made to the crisis to date; and what they might bring to any future action. Critical reflection and radical thinking are urgently needed from all academic disciplines, from mathematics to music, and from medicine to management.

It is colonizing to see the recent proliferation of online pedagogical resources that promote more critical and constructive engagement with environmental crises across HE teaching. For example, the seed library developed by the Faculty for a Future provides a wealth of information, approaches and models for critically engaging with the environmental crises across a wide variety of disciplines. Examples of genuinely transformative pedagogical practice in HE include the work of Andreotti and her colleagues who are located in British Columbia on the lands of the Musqueam people, and sharing their approaches through decolonialfutures.net, or the pioneering approaches of Schumacher College, in Devon, United Kingdom. However, such practices are far from widespread across the sector, typically existing in isolated pockets and dependent on the particular expertise and/or commitments of

determined individuals or groups working within relatively aligned disciplines. At one level, sharing transformative pedagogical resources that engage with the crisis – curricula, pedagogical approaches, assessment models, etc. – is vital if transformative HE practices are to be developed and enacted on the scale required. However, as our analysis will set out, this alone will typically not be enough: in most cases, access to pedagogical resources is a necessary but insufficient condition for developing and enacting the transformative education that the crisis demands. Real progress depends on ensuring that HE educators have genuine opportunities to incorporate these approaches, techniques and resources into their day-to-day practice. It also requires greater recognition that the diversity of disciplinary, institutional and national contexts makes replicating ‘best practice’ across HE sectors a significantly more complicated challenge than can be addressed by merely sharing materials. As we elaborate, creating genuine opportunities for HE educators to teach the crisis means engaging with, and in some instances disrupting, the complex nexus of institutional and political structures which govern HE teaching practices, not to mention the epistemic and cultural dimensions of disciplines themselves. Greater understanding of the nature of the challenge is needed before widespread transformative practice can be developed and enacted.

This article contributes to this work by helping to conceptualise teachers’ agency and opportunities to teach the crisis in contemporary HE. It investigates the genuine opportunities that educators have, or do not have, to teach the crisis in their day-to-day practice by drawing on the capabilities approach (CA), a philosophical and social scientific perspective that is grounded in conceptions of freedom, human flourishing and social justice. We use the CA as conceptual and methodological tool to help draw attention to the various structural factors – personal, social and material – that enable or impede educators from taking up these resources to support deep and critical understandings of the environmental crisis and promote meaningful responses through their practice. The significance of our contribution is two-fold. Firstly, we highlight the importance of developing nuanced understandings of HE educators’ agency and capabilities to teach the crisis and the complex structural factors that mediate these capabilities. This understanding can help to explain how educators’ agency is shaped by such factors, thereby providing a basis for evaluating existing policies, practices and institutional arrangements, and for arguing that significantly more activity is needed than the mere sharing of resources. Secondly, by centring the perspectives of educators, a CA-informed analysis can illuminate the potential diversity of beliefs, approaches and perspectives involved in ‘teaching the crisis’ in a way that supports the creativity and professional autonomy of educators to make situated judgements about how to teach transformative environmentally-oriented education. It also highlights the challenging nature of this work. We will return to develop these points in the penultimate section. For now, we will proceed by introducing the CA with support from a vignette of an imagined HE educator that grounds the CA in a practical example. Although empirical data about the capabilities of HE educators to teach the crisis is needed to advance our understanding (and is an endeavour that we are currently undertaking), this vignette is based on our reading of the academic literature, our interactions with colleagues and reflections on the challenges of developing our own practice. It is presented as an exemplar which we believe will be familiar to many HE educators.

3. Understanding educator's capabilities to teach the crisis: introducing the capabilities approach

Ali teaches in the business school of an HEI in England delivering undergraduate modules on microeconomics, financial practice and industrial organisation. She is increasingly concerned by the climate breakdown and biodiversity loss and aware that the economic theories and methods she teaches are at the heart of systems of economic production and consumption that are driving these problems. Ali knows that many of the prevailing paradigms in classical and neo-classical economics which inform her teaching pay scant regard to the environmental crisis (if it is mentioned, the ‘environment’ is treated as an externality which can be discounted) and has been exploring the possibility of incorporating perspectives from heterodox economics and degrowth perspectives into her teaching. She has accessed a number of online pedagogical resources by the Doughnut Economics Action Lab, including reading lists, seminar activities and alternative forms of assessment which she is keen to include in her modules, and has been inspired by economists working in a Canadian university where movements towards decolonization and environmental justice have produced novel and innovative approaches to business education.

During the summer break Ali is preparing her modules for the coming academic year. After speaking to colleagues and reflecting on her teaching, Ali feels uncertain and reluctantly decides that she is unable to change her practice for a number of reasons: she is required by her faculty to deliver core topics and material in her modules in alignment with expectations of her peers, and with external examiners, which leaves little room for novel and ‘alternative’ perspectives, many of which contradict core aspects of the content matter she is required to deliver; Ali’s senior departmental colleagues view heterodox economic perspectives with suspicion and as unworthy of inclusion in core modules on business and finance courses, and she fears that their inclusion could jeopardize her hopes of succeeding in the forthcoming academic promotion round; Ali is worried that introducing material that explicitly includes political and value judgements may lead students to question her credibility as a teacher and affect her scores in the teaching evaluation survey in which her performance is monitored; given significant workload pressures Ali feels she lacks sufficient time to redesign her teaching practice; Ali discovers that in order to be consistent with the module descriptions advertised to students her department require any changes to her modules’ learning aims, curricula and assessment tasks to be submitted for approval via a lengthy bureaucratic processes, with the deadline long since passed; and finally, Ali is aware that room allocations have been made for the forthcoming semester, and that finding appropriate spaces that will accommodate small group discussions or active pedagogies amongst her large undergraduate cohort will be extremely difficult.

Ali feels deeply frustrated. She remains interested in developing alternative approaches to her teaching but feels she lacks the ability to do so. Ali concludes that she is not in a position to change her practice without further support and therefore resigns herself to continuing to deliver the modules as they had previously been taught.

What can we say about the agency and opportunities that HE educators like Ali have to teach the crisis? What are the factors that shape the formation of such opportunities, and what might need to

be done to support HE educators to develop and enact transformative forms of environmental pedagogy in their practice? These are complex questions that are not easy to answer. For this reason, we apply the capabilities approach (CA) as our theoretical framework and to guide critical reflection. Here we also note that the CA can also act as a methodological tool to aid empirical investigation in this area.

Ingrid Robeyns describes the CA as ‘a broad normative framework for the evaluation and assessment of individual well-being and social arrangements, the design of policies, and proposals about social change in society’ (Robeyns, 2005: 94). The CA was developed by the Nobel Prize winning philosopher-economist Amartya Sen in response to what he saw as the limitations of prevailing conceptions for measuring well-being, equity and quality of life (particularly classical and neoclassical economics, utilitarianism and Rawlsian political philosophy) which he argued revealed little about the lives and freedoms of individuals and groups (Sen, 1999, 2009). Rather than focusing on the goods, resources and commodities a person has access to or the things they may be able to achieve, the CA seeks to understand what people can *do* and *be* in their lives, and the freedoms they have to achieve those things which they value. The CA has become embedded across a wide variety of fields and disciplines, contributing novel insights within philosophy, economics, the broader social sciences and has been applied to the evaluation and design of policy and practice, especially in the fields of international development (Nussbaum, 2011; Stewart et al., 2018), healthcare (Venkatapuram, 2013; Entwistle et al., 2016) and education (Saito, 2003; Walker, 2005). While initially concerned with questions of human well-being and social arrangements, the capabilities approach has subsequently been applied to concerns about ecological integrity (Schlosberg, 2012), animal rights (Nussbaum, 2023) and multispecies justice (Cripps, 2022). Thus, it has the potential to prompt reflection about how we can learn to live well together with non-human species and ecosystems in the context of the environmental crisis, and how we might promote opportunities for ecological kinship with other species (for example see Dunkley, 2023).

For our purposes, the CA provides a framework for investigating the agency of individual HE educators (or groups of HE educators), taking into account their experiences, beliefs, ambitions and values, and for understanding their agency in the context of the particular material and social circumstances in which they are situated. Key to this perspective is the distinction made by the CA between a person’s access to resources and the real opportunities, or capabilities, this person has (or does not have) to act as a result, and what this means for the ‘functionings’ they can achieve. The CA defines functionings as the valuable activities and states – the doings and beings of a person’s life – that are central to their well-being (for example, the state of being well-nourished, or of being a teacher). By contrast, capabilities are the freedoms and opportunities a person has to achieve particular valued functionings (for instance, the opportunities a person has to eat if they wish to, or to fulfil an ambition to become a teacher). The vignette above can help to illustrate this distinction: Ali does not have the capability to change her pedagogical practice and achieve the valued functioning of teaching the crisis despite being highly motivated and having access to the educational resources which suggest how this might be done. The reasons for this are complex but include a range of factors which affect Ali’s ability to convert this resource access into genuine opportunities to teach the crisis. To use the language of the CA, the circumstantial ‘conversion factors’ which

constitute Ali’s institutional and professional context limit her capabilities to develop new forms of teaching. These factors include social and environmental factors like institutional culture, bureaucratic regulations, epistemic and scientific norms within her discipline, interpersonal and professional relationships, student expectations, and so forth. The opportunities that Ali has are determined not only by her access to resources, but also by other myriad conversion factors which shape her capabilities to achieve the functioning of teaching the crisis in her day-to-day practice.

The CA does not suggest that capabilities are the *only* thing that matter. Rather, it suggests that factors like the distribution of resources or institutional procedures make particular capabilities possible, and the achievement of functionings – like education itself – provides the grounds for future capabilities opening up. The key point is that according to the CA it is capabilities that should be treated as the primary unit of analysis. The benefits of this are three-fold. Firstly, focusing on capabilities draws attention to the diverse structural circumstances in which people are operating. For instance, it might be relatively easy for Ali’s colleague Runa to teach the crisis at the same institution given her position teaching human geography with colleagues in a department that is committed to promoting critical thinking about environmental issues. Unfortunately, Ali does not enjoy such amenable disciplinary or departmental conditions. Understanding Ali’s agency as mediated by challenging structural factors provides a basis for developing a nuanced explanation of how (and why) her opportunities are formed and, in this case, circumscribed. Indeed, the CA can provide a means of understanding the (unequal) distribution of opportunities across society, helping to explain why some people, as individuals or groups, appear to enjoy opportunities that others do not. In so doing, it can also provide a means of evaluating and critiquing the structural conditions (including, for instance, policies, practices and institutional arrangements) that underpin the distribution of agency.

Secondly, the CA recognises that a person’s capabilities are not simply shaped by their structural circumstances and factors external to them, they are also mediated by the person themselves, by their beliefs, values, dispositions, talents and choices. Analysis must account for the idiosyncratic and personal dimensions of each case. For example, Ali’s awareness of the depth of the environmental crisis leads her to make a resolution to integrate this into her teaching, but her lack of support undermines her resolve, resulting in a belief that it will be too difficult for her to achieve in practice. Others may interpret their own situation differently, and have different levels of awareness, expertise and contrasting values and motivations in relation to the crisis. The CA encourages an understanding of peoples’ capacity to be active and creative agents, including of their own capability development, while recognising that this agency will be influenced by a variety of factors, including social structures and relationships.

Thirdly, the CA is committed to value pluralism, which recognises that more than one thing matters, and that reasonable people may disagree about what this is. A CA-informed stance would resist overly prescriptive approaches to teaching about the environmental crisis and instead encourage HE educators to reflect (individually and collectively in communities of practice) critically and carefully about what matters in their teaching, and how they can foster the same critical reflexivity in their students. Promoting such pluralism seems particularly important when pedagogy becomes oriented towards social transformation and bound up with political and ethical

judgements, and in order to resist the dangers of indoctrination whereby students are taught what to think and how to live, rather than how to think critically about living well together in the unfolding crisis (Jickling and Wals, 2008; Bangay and Blum, 2010).

In summary, it is worth underlining the relationality of the CA as a framework for conceptualising agency as mediated by a wide variety of factors and conditions, including networks of culture and structures of power. Owens et al. summarise the relational dimensions of the CA in these terms:

Capabilities are the genuine freedoms, opportunities, or causal powers that a person has to be or do things. They emerge from, and can be either sustained and strengthened or diminished or lost over time as a result of complex interactions between the person's own interpretations and actions and the dynamic nexus of material and social structures within which they live their lives. A person's power or agency to influence their own interpretations and actions, and to some extent the situations and relationships in which they are embedded, is itself a product of the complex multitude of causal mechanisms that constitute the person and their environment. Their agency can also be said to depend on, or be part constituted by, some of their particular capabilities. And particular capabilities can both contribute to and be supported by other capabilities. (2022: 100)

Recognising the relationality of agency in this way makes the CA compatible with a number of research traditions and approaches, not least critical theory, feminist and decolonial perspectives. Such approaches underscore the need to understand agency as mediated by political and cultural structures of power associated with capitalism, gender inequality and the legacies of colonialism, respectively. As Owens et al. (2022) make clear, the relational dimensions of the CA also make it potentially compatible with complex systems theory, itself a key perspective for understanding the environmental crisis, its causes and its potential remedies.² From this relational perspective, the discussion below examines some of the important personal, material and social conversion factors which affect the agency of HE educators and shape their capabilities to teach the crisis.

4. Factors affecting the capabilities of higher education educators to teach the crisis

The agency of educators is relational, meaning it is shaped by a complex array of factors (Molla and Nolan, 2020). In this section we draw on the CA alongside the extant academic literature and Ali's story, to reflect on salient personal, material and social conversion factors affecting HE educators' capabilities to teach the crisis. For clarity, our discussion follows the CA's analytical distinctions between these

three groups of factors, but we readily acknowledge that many of the factors will overlap and/or span these groupings. We will particularly focus on examining the influence that social conversion factors have on HE educators' capabilities to teach the crisis; factors that tend to be overlooked given their status as intangible and complex social entities which can be hard to observe and analyse and have a propensity to generate inconvenient questions. Our aim is to recognise and affirm those factors which open up opportunities for HE educators to develop and enact critical and transformative environmental pedagogies, and to highlight factors which act as barriers to doing so. This discussion is offered as a tentative outline to inform the necessary empirical work of testing and potentially validating the points made above. By providing examples of the sorts of factors that shape the capabilities of HE educators to teach the crisis it offers a more substantive account of the structural formation of HE educators' agency, as well as an indication of which factors might be generalisable and/or context specific.

4.1. Personal conversion factors

As set out above, personal factors affecting the capabilities of educators to teach the crisis might include a person's beliefs, dispositions, attributes and characteristics. Personal conversion factors which support opportunities to teach the crisis may include (but are certainly not limited to) the following: an educator's knowledge and awareness of the crisis (including specific aspects and the broader context in which it is situated and through which it has emerged); their confidence and competence to incorporate the crisis into their existing teaching; and their inclination and motivation to find ways to embed the crisis in their teaching practice. It will be important to take into account the complexity of intrapersonal dynamics, and the significant scope for interpersonal variability: in Ali's case her knowledge and awareness of the crisis and motivation to respond is somewhat hampered by her limited sense of agency, but as we have noted this may not be true of others in similar positions.

Molla and Nolan use the terms 'inquisitive agency' to refer to the 'specialist knowledge and skills' educators require in order to be able to execute their work and 'deliberative agency' as the capability to 'critically reflect on one's practices and on theories and assumptions that inform the practices' (2020: 72–3). Exhibiting deliberative agency involves critically evaluating one's own (and indeed others') teaching practice to consider how it might be developed and improved. Both inquisitive and deliberative agency are of central importance to educators' capabilities for pedagogical innovation. Developing ways of teaching the crisis requires core skills and specialist knowledge that straddle disciplinary traditions, and without structured time for deliberation and opportunities for peer observation and discussion, educators may lack opportunities to think about the relevance their work has to the environmental crisis or to imagine how they can respond. For instance, it may never occur to educators that they might: teach their students outside of traditional classroom settings; move beyond the standard lecture/seminar/laboratory format; develop non-standard forms of assessment other than exams and essays; include opportunities for affective, alongside cognitive, responses to stimuli; incorporate current events into their teaching; and bring in external partners and guest speakers. These possibilities depend on a range of other (material and social) factors, but in general, educators' capabilities to teach the crisis will be supported by greater knowledge,

² Further research is required to understand the potential for using complex systems analysis to understand and promote social transformation in response to the environmental crisis. However, following the analysis of Meadows (1999) it may be that embedding critical and transformative environmental education across HE represents a key 'leverage point' through which social change may be accelerated.

confidence, competence and support for motivation, imagination, deliberation and reflection.

Support to develop personal conversion factors that enable individual educators to teach the crisis will be an important objective for HEIs. While data concerning the preparedness of HE educators to teach the crisis is limited, there is evidence in England that high proportions of school teachers feel inadequately trained to do so (*Teach the Future*, 2021; Greer et al., 2023b). What seems clear is that it cannot be assumed that every HE educator will be on an equal footing when it comes to their engagement with or concerns for the environmental crisis. Indeed, some educators may be unaware of the scale and depth of the crisis, others might be disinclined to make changes, and/or others may offer reasons why they believe it is not appropriate for them to change their practice. The degree of confidence (or perhaps courage?) that educators have to seek to implement transformative forms of pedagogy may, quite reasonably, vary given the differing positions that educators find themselves in. Many educators will no doubt feel they lack the subject knowledge required to design and enact new forms of pedagogy, or indeed that attempting to teach the crisis could expose the limitations of their knowledge and pedagogical abilities. This is a substantial issue that can only partly be addressed through access to pedagogical resources and support, especially as subject knowledge, mediated by perceptions of experience, is closely linked to confidence and self-efficacy (Bandura, 1997). There is also the question of developing the pedagogical techniques, competencies and skills required to teach sensitive and emotionally challenging issues associated with the environmental crisis, especially those associated with loss and damage, injustice and/or catastrophic risk. Such teaching requires interdisciplinary engagement across a broad range of topics, incorporating critical, normative and political perspectives and challenging emotional engagement, and this can be demanding of even the most experienced and skilled educators (Finnegan, 2022). Indeed, for many HE educators a key challenge may be dealing with their own negative emotional responses to the crisis (including for example feelings of fear, grief and loss) and channelling this positively into their teaching (see for example Verlie, 2022). Finding the means to navigate this emotional labour and to cope with potential discomfort and disagreement in classrooms, as well as the possibility of uncertainty, disappointment or even failure should students, or indeed colleagues, react negatively to the novel pedagogies being introduced is highly skilled and demanding work.

4.2. Material conversion factors

Alongside personal factors, a range of material factors will shape the capabilities of HE educators to teach the crisis. Material conversion factors might ordinarily be understood in terms of the environmental surroundings, physical infrastructure, facilities, and goods, commodities and various other resources that shape educators' opportunities. This draws attention to the local geography of and infrastructure on campus, as well as access to the books, technologies, classrooms, laboratories, field trips and any other pedagogical resources which may be required for education to take place. Ali's case illustrates the types of constraints that can be encountered when trying to introduce creative pedagogies into inflexible HE learning spaces, especially where limits are imposed by factors like the size of rooms or the type of furniture present. Alongside consideration of material resources and teaching spaces, there is growing consideration

about the importance of the 'places' where education occurs, for example in the academic literature on 'place based learning' for environmental education (e.g., Ayotte-Beaudet et al., 2017) that highlights the relationship between modes of pedagogy and the natural world. Further, indigenous knowledge and practice is often steeped in cultivating a connection to and valuing of place and land, while the pioneering educational approach of wild pedagogy aims to re-orient learners with 'wild places', 'nature', and non-human beings, and by moving learning outdoors and into less managed spaces so that 'the places we visit to become an integral part of our work' (Morse et al., 2018: 241). While some HEIs will be located on campuses which afford learners access to green spaces or to less managed environments and, thus, ready opportunity for connecting with non-human species and ecosystems, many HEIs are located within highly urbanised environments without such access. While urbanised environments may afford some pedagogical opportunities (for example, they may be instructive settings to discuss certain technological responses) they might be perceived to limit what is pedagogically possible for teachers. Either way, location, physical environment and access to 'wild' and 'natural' places can be treated as a material conversion factor affecting the capabilities of HE educators to teach the crisis.

As already established, access to appropriate pedagogical resources is also a necessary condition for educators to have opportunities to teach the crisis. Such resources can have a transformative effect on the possibilities for educational practice and they should continue to be developed and shared across disciplinary and institutional contexts. We have argued that new pedagogical approaches must not reproduce the forms of knowledge and pedagogy that have led to this current state of emergency. Therefore, it is important that educators can access resources that draw on decolonial, feminist, indigenous, heterodox and eco-centric perspectives. With this in mind, it seems likely that forms of professional development and dynamic relationships of pedagogical support (which we acknowledge could also be classed as a social conversion factor, see below, and which will clearly impact on personal conversion factors) will be important for supporting educators' agency (Imants and Van der Wal, 2020). This might take many forms, ranging from local departmental or institutional support to large scale global networks of peer-to-peer learning and knowledge exchange (such as Faculty for a Future).

4.3. Social conversion factors

The discussion of personal and material conversion factors above points to a related set of social factors that affect the capabilities of HE educators to teach the crisis, particularly institutional arrangements, cultures and working conditions. For instance, institutional discourse can have an indirect influence on the agency of HE educators by establishing the context in which pedagogy is maintained and developed. To create a permissive context that supports educators' agency to teach the crisis it will be important that senior management at HEIs 'set the tone' by recognising the seriousness of the environmental crisis, articulating institutional obligations and ambitions and by putting in train meaningful action for their realisation. Public statements that recognise the seriousness of the environmental crisis and pledge institutional commitments to support societal transformation (such as those that accompany HEIs' declarations of a 'climate emergency', or their involvement in the United Nations Environment Program's 'Race to Zero' campaign) can

be helpful where they set an agenda and establish the socio-cultural context within which educational priorities, policies and practices are developed. Forms of critical and transformative environmental pedagogy can often align with institutional mission statement (which, in many cases, seek to promote public good and encompass aspects of education, research, service to communities) and may thus be seen as a means of enacting institutional priorities. Moreover, public statements that make environmental commitments can help to reinforce institutional responsibilities, and generate a level of accountability. For example, the greening of institutional operations has both intrinsic and symbolic value, sending positive signals to staff, students and external stakeholders that institutions are upholding their obligations and taking action to address the environmental crisis. However, Latter and Capstick identified a tendency amongst UK universities to 'use declarations as publicity and promotional material' (Latter and Capstick, 2021: 1) while O'Neill and Sinden characterise some HEIs activities and pronouncements on sustainability as 'boosterism' deployed for reputational purposes (2021: 35). In view of this, it is clearly important that such statements do not operate simply as performative rhetoric and that they are accompanied by meaningful and substantive action.

It will be particularly important that HEIs recognise, value and promote the work that educators do to develop pedagogies which teach the crisis. Rather than Ali fearing being penalised in academic promotion or being criticised for scoring poorly in students' evaluations of her teaching, she might be motivated by the knowledge that her attempts to trial new pedagogies and introduce alternative perspectives would be acknowledged by her colleagues and evaluated in a supportive peer-environment. Molla and Nolan describe the importance of 'recognitive agency' (2020, 74) for supporting the capabilities of educators, suggesting that recognition from senior colleagues and management for the value of the work educators undertake can support their autonomy, particularly in terms of enhancing their morale, motivation and confidence. This again underlines the importance of management cultures in HE that 'get' the seriousness of the crisis and the urgent need for an educational response across HE. It also illustrates how HEIs' policies and practices are a salient form of social conversion factor that interrelate with personal conversion factors and affect educators' broader capabilities to teach the crisis. Leadership and management across HE will need to carefully consider how their behaviour, and the broader institutional context (including forms of educational culture, recognition, professional development, support for innovation and administrative processes and frameworks) will influence for better or worse educators' agency. This matters because there is likely to be considerable uncertainty from many educators about how critical engagement with the environmental crisis (and the complex political and ethical questions this raises) could be integrated into their teaching, especially in supposedly 'non-aligned' disciplines (for example, in classics or linguistics). Support might include targeted forms of pedagogical advice, professional development and/or the creation of communities of practice and networks of knowledge exchange to help educators understand the relevance of the environmental crisis to their discipline and to develop appropriate and effective pedagogy aligned with existing curricula (Sibbel, 2009). In addition, bureaucratic assistance may be needed, perhaps most importantly the allocation of time to develop and test novel pedagogical approaches. If educators are to develop critical and effective forms of pedagogy which are transformative in nature and

commensurate with the depth and complexity of the crisis, they will need time and space to think and plan.

At present, many HE educators may feel that embedding the crisis in their teaching is beyond what is possible for them, particularly where their time is already highly pressured and unmanageable workloads are endemic across the HE sector [as is the case in the United Kingdom (University and College Union, 2022) and elsewhere (Miller, 2019; Haven et al., 2020)]. A key variable in this respect will be how leadership and management of HEIs respond, and whether they will be prepared to act in support of educators' agency to develop and enact novel forms of critical and transformative environmental pedagogy. Corporate management approaches have become commonplace in HEIs around the world over the last decades, and reductions in public funding, globalisation and the rise of neo-liberal governance strategies have led HEIs to become more competitive and business oriented (McGeown and Barry, 2023). Kenny and Fluck describe an international trend in HEIs that produces a 'strong focus on efficiency, productivity and accountability' (Kenny and Fluck, 2022: 1371) and which may limit the time and space afforded to educators to develop and implement novel pedagogical approaches. Education in HEIs has been described as increasingly subjected to neoliberal reforms and application of 'top-down' new public management techniques (Ferlie et al., 2008; Broucker and De Wit, 2015) which include strict use of quantitative data and metrics to evaluate educators, measure student experience and satisfaction and to rank performances of educators, programmes and institutions (Cribb and Gewirtz, 2013; Dougherty and Natow, 2020). Within HEIs, as across education more widely, the prevailing techniques and pressures of the neoliberal policy regime has curtailed the professional autonomy of educators (Molla and Nolan, 2020). Amongst other things, it seems likely that some reconsideration of the pervasive model of top-down and tightly regulated management regimes across HE will be needed to support educators' agency to develop and enact innovative, transformative environmental pedagogies, and for these to proliferate across the sector.

Broader cultural and institutional attitudes and agendas concerning the crisis are important social factors influencing HE educators' agency. For example, recognition of the threat to health posed by climate breakdown and calls for urgent change expressed by leading medical organisations (Atwoli et al., 2021; WHO, 2021) can positively contribute to a culture where social transformation is seen as necessary and desirable. Of course, collective action, organising and activism concerning the crisis exist already in many forms across HE, from students' campaigning³ to trade union activities.⁴ There is also evidence that a growing number of HE students want to learn more about the crisis (SOS, 2022). However, where novel pedagogies significantly disrupt existing teaching patterns and/or run counter to the expectations and supposed interests of those within HE (including students, academic staff, managers, etc.) and beyond it (e.g., corporations, employers' organisations, politicians, regulators, professional bodies, etc.) the agency of educators may be impeded. For instance, where influential stakeholders are unsympathetic or indeed hostile towards approaches to environmental education which are explicitly political, critical and transformative [as may be the case with the UK government's demands for conservative and apolitical

³ <https://www.sos-uk.org>

⁴ <https://www.ucu.org.uk/environment>

approaches to environmental education in schools (Glackin and King, 2020) or where education is being directed towards promoting the interests of fossil fuel corporations (Tannock, 2020)] it may be extremely difficult for educators to enact changes.

Similar difficulties may be experienced by educators working in HE disciplines which have canonical curricula, as illustrated in Ali's story, and where there are strong expectations that epistemological and methodological norms and pedagogical conventions are respected and reproduced. This will of course vary across disciplinary contexts: in some disciplines discussing the political, social and/or ethical dimensions of the crisis might complement existing approaches, but in others such discussions might feel unfamiliar, inappropriate and/or beyond the bounds of knowledge or concern. For instance, within scientific disciplines with a strong tradition of positivist methodologies and epistemologies there may be resistance to incorporating the political, cultural and normative dimensions of the environmental crisis into teaching practice, elements we believe are essential to understanding the complexity and uncertainty of the crisis and developing the critical and transformative pedagogies that are needed.⁵ Teaching the crisis may place demands on educators to move into uncomfortable spaces that transcend the boundaries of their discipline and challenge the norms and standards that govern their community of educational practice, at least as these have been typically conceived. A lively debate is already underway about such difficulties, with Gardner et al. (2021) contending that in the face of the unfolding crisis scientists and other researchers are obliged to abandon their supposedly 'neutral' and 'impartial' positions and adopt roles as academic advocates and activists. What is needed, therefore, are conditions which create opportunities for academics to discuss within communities of practice the implications and complex questions that the environmental crisis has for knowledge, methodologies, norms and conventions in their disciplines. Such opportunities might be found in 'set-piece' initiatives like colloquia at academic conferences or articles sharing experiences and best practice in journals and society publications. Perhaps more importantly such opportunities would be grounded in educators' routine interactions, for example, through discussion at departmental meetings, teaching forums, peer-observation, and within the 'organic' and informal exchanges which are part of day-to-day academic life. However, there is a danger that at a time when HEIs need to be supporting educators to develop innovative transformative forms of pedagogy, the prevailing institutional arrangements, organisational cultures and epistemic norms – what we might call the neoliberal structural conditions of contemporary academic life (McGeown and Barry, 2023) – are curtailing the agency of educators, leaving them stuck in conventional modes of teaching with scant opportunity to develop and enact ways of embedding the crisis in their teaching.

Given these challenges, it is perhaps unsurprising that, as established above, many HEIs elect to incorporate concerns about sustainability and the environment in specialist stand-alone modules

that avoid detailed examination of the socio-political and/or ethical dimensions of the crisis. Such policies and practices can themselves be understood as curtailing HE educators' capabilities to embed the crisis in their teaching. If educators believe that environmental issues are being catered for by specialists elsewhere, they might view their responsibility to engage with these issues as being met by others and/or that it would be best to avoid any unnecessary repetition. Meanwhile, if prevailing institutional cultures typically construct 'the environment' and 'environmentalism' in reductive terms (e.g., by sticking closely to the paradigm of sustainable development) educators may feel unable to transcend this narrow framing to discuss more contentious topics, or indeed it may not even occur to them to do so. This point reflects the dominance of anthropocentric and capitalistic environmental discourses that permeates not just HEIs but the (largely Western/ised) societies of which they are a part (Washington et al., 2021). Shallow and piecemeal approaches to environmental education that provide HEIs with a rhetoric that assures that action is being taken and obligations are being met (despite these actions brushing over and, in some cases, obfuscating the structural causes of the crisis) can stymie educators' possibilities for developing and adopting deeper and transformative pedagogies that critically engage with the arrangements which have contributed to the crisis (O'Neill and Sinden, 2021).

We end this section with a brief but important point about the broader social factors shaping academic identities, experiences and agency and the importance of adopting an intersectional approach to any assessment of capability bearing in mind persuasive inequalities associated with identity and social position. As we have said above, the agency of educators is relational, and because HE educators' identities vary significantly, they will occupy different positions in relation to the demands of 'teaching the crisis'. For example, there is evidence that female academics tend to have greater teaching and administrative workload commitments than their male counterparts (Guarino and Borden, 2017; O'Meara et al., 2017; Cabero and Epifanio, 2021) and are typically in less senior academic positions (Aiston and Kent Fo, 2021). We also know that socio-economic class (Haney, 2015; Waterfield et al., 2019), race and ethnicity (Bhopal, 2016), disability (Olsen et al., 2020) and employment status (particularly in contexts of precarious employment and casualised contractual arrangements, see for example Crimmins, 2017) all affect the experiences and agency of academics working at HEIs. It is therefore important that any understanding of the conversion factors affecting the capabilities of HE educators to teach the crisis must be sensitive to the diverse identities and circumstances of educators themselves, and to the stubborn and pervasive influence of social inequalities, within and beyond the academy.

5. Enacting an educational strategy: diversity, deliberation and critical transformation

In this penultimate section we return briefly to our vignette to consider questions surrounding HEIs' enactment of an educational strategy for teaching the crisis, highlighting issues of deliberation, criticality and diverse forms of pedagogy which seem central to successfully enacting a critical and transformative educational strategy.

⁵ Machado De Oliveira (2021) has argued that it is reductive and rationalistic approaches to epistemology (e.g., that separate facts and values and which silence and exclude marginalised communities) that has informed Western industrial progress throughout the modern period and which has helped to bring the crisis about.

The Dean for Education at Ali's university is proposing to implement a major educational initiative which will deliver teaching on 'environment and sustainability' to all undergraduate students. Given her interests in this area, Ali is invited by her head of department to join the working group tasked with developing the strategy for enacting this initiative. After lengthy discussion the working group settles on two possible options: the first proposes the development of a single new compulsory stand-alone module to be taken by all first year undergraduate students that provides an interdisciplinary introduction to 'environmental sustainability'; the second option is for a distributed and integrated approach that sees the university provide academic departments with support to embed the themes of environmental crisis and sustainability into their programmes' existing core modules.

The first option attracts considerable support within the working group, with its advocates arguing that it would be the simplest and least resource intensive way to incorporate environmental concerns across the university's undergraduate teaching because it would allow a small group of experts to deliver the content without disrupting existing taught programmes. It would also enable management to retain oversight of the emergent programme and to steer its development. However, Ali makes the case for the second option, giving four key reasons. Firstly, a stand-alone module risks becoming marginalised and devalued by staff and students, so if this topic is to be taught effectively, integration with specific disciplines and subjects will be preferable. Secondly, because the environmental crisis is relevant to education in all disciplines, a distributed and integrated approach is needed to provide departments with opportunities to meet their responsibilities while bringing their teaching 'up to date' with the unfolding crisis. Ali cites her own teaching in the Business School around financial accounting and management, explaining that decades of teaching neoclassical economics that treats environmental concerns as externalities have effectively reproduced forms of knowledge and culture which has played a key role in the development of the crises faced, and that there is a need for a change of economic paradigm if their teaching is going to be fit for purpose. Thirdly, a distributed and integrated approach has the potential to cultivate novel and diverse forms of pedagogy across the university which would be sensitive to the demands, standards and contexts of particular disciplines. Fourthly, this approach would be an opportunity to support the professional development and autonomy of colleagues as pedagogues. Ali suggests the university should create an expert-led service unit which can work with educational leads within departments to explore how the environmental crisis could be integrated within existing programmes, and could provide them with whatever advice, funding, resources and support that may be needed.

While Ali has some support from fellow academics within the working group, the Dean and other members of senior management favour the first option. Despite her representations for a distributed and integrated model garnering some support within the working group Ali is not confident that the pending vote on the initiative will go her way.

The vignette illustrates the potential that a distributed and integrated approach to embedding transformative environmentally oriented pedagogy across disciplines and programmes of HEIs could have, as well as problems that this approach might encounter along the way. Adopting a distributed and integrated approach would mean centring the agency of HE educators to develop and enact pedagogies for teaching the crisis in their specific disciplinary contexts. If HEIs

attend to the various factors that affect educators' agency and create supportive conditions for this work, this strategy could produce a profusion of novel pedagogical methods and approaches. Not only would this promote the professional development, autonomy and agency of educators, it could be broadly transformative for higher education itself, enabling, as Green suggests, HEIs to better fulfil their 'over-arching mission to humanity and the planet' (Green, 2021). Of course, it is by no means clear that HEI leaders would favour such a distributed and integrated approach, especially given the financial and institutional resources that may be required to implement it, and the relative simplicity and control afforded by offering stand-alone modules.

Those making decisions about educational strategy will need to engage in forms of deliberation and critical reflection about the forms of pedagogy deemed appropriate and how the inevitable plurality of perspectives, beliefs, interests and values may be managed. As such, a further advantage of adopting the CA in conceptualising educators' agency to teach the crisis is that it emphasises the importance of creating arrangements and practices which respect and promote freedom, value pluralism, democratic deliberation and participation while paying attention to the ways in which (personal, material and social) conversion factors will affect agency (Sen, 2009; Bonvin et al., 2018). This may prove particularly helpful for the development of distributed and integrated educational strategies which will need HE educators to deliberate and decide for themselves, in communities of practice, how the crisis should be taught in their particular institutional, social and disciplinary contexts. How, in practice, such deliberation takes place can be determined locally, but Sen's work emphasises the importance of democratic processes supported by egalitarianism, free participation and public reasoning (1999).

While endorsing this emphasis on deliberative democracy, we do, however, argue that this and the development of pedagogy more generally, must be conducted with regard for the full nature, extent and depth of the environmental crisis we face. While educators should be free to decide together what and how to teach, the pedagogies adopted should be commensurate with the scale of the crisis and must provide opportunities for a deep and critical engagement with its social, political and ethical dimensions. As Kopnina (2020) suggests, this may lead educators to consider incorporating critical perspectives and non-standard pedagogies which are ethically and epistemologically open to non-Western knowledge and culture and ecocentric values. For example, they may draw on indigenous knowledge, local and traditional forms of learning as well as heterodox economic perspectives and notions of multispecies justice and kinship, putting ecological concerns before the interests of humans and capital (for example see Taylor and Pacini-Ketchabaw, 2015 and Dunkley, 2023). Such pedagogies could promote opportunities for participants to imagine alternative economic, political and ecological futures. Indeed, they could create fertile ground for deep and radical forms of learning to occur, those required for the social transformation needed to mitigate the most severe consequences of the environmental crisis.

Introducing critical and transformative pedagogies may prove challenging for staff, students, administrators, managers, and those already working within environmental and sustainability roles with HE and beyond. O'Neil (2021: 1) has characterised the relatively fixed nature of economic, administrative and faculty structures in HEIs in

terms of ‘institutional fragility’ which acts as a barrier to HEIs contributing meaningfully to a sustainable future. Of course, pursuing critical and transformative educational strategies could be controversial because of their potential to disrupt existing administrative processes and institutional priorities, and for challenging dominant constructions of knowledge and prevailing structures of power that this knowledge supports. For example, in our vignette Ali’s disagreement with her departmental colleagues about the need to introduce heterodox in place of neoclassical economics, and her advocacy for a distributed and integrated pedagogical approach in contrast to the views of her Dean, illustrates the sorts of disagreements and disruption that may be experienced across departments and institutions. As well as requiring additional pedagogical and administrative labour, in many cases, changes will involve confronting the dominance of neoliberal politics and cultures of Western Modernity, within HE and across broader society. Doing so will entail challenging constructions of ‘the environment’ and ‘environmentalism’ in ways that are compatible with continued economic expansion, market fundamentalism and the continued dominance of human beings over animals and ecosystems (Hatzisavvidou, 2020; Machado de Oliveira, 2021; Greer et al., 2023a). Such confrontation might be expected given that the task at hand is to develop forms of education that are capable of responding to an anthropogenic environmental crisis that has its root causes in centuries of capitalist and colonial power (Sultana, 2022). That HEIs, in the United Kingdom and globally, have typically developed within and continue to serve these same structures of power will perhaps make conflict unavoidable. However, understanding and addressing the crisis is an inescapably political endeavour. Teaching the crisis cannot be a neutral, apolitical business: it will inevitably involve understanding and confronting vested interests and the central role of economic, social and political power that have caused the crisis, including hegemonic epistemologies, cultures and discourses that operate within and across HE (Stoddard et al., 2021). As Kohn (2016: 146) points out ‘Anthropocentric hegemonies will not allow space for dissent unless we create it’, and the critical and transformative education that the crisis demands will need to be ready to confront entrenched interests and dominant forms of power, within the academy and beyond.

6. Conclusion

Further research is urgently needed to support knowledge and understanding in this area. We are in the process of undertaking empirical research with HE educators and students to illuminate the challenges of and possibilities for developing and enacting critical and transformative ways of teaching the crisis across HE institutions and disciplines. For now, it is clear that HEIs have a responsibility to develop their educational provision in ways that will support the social transformation needed to mitigate the worst effects of the environmental crisis, and while the agency of HE educators is central to this it must not be taken for granted. As we have argued, promoting opportunities for HE educators to develop and enact critical and transformative environmental pedagogy in their day-to-day teaching practice is a complex business mediated by a variety of (personal, material and social) factors. It involves negotiating conflict, and understanding and confronting entrenched structures of power, from the local and institutional to the national and global.

It is positive to see HEIs making commitments and pledges to respond to the environmental crisis, and the proliferation of pedagogical resources and growth of networks and capacity building initiatives is similarly to be welcomed. Nevertheless, we must question whether these developments are sufficient for progress, and why it is that it is still so challenging for HE educators to embed the environmental crisis in their teaching. To gauge the progress HEIs are making in this area we suggest a single practical question can be asked of their commitments, actions or initiatives: how far does it help to create genuine opportunities for educators to teach the crisis in a critical and transformative manner, and what else may be needed for it to do so? This question prompts critical reflection about what is really needed from HEIs. Professed concern and ambition from HEIs about the crisis, encouraging rhetoric from management and enhanced access to pedagogical resources are all important but will often not be sufficient to enable educators to develop and enact the critical and transformative pedagogies that are needed. Greater attention must be paid to the complex combination of factors which mediate HE educators’ agency and which make teaching the crisis more or less possible for them. In particular, alongside personal and material factors, close critical attention must be paid to the role that social factors have in shaping educators’ opportunities, especially to epistemic and disciplinary norms, institutional policies and practices, and the broader formations of culture and power that structure HE.

As our analysis has demonstrated, the CA can help to guide understanding and action in this area. As well as supporting conceptual insights, the CA can guide much needed empirical inquiry about the extant opportunities HE educators have to develop and enact critical and transformative environmental pedagogies, how these opportunities are formed and structured, and their experiences of attempting such work. As a starting point, the CA provides clarity about the distinction between educators’ access to pedagogical resources and their capabilities to teach the crisis in their day-to-day practice. Moreover, by highlighting the complex (and somewhat overlooked) factors that mediate HE educators’ agency the CA can illuminate the scale of the challenge faced, and the importance of anticipating and finding ways to address political challenges bound up with power structures within and beyond the academy. Of course, there is a significant amount of work to do (beyond the scope of this paper) to identify and develop pathways for successful action. How these challenges can be overcome is an open-ended question which will vary depending on local circumstances. There is, however, much to learn from the experiences and efforts of educators who have been engaged in promoting decolonial, anti-racist, feminist, queer and heterodox curricula and pedagogies across HE. Since these movements are based on critical perspectives which disrupt HE’s status quo, analysis of the opportunities and challenges that these educators have experienced and continue to face may be instructive for understanding the agency HE educators have to teach the environmental crisis. There will also be much to draw on from these movements that informs the substantive content and pedagogical methods of critical and transformative environmental pedagogies across HE. In all cases it will be essential to engage in and promote critical thinking about environmental concerns, and to foster in students the practical skills, know-how and collective agency to help enact social

transformation (Hodson, 2014). Developing and enacting critical, transformative environmental education across teaching programmes is likely to be difficult, but it offers HEIs an opportunity to meet their responsibilities and renew their fundamental purpose, and is central to supporting the deep societal transformations that the environmental crisis demands.

Data availability statement

The original contributions presented in the study are included in the article further inquiries can be directed to the corresponding author.

Author contributions

All authors contributed to conception of the study, composed and refined the analysis, and contributed to the processes of drafting and manuscript revision. All authors have read and approved the submitted version.

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Can universities catalyze social innovation to support their own rapid decarbonization? Assessment of community and governance readiness at the University of California

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Universities aspire to lead on sustainable energy transitions, yet progress toward reducing their own emissions has been challenging. We assessed barriers and opportunities for engagement of University of California (UC) campus communities in stimulating more deliberate and rapid campus energy transformation, and our findings highlight the complexity of the socio-technical and governance systems that limit potential for transformative change for decarbonization. Through surveys, interviews, focus groups, and content analysis, we found strong interest among students, faculty, and staff in advancing decarbonization. We found a preference for local and on-campus solutions such as energy efficiency, behavioral change, renewable-energy production, and electrification, and much less support for market offsets and non-local investments. We also found that students and faculty had limited knowledge and sense of agency regarding campus-based decarbonization programs and options, which is consistent with the limited availability of data and information about these programs beyond the few who are directly involved. Weaving our findings with insights from social-innovation theory, we propose an action research agenda that conceives of university operations and governance systems as loci for socio-technical energy transition experiments. In alignment with higher education's long-standing commitments to catalyzing social innovation, opening university energy operations and governance to inclusive, community-led collaborative experimentation has strong potential to create the conditions necessary to produce the social innovation so desperately needed for energy system transformation within universities and beyond.

KEYWORDS

social innovation, third mission, decarbonization, energy transition, collaboratory, living laboratory, sustainability

Introduction

For decades, universities and other institutions of higher education have been looking to discover, design, and lead society along pathways to a sustainable future. Motivated by an ever-advancing understanding of dangerous climate warming, growing inequality, demographic pressures, biodiversity loss, biogeochemical interference (Steffen et al., 2011; Wiedmann et al., 2020; Dasgupta, 2021), and a desire to be centers for problem solving

and innovation, university leaders have initiated and collaborated on agreements and commitments to address climate change through actions by their institutions. Nevertheless, progress toward these goals has been slow and uneven, and often lacking in public accountability (Bekessy et al., 2003, 2007). Rapid and deep decarbonization across all sectors, including universities, will require transformation of sociotechnical systems through investments not only in technologies, but also in social change (Geels et al., 2017). This need for social innovation provides an opportunity for colleges and universities to play an important role in the global energy transition. By catalyzing the social innovation necessary to decarbonize their own operations, universities may also contribute scalable pathways to help reduce greenhouse-gas (GHG) emissions in other sectors (Ramanathan et al., 2016), thus fulfilling the desire for a leadership role for higher education in energy transitions.

While efficient and equitable economic and technical pathways to decarbonize the electricity sector have been clearly articulated (e.g., Williams et al., 2021), society's dependence on carbon-based energy necessitates not only technical advances, but also social innovation. A *social innovation* has been defined as a novel solution to a social problem that is more effective, efficient, sustainable, or just than existing solutions, and is distinguished from business innovation in that the value created from its solution to a problem accrues primarily to society rather than to private individuals (Phills et al., 2008). Furthermore, for an innovation to qualify as a social innovation, it must be virtually impossible to exclude others from the benefits of the new idea, and the marginal cost of an additional person making use of the new idea must be zero (Pol and Ville, 2009). A true social innovation permanently alters the perceptions, behaviors, and structures that give rise to societal challenges, and contributes to changing the defining routines, resource flows, authority, or beliefs of the broader system into which it is introduced (Centre for Social Innovation, quoted in Pol and Ville, 2009).

Pressing societal problems such as global sustainability, rising inequality and associated humanitarian crises, together with universities' reliance on public funding to support many of their education and research programs, has led to growing expectations of universities to play a role in catalyzing or contributing to social innovation (Bayuo et al., 2020). Intentions to catalyze social innovation have recently come to be associated with the notion of a *third mission* for universities, often referred to as a *contribution to society*, and a complement to the core missions of teaching and research (Vorley and Nelles, 2008; Compagnucci and Spigarelli, 2020). While most third-mission activities to date have focused primarily on commercialization of innovations and technology transfer, there are growing demands for universities to fully incorporate social innovation not only into the goals of their third mission, but also in the way they organize resources, incentives and collaboration structures (e.g., Trencher et al., 2014; Fazey et al., 2018; Cinar and Benneworth, 2021).

Research and theory development related to social innovation have engaged a broad array of academic disciplines over the past several decades. While a universally agreed-upon definition of the concept remains elusive, the various disciplinary perspectives have highlighted a variety of important features that are relevant

to how universities might play a role in social innovation processes. According to these scholars, an innovation is social when it (i) involves non-material elements such as processes, institutions, social behavioral patterns, and cultural, normative or regulative structures (Heiscale, 2007; Cajas-Santana, 2014; Choi and Majumdar, 2015; Howaldt and Schwarz, 2016); (ii) is developed through a process or mechanism that is inherently social (Mulgan et al., 2007; Mulgan, 2012; Grimm et al., 2013); (iii) involves collaboration among diverse participants (Mulgan, 2012; Ceschin, 2014); (iv) satisfies needs not taken on by markets (Pol and Ville, 2009); and (v) aligns with rhetorics of progress and justice (Mulgan, 2012).

The clear need to complement the technical innovations emerging from research with social innovations is thus both an opportunity and challenge for research universities (Miller et al., 2015; Geels et al., 2017; Hoppe and De Vries, 2018). Using the ten research universities that make up the University of California (UC) system as a case study, we examine opportunities to catalyze social innovation to support decarbonization of UCs energy use. In particular, we assess community and governance readiness for creating the types of institutional structures and changes that are likely to lead to the emergence of social innovation.

Study domain and context

Our study domain was the 10 universities in the University of California (UC) system. Recognizing the potential of universities to lead on sustainability, the UC president signed the American College and University Presidents Climate Commitment (ACUPCC) in 2007 on behalf of the 10 chancellors. With this pledge, universities across the United States and internationally pledged action on climate change, while promising to prepare students through research and education to “solve the challenges of the twenty-first century” (Dyer and Dyer, 2017). In 2013, UC launched the Carbon Neutrality Initiative (CNI), with a goal of achieving net-zero greenhouse-gas emissions for on-campus operations and purchased energy (Scopes 1 and 2 emissions) by 2025. The plan to meet the CNI goal relied heavily on offsets and biogas procurement, with continued energy efficiency, electrification, and renewable-electricity use (see Figure 1). By 2019, when our research was completed, nearly all of the campuses reported emissions that were still quite far from the goal (see Figure 2). In 2023, due to challenges with finding or creating suitably verifiable and cost-effective emissions reductions projects to generate the carbon offsets that would be needed to meet the CNI goal, UC pivoted strategy toward direct campus decarbonization and committed to invest in on- or near-campus decarbonization infrastructure and climate justice projects. Current UC goals are focused on Scope 1, Scope 2, and identified Scope 3 emissions for all campuses to 90% below 2019 levels by 2045. Since 2019 UC has been making its investment portfolios fossil free, given the financial risk associated with fossil-fuel assets (Bacher, 2019; <https://www.ucop.edu/investment-office/>).

Throughout UC efforts to reduce emissions, each campus has been largely responsible for defining its own path to

meeting emissions reduction goals. Decarbonization strategy and implementation on most UC campuses involves campus administrators, facilities, and sustainability staff, and engaged members of the faculty, staff and student communities. At the systemwide level, UCs Global Climate Leadership Council (GCLC), appointed since 2014 by the UC President, has been charged with increasing awareness of and engagement with

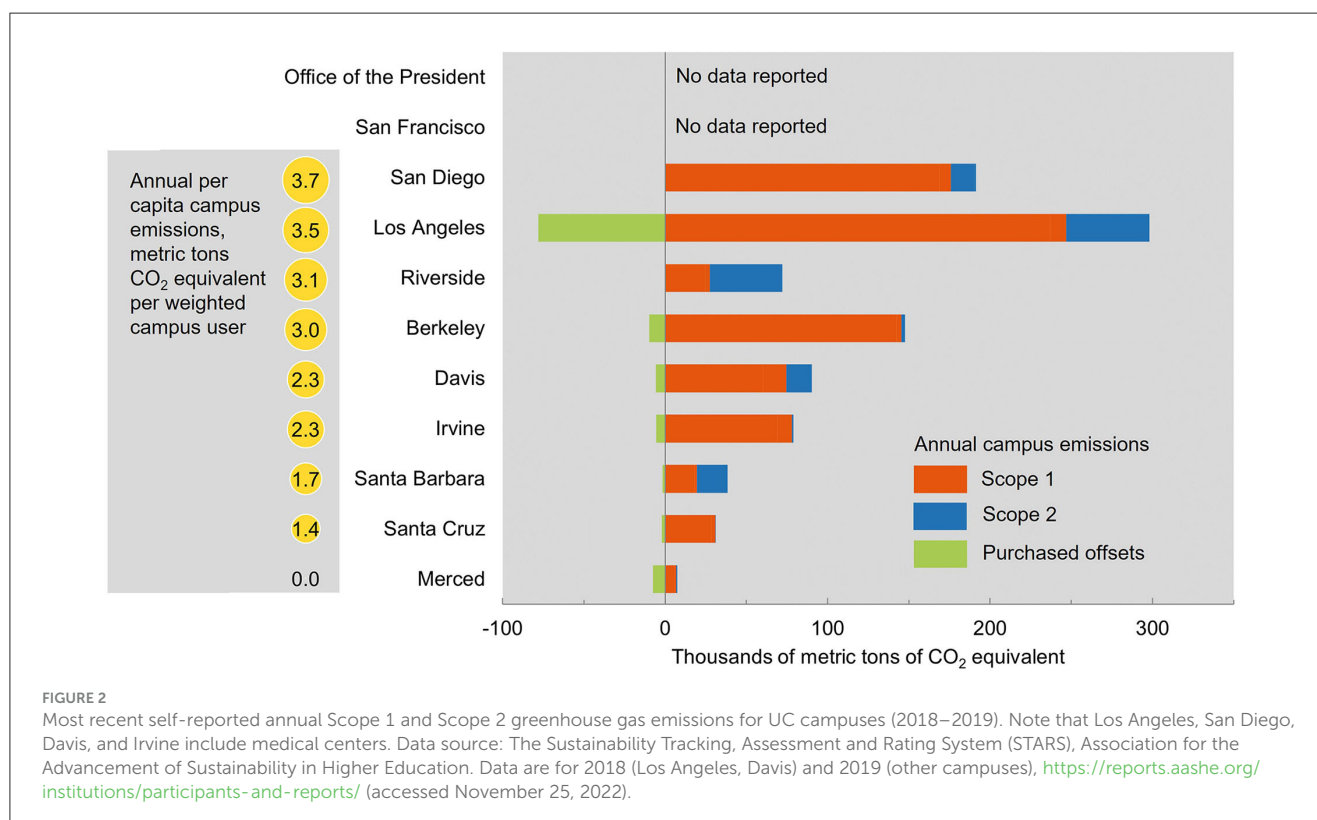
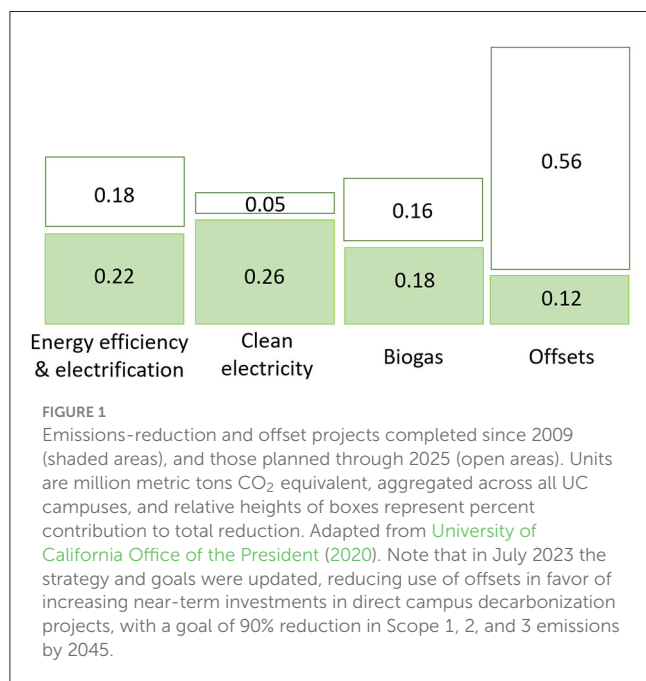
campus emissions-reduction goals and programs. Comprised of administrative leaders from across the UC system, faculty, and student representatives, and outside advisors, the GCLC advises on achieving emissions reduction while also providing guidance for aligning decarbonization and other sustainability goals with UCs teaching, research, and public-service mission. Since 2022, a Task Force on Pathways to a Fossil Free UC has worked under the purview of the GCLC to advise the President and the 10 university Chancellors on accelerating progress toward decarbonizing the UC campus and medical-center operations, and with developing programs and recommendations that can overcome key structural, technical, resilience, organizational, financial, operational, land use, cultural, and legal barriers.

Methods

We used mixed methods, collecting both qualitative and quantitative data through interviews, surveys, and content analysis, to gain insight into how the UC community perceives the issue of decarbonization, and what governance steps might be taken to better engage these campus communities in helping to achieve that goal. Data and details of questions and statistical analysis are available elsewhere (Bales et al., 2018).

Editorial content analysis

To understand what had been communicated to the UC community about decarbonization, we analyzed the content of online campus news stories that focused on energy, sustainability,



and decarbonization. This indicated how UCs Office of the President (UCOP) and the 10 universities within the system have communicated about decarbonization, and how UC communities may have been informed about the topic. Our search for news stories and press releases focused on collecting all online stories with themes relevant to decarbonization that were published between January 2016 and March 2017 by campus-based sustainability offices and public-communication offices. Our initial search using potentially relevant index terms yielded 1,058 sustainability-centered articles, from which we found 356 unique articles. Of these, 240 were randomly selected and analyzed to identify the main, overarching categories using an open-coding process (Rubin and Rubin, 2005).

Administrator interviews

We conducted semi-structured interviews with 30 decision makers across campuses, including high-level staff and administrators in sustainability, facilities, utilities, energy management, and capital planning, to gain insight into their perceptions of costs and benefits of implementing decarbonization goals, thoughts on effective communication and engagement, and opinions about the ideal role that UCOP should have in helping each campus achieve their decarbonization goals. Questions focused on eliciting interviewees' views on: (i) competing priorities and other barriers to achieving decarbonization as well as key opportunities for progress; (ii) existing organizational structure, roles, and internal communication relevant to decarbonization; (iii) promising decarbonization strategies and tradeoffs associated with those strategies; (iv) prevailing attitudes toward decarbonization among campus stakeholders; (v) current and previous communication and outreach efforts focused on decarbonization; and (vi) burden of responsibility for action, as well as resources that could support effectiveness of their own actions.

Faculty surveys and interviews

We did in-depth and broad-scale research on faculty opinions and perceptions through a survey. Questions were designed to elicit information about decarbonization-relevant attitudes, behaviors, and values, willingness to accept trade-offs to achieve decarbonization, and preferences for possible strategies their campuses could pursue to achieve the goal. We complemented this with a small number of semi-structured interviews to explore the context for faculty attitudes and preferences, and engaged interviewees in conversation about university decision making. We estimate that the invitation to participate reached over 44,000 email addresses via campus listservs, with 3,396 faculty members choosing to participate and 2,427 finishing the entire survey. The survey solicited information across a broad range of topics divided into 10 blocks, with each participant randomly assigned to complete five blocks, plus the demographic information, creating an ~10-min survey for most participants. Our self-selected sample was reasonably reflective of the gender and disciplinary focus of UC faculty, but substantially more White/European American than the UC system overall (77 vs. 58%, respectively).

Student surveys, workshop, and focus groups

We gathered data on UC students' knowledge, attitudes, and behaviors toward decarbonization through: (i) a general survey on knowledge, attitudes, and willingness to engage with decarbonization, (ii) a survey of members of the Associated Students of the University of California government group to uncover barriers to action through a student-government resolution, (iii) focus groups with environmentally engaged students at two campuses to explore student identities, values, attitudes, and motivations, and (iv) a workshop for carbon-neutrality student fellows and interns that provided insights on the kinds of support these highly engaged students were looking for as they worked to become successful agents for change. Because the response rate for the survey was very low, and we received considerably more responses from some campuses than others, results may not be representative of the typical student across the UC system or within any individual campus. Rather, results may reflect those students who are most likely to be involved with on-campus efforts to achieve decarbonization. Our other research methods also focused on student activists and leaders whose level of involvement in the issues under consideration may be quite different from the average student.

Results

Each study component was designed to explore specific aspects of campus decarbonization with different segments of the campus community. In this section, we summarize results, contrasting and integrating perspectives across different segments of the campus communities. These results provide insights into key institutional challenges for UC as well as community and governance readiness for energy system transformation.

Finding 1: existing institutional commitments are perceived to pose significant challenges for campus decarbonization

Existing carbon-based energy infrastructure

As reflected in UCs campus-based Climate Action Plans, achievement of the 2045 decarbonization goal will require phaseout of most campus combustion of natural gas (Figure 2). Replacing natural-gas cogeneration plants before the end of their useful life, e.g., through electrification, will require significant capital investments, retiring of facilities campuses are still paying for, and rethinking heating, cooling, and electricity use.

Many of the faculty we interviewed expressed concern about how campus facilities and operations are currently managed, and they expressed little confidence that changes to campus operations would be done in an efficient and productive manner. They felt that better organization and communication are essential if any changes to campus infrastructure are to be made. Campus energy managers, sustainability officers, and administrators we interviewed generally

did not consider technical issues to be the primary barriers to achieving carbon neutrality. Nonetheless, campus dependence on cogeneration plants and the need to work with outdated and inefficient infrastructure were identified as significant challenges.

Competing priority: primary and secondary missions of the university

Research participants across all groups voiced concern that the relationship between decarbonization efforts, existing decarbonization programs, and the UC mission and values was poorly defined. To these respondents, clear and transparent communication with campus stakeholders about the synergies and tradeoffs between emission-reduction goals and UCs mission is considered fundamental to broad engagement and support. Alignment of emissions-reduction efforts with the institutional missions of research, education, public service, and patient care (for campuses with medical schools) is considered critical. Faculty placed high value on the education and research missions of the university and indicated that they would be less likely to support actions they perceive as diminishing support for those core missions. Further, when asked about actions they were willing to personally take, they were most willing to take actions that align with the missions of research and education. This suggests that to gain faculty support, campus actions to address climate change and reduce emissions must be supportive of education and research, rather than detracting from them.

Competing priority: education affordability

When faculty-survey respondents were asked to rank four values—diversity, affordability of education for students, conducting research that benefits society, and eliminating environmental impact—the affordability item was ranked the highest, while the environmental-impact item received the lowest ranking (Figure 3). Like faculty, students who participated in our research were generally very supportive of actions to lower campus carbon emissions; however, this support diminished somewhat when potential tradeoffs were suggested. Students who participated in our research were split on whether a student fee should help fund energy sustainability initiatives on campus, reflecting the high priority many students place on education affordability.

Competing priority: campus growth

The high priority placed on campus growth—in particular, expansion of the research and patient-care infrastructure—is seen as a barrier to achieving decarbonization. Capital planning was identified as a key locus of activity to ensure that campus growth does not magnify challenges to reducing emissions. Campus energy managers, sustainability officers, and administrators perceived decarbonization programs to be especially vulnerable to budget constraints, with budget shortfalls easily leading to loss of the staff and know-how critical to implementing emission-reduction projects. These findings suggest that competing priorities will continue to be a challenge for reducing university carbon emissions. Aligning decarbonization programs with the university's core mission would provide opportunities to not only harness

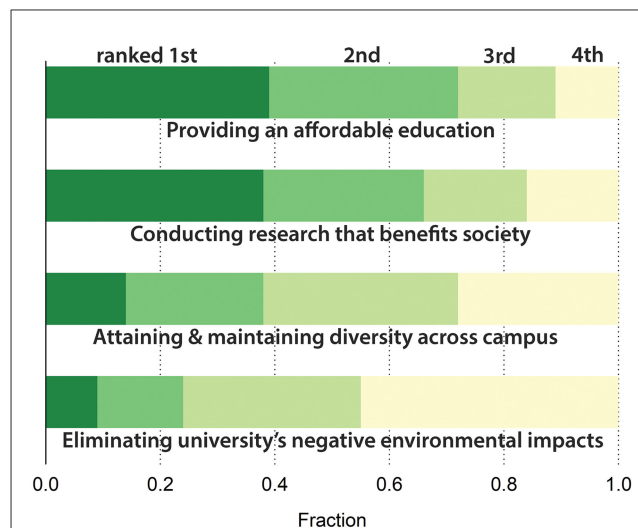


FIGURE 3
Faculty ranking of values for the UC system. Response to question: Please tell us how you prioritize the following set of values for the UC system as a whole by ranking these items such that 1 = the most-important priority and 4 = the least-important. Mean rank values shown here transformed by $1 - \text{response}/4$, so 0 is least important and 1 is most important. Adapted from project report (Bales et al., 2018).

the creativity of the campus community, but also elevate decarbonization as a priority for campus investments, extramural-research support, and donor giving.

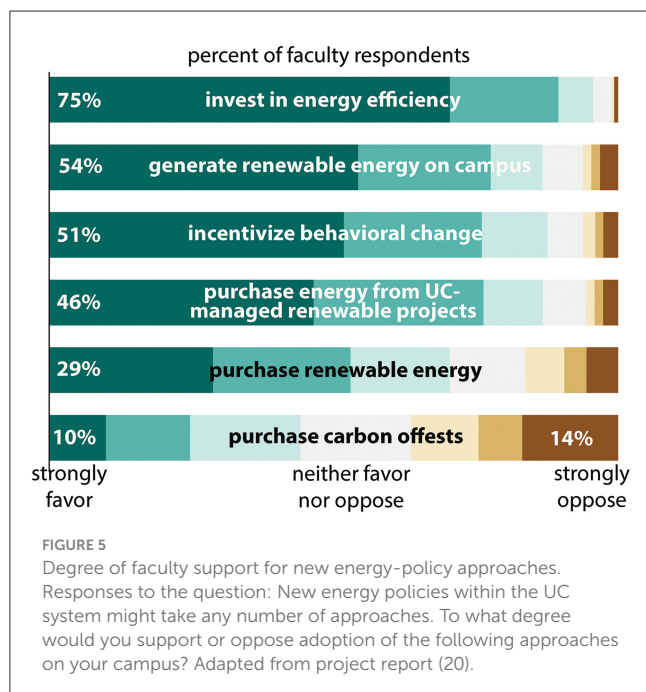
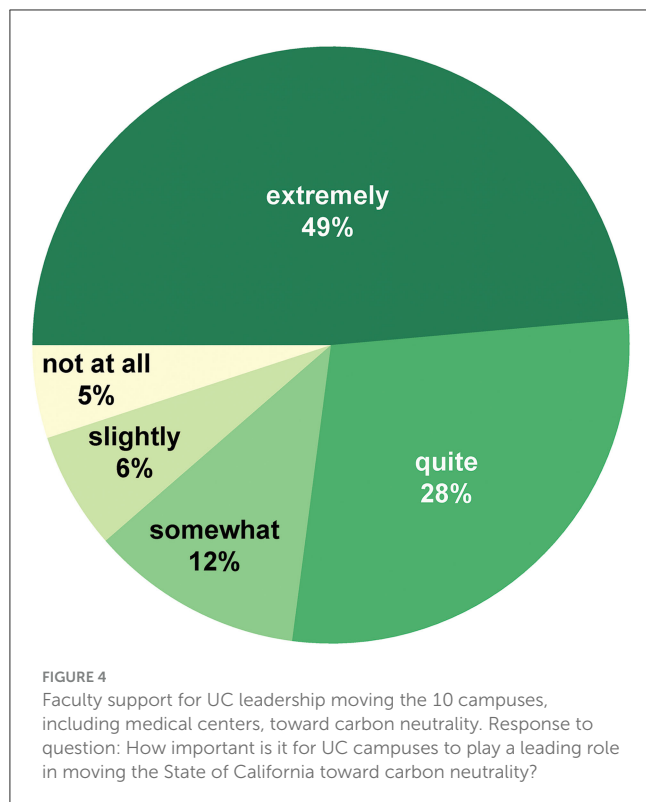
Finding 2: campus communities desire transformative change in campus energy systems, but often lack critical information and sense of agency

Desire to act on climate change

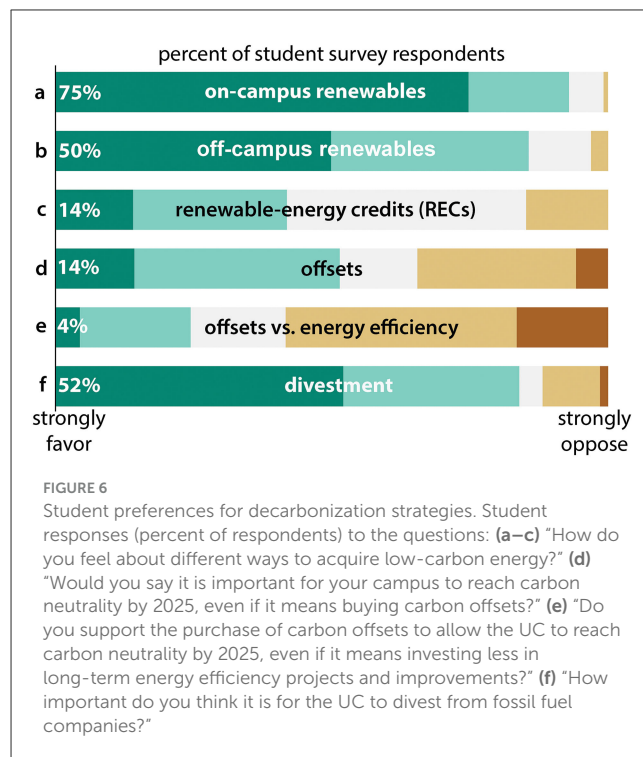
Ninety-two percent (92%) of the UC faculty who participated in our study were very concerned about global warming, vs. about 62% of a representative U.S. sample at the time. Across a broad spectrum of issues related to decarbonization and sustainability, faculty who responded to the survey expressed willingness for the UC system to take actions to become more sustainable. When asked about how important it is for the UC campuses to play a leading role in moving the state of California toward carbon neutrality (Figure 4), 49% of respondents reported finding it extremely important, and an additional 40% found it somewhat or quite important. While in the minority, 5% of respondents indicated that taking this kind of leadership role was not at all important.

Preference for more transformative emissions reduction approaches

Faculty who were already knowledgeable about campus emissions reductions often had specific strategies in mind, including technology upgrades, power-purchase agreements, and investments in renewable energy. Of note is the strong



preference for on-campus solutions that change the way energy is generated or used locally (Figure 5). Across the UC System, the support for energy efficiency, incentives for behavioral changes, and renewable-energy generation was higher than support for purchasing renewable-energy certificates and carbon offsets, and we encountered some opposition to use of offsets to achieve carbon-neutrality goals.



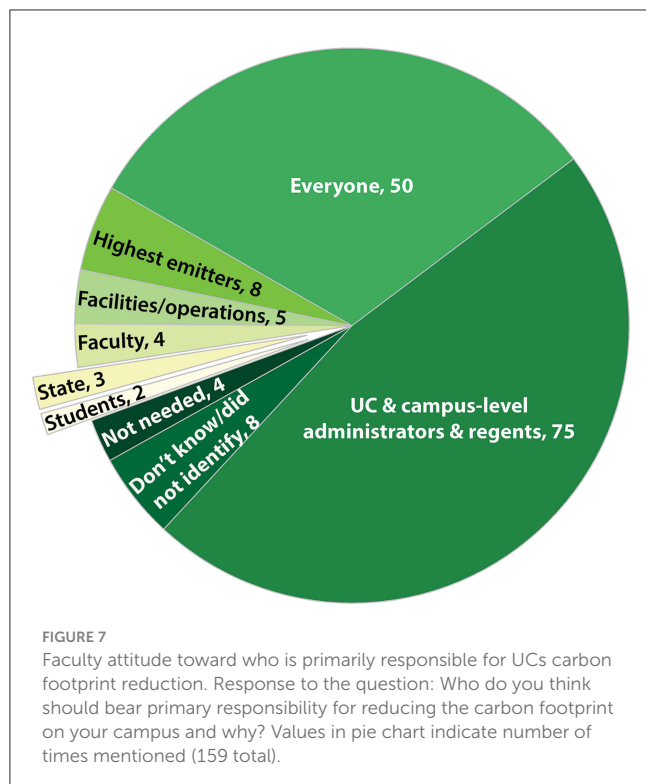
Students expressed strong support for UC further developing renewable energy to serve campuses. Their support for campus-based renewables was much greater than their support for offsets, and even greater than their support for divestment of campus investments from fossil-fuel companies (Figure 6).

Staff involved with campus-level emissions-reduction activities saw energy efficiency and on-campus renewables as the most-important opportunities for making progress toward decarbonization. At campuses with natural-gas-fueled central-heating and power plants (also called cogeneration plants) there was concern about challenges involved with transitioning away from such systems. Changes to space use, fuel procurement, and transportation were only suggested by a few of those interviewed.

Most faculty interviewees did not see market-based offsets as a viable strategy for campus decarbonization because they would divert funds from efficiency or renewables-focused projects. Interviewees did, however, support offsets if they were a funding mechanism for on-campus projects, or if purchased locally. All those interviewed agreed that while offsets might be an inexpensive “easy fix,” they were not the best use of funds for meeting long-term sustainability and development goals on campus. Most would rather spend money investing in campus infrastructure, such as energy-efficiency projects, to receive long-term savings, rather than spending money each year on offsets. If offsets are needed, respondents noted that they would need to be chosen with the teaching and research missions of the university in mind. Further, to satisfy students and California taxpayers, they felt that offsets should be purchased locally, or at least from California.

Desire for action, but (perceived) lack of agency

Faculty and students who participated in our research saw campus and systemwide administrators as bearing the primary



responsibility for decarbonization actions on campuses (Figure 7). Because of the type and scale of projects and actions needed to decarbonize campuses, participants in our research saw high prioritization by leadership as necessary for enabling and reinforcing higher prioritization by others on campus. Overall, research participants expected administrators to: (i) promote sharing of data and information about campus-energy use and decarbonization strategies, (ii) help with acquiring funding and partnerships needed to reduce campus emissions, (iii) provide coordination support for inter-campus collaboration, and (iv) have a structured system for chancellor-level reporting on progress.

Overall, although many student respondents did not know a lot about campus decarbonization, they expressed willingness to take significant personal action to reduce carbon emissions and strongly supported other issues related to decarbonization (Figure 8). Students indicated willingness to conserve energy by turning off appliances and electronics when not in use, adopting energy-efficient appliances, using less heating, and taking green transit to campus, as well as expressing support for carbon neutrality and undertaking other activities. However, the range of actions they identified was limited by their lack of knowledge about the actions and strategies most capable of producing sizable reductions to their campus' emissions.

Insufficient knowledge of potential campus-decarbonization pathways

Even though the students and faculty who participated in our research were among those already engaged with sustainability and climate issues, their familiarity with, and understanding of, campus decarbonization goals and activities were relatively limited. Most faculty surveyed and interviewed had some understanding

of actions that can be taken to reduce campus carbon emissions, and a few had considerable knowledge about this topic. Many were not familiar with UCs Carbon Neutrality Initiative (CNI), and the sources of emissions that the CNI is focused on (on-campus energy generation and purchased energy) were less salient to them than are other categories of campus emissions (e.g., commuter transport).

Among students, even those who were already familiar with the CNI or engaged with environmental issues saw a need for more information; many anticipated a benefit from deeper understanding of campus emission-reduction goals and strategies. For example, while most of the 22 students who participated in our focus groups had heard of the CNI, when they were asked to explain carbon neutrality, many responses involved topics that are only somewhat related, such as divestment and recycling. They were unsure what campus environmental initiatives were aligned with the CNI, and what the campus had done toward reducing carbon emissions. Students in particular saw a need for clear, actionable information about the decarbonization strategies being pursued or considered.

Finding 3: inclusive participatory governance of campus energy strategy and investment is seen as critical for transformative change

Decision-making structure, processes, and institutional capacity

As a group, faculty-survey respondents were cautiously optimistic about the effectiveness of their campus' and the UC system's actions to achieve carbon neutrality by 2025. However, a significant minority of faculty were quite pessimistic about reaching this goal (Figure 9). Both faculty and students who participated in our study had expectations for how institutional decisions would be made regarding programs, investments, or incentives to reduce or offset campus emissions. These campus-community members indicated expectations for inclusive, consultative, and deliberative processes. Students indicated the need to feel a sense of ownership, participation in decision making, and confidence that actions will have an impact in order to participate in activities focused on decarbonization. Faculty who were less familiar with campus-decarbonization efforts and plans emphasized the importance of transparency and open sharing of information both within and beyond the campus community.

Limited communication about decarbonization from leadership

In our analysis of sustainability-related campus news, campus-decarbonization goals and strategies to achieve emissions reductions for campus operations did not feature prominently in news stories produced by either campus public-communication or sustainability offices. While public-communication offices generally produced more sustainability-themed news stories than did sustainability offices, news items produced by sustainability offices were more likely to feature information about emission-reduction and decarbonization goals.

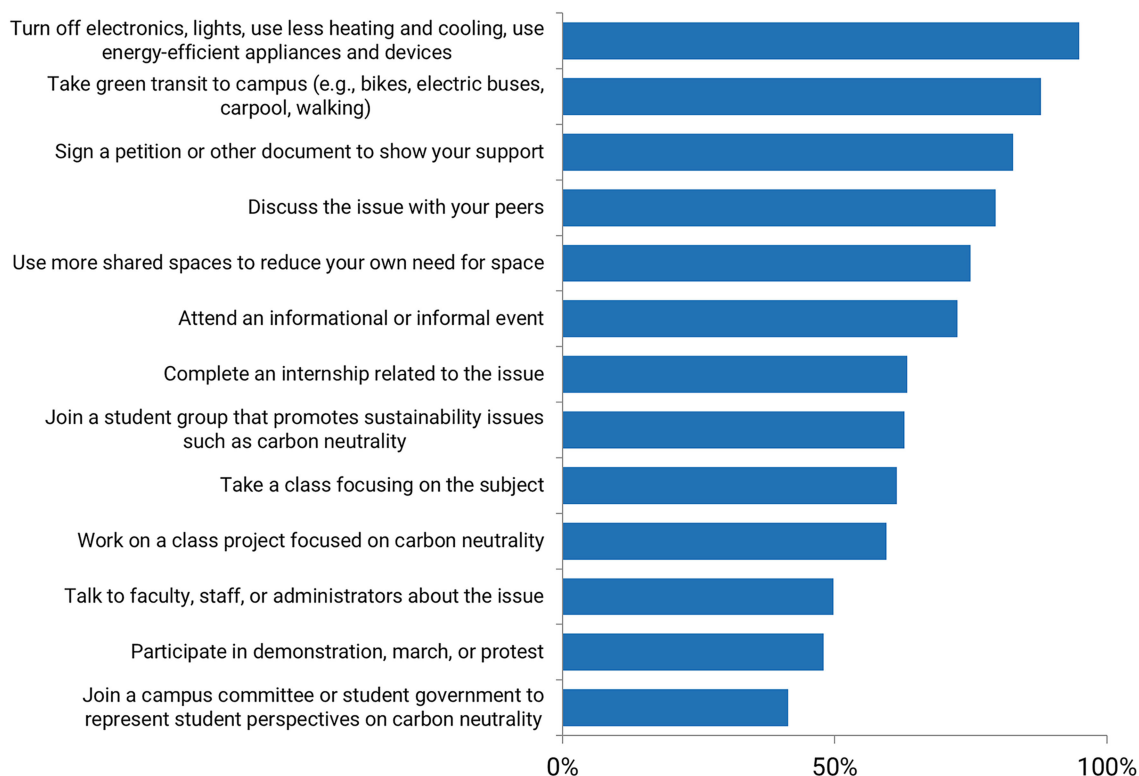


FIGURE 8

Student willingness to take specific actions to help achieve carbon neutrality. Student responses (percent of respondents) to the question, "Which actions would you be willing to take to help achieve carbon neutrality on your campus?"

Thematic analysis of the campus news stories that mentioned carbon neutrality provided limited and sometimes ambiguous information about steps campuses can take to achieve emissions reduction. Among stories that did cover strategies for campus carbon neutrality, renewable energy and energy efficiency or conservation featured prominently; meanwhile, market-based mechanisms such as renewable-energy credits, cap and trade, and carbon-offset programs very rarely appeared, and were entirely absent in sustainability-themed news at many of the UC campuses. This lack of information and communication around market-based programs results in a lack of awareness of these programs, and in turn prevents community-wide dialog and deliberation about the full suite of possible pathways to emissions reduction.

Lack of transparency and accountability regarding emissions and expenditures

While UCs Office of the President provides aggregated annual Scope 1–2 emissions data for each campus through its sustainability website, there exists no centralized accessible source for timely, disaggregated data about UC carbon emissions, energy sources and use, and emission-reduction activities or projects. A few UC campuses provide somewhat more-detailed information on their sustainability websites, but even in these cases the data are generally aggregated on an annual basis for the whole campus. For only one campus (UC Santa Barbara) were we able to find a data dashboard that offered deeper insights into projected

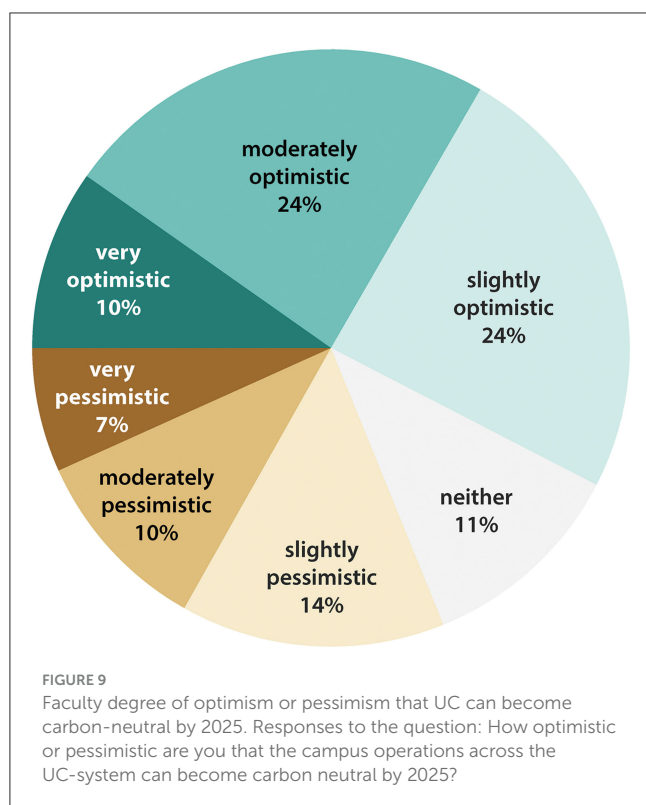
costs, savings, and emission-reduction potential for different campus-energy strategies. Scope 3 emissions are poorly accounted for in publicly available data about UC emissions, with only a few campuses providing even partial estimates. Such data, updated frequently and in a form that could be used to inform research projects, educational activities, communication campaigns, or community-led deliberation processes, was identified as an important component of campus-community involvement in decarbonization.

Both faculty and students expected data on decarbonization-related expenditures and their effectiveness to be provided in the context of a deliberative decision-making process that includes faculty, staff, and student priorities and concerns. At the same time, some administrators—plus those responsible for implementing decarbonization actions—expressed concerns about presentations of energy use and emissions data that might encourage comparisons that are inaccurate or unfair. We observed that the administrators we spoke with appeared to feel responsible for maintaining their campus's outward-facing reputation as a leader in sustainability.

Discussion

Opportunities and challenges

Our findings are consistent with studies of other higher-education institutions, which have also found a lack of



awareness and knowledge across campus communities, as well as no clearly designated group to implement solutions to sustainability challenges (Verhulst and Lambrechts, 2015; Filho et al., 2017; Hueske and Guenther, 2021). Many of the tensions and contradictions that others have identified as barriers to organizational change within colleges and universities—for example, competition/territoriality vs. collaboration; individual vs. collective systems of support and reward; expertise/leadership action vs. grassroots involvement; and “rational/pragmatic” systems governance vs. environmental and holistic worldviews—emerged as important factors in our case study as well (Hoover and Harder, 2015).

The data we gathered reveal a tension between, on the one hand, the public commitments made by UC and campus leadership and the goals and desires of many members of the UC campus communities, and on the other hand, the existing commitments and competing priorities those leaders and community members face. As is true for broader society, these tensions and complex decarbonization challenges involve values, social structures and roles, cultural meanings and norms, and ways of doing things—all phenomena that do not lend themselves to purely technical energy solutions. Our results thus serve to strengthen calls by other researchers (e.g., Ceschin, 2014; Miller et al., 2015; Ceschin and Gaziulusoy, 2016) for reconceptualization of energy transition as a socio-technical challenge. While numerous studies have identified and highlighted the importance of the social aspects of energy systems, there remain many questions about how such systems function, and in particular, what conditions and factors are most effective at catalyzing system changes (Ávila et al., 2017; Adams et al., 2018). Opportunities for universities to take a leading role

in society’s much-needed energy transitions emerge from these complex socio-technical challenges and unknowns.

Universities are uniquely positioned to conduct the types of socio-technical experiments called for by social-innovation researchers. University communities possess deep expertise in designing experiments and evaluating their outcomes; their communities (including staff, faculty, and students) are comprised of individuals with diverse cultures, backgrounds, knowledge, and values; and their energy operations and governance systems are of relatively large scale and high complexity (Purcell et al., 2019). Perhaps, however, the factor that most uniquely distinguishes universities as ideal sites for socio-technical energy experiments is their considerable freedom from the commercialization and market constraints faced by businesses and other organizations aiming to generate social innovations for energy transitions. Because the primary missions of universities are research and education, any activities (including socio-technical energy experiments) that produce high-quality education and research outcomes can be considered wise use of university resources, even if they do not immediately produce high-impact social innovations. Universities that plan strategically can, in fact, offer their students and faculty cutting-edge learning and professional opportunities while engaging in socio-technical experiments that would be considered too risky even for social-innovation-focused businesses (Nicholls and Murdock, 2012; Tjörnbo and McGowan, 2022). If pursued under this framework, social innovations for energy transitions could be a valuable tertiary outcome of universities’ research and educational activities while contributing to, rather than detracting from, those important missions.

So why haven’t these types of experiments emerged already within UC? Some experiments, in limited forms, have. Each campus has been engaged in work to reduce their carbon emissions, and many of these efforts have involved students or members of the research community. For example, since 2015 a Climate Action Fellowship Program has funded student-generated projects at each campus in support of UC’s greenhouse-gas emission-reduction goals; and in 2022, UC invested \$11.5 million in new multicampus-national laboratory collaborative projects tackling climate and decarbonization, and providing training support for early career scientists (University of California Office of the President, 2022). Such efforts have, however, been limited in various ways—they have been relatively small in scale, short in duration, lacking strong integration between operational implementation and evaluative research, or without the broadly inclusive and deliberative governance and decision-making processes that characterize the conditions leading to social innovation (Maclean and Harvey, 2012; Mulgan, 2012). UC campuses, and the individuals and teams on those campuses who have been working persistently to decarbonize have made incremental progress, but their efforts have not yet produced transformative change, or “permanently alter[ed] the perceptions, behaviors, and structures that previously gave rise to these challenges” (Pol and Ville, 2009; Surman, 2018).

Our research, together with previous work on social innovation, provides insights into factors that may be impeding transformative energy-systems innovation at UC and other universities. Our data reveal a degree of mismatch between UC governance structures and organizational culture and the

conditions that researchers have identified as conducive to the emergence of social innovation.

First, there is a *misalignment of reward systems and priorities*. We observed a high level of interest across the campus community in actively contributing to decarbonization of the operations of our campuses. Our analyses reveal multiple opportunities to engage the campus community intellectually and physically in climate solutions, and the need for programs that offer co-benefits to those who participate. Our identification of high interest in alignment between reward mechanisms (e.g., tenure, promotion, publication) and faculty engagement in campus decarbonization aligns with findings from previous work (e.g., Ferrer-Balas et al., 2008; Bayuo et al., 2020; Cinar and Benneworth, 2021). Students who participated in our research expressed the most interest in engaging with campus decarbonization activities that also provide hands-on opportunities for career development, such as authentic research opportunities, group work with a diversity of participants, paid internships, and class credit. Without opportunities to engage in the types of activities that are deemed valuable within the organizational culture (i.e., research and learning), university-community members will feel compelled to deprioritize their contributions to campus decarbonization efforts and projects.

Our findings also underscore the *importance of the location of power and ability to effect change*, and the *need to link power with accountability*. Across the various campus groups we studied, a recurring theme was a lack of knowledge about decarbonization strategies, and about how much (or how little) impact particular projects or actions can have on overall campus emissions. This lack of awareness of the full range of potential strategies poses an important limitation on the types of actions individual members of the campus community are willing to support. Students who participated in our research expressed more support for initiatives that allow them to actively participate, and identified access to credible, salient data and information as key to enabling this type of active participation. Students expressed a need for the freedom to create and direct their own activities and saw systems for supporting long-term communication and collaboration as key to student engagement and effectiveness. The low levels of awareness and knowledge about campus decarbonization that our studies revealed indicate that many members of the campus community have not been invited into discussion of decarbonization pathways for UC. At the same time, many of those who have been engaged with the issue feel that their power to effect change is very limited, or that primary responsibility for change does not rest with them. A few within the system have been tasked with leading the change, but in many cases, they have lacked access to the resources necessary to make change happen. And those in leadership positions who have taken the lead in making high-profile climate commitments have reaped the benefits of these commitments (e.g., image building as a sustainable university) without being held accountable for delivering on those commitments (Bekessy et al., 2007) or for transparent and open sharing of the data and information necessary to evaluate their progress toward the goals.

Insufficient structures and processes for inclusive deliberation and decision making delay action due to unresolved disagreements

about strategy. Without arenas and incentives to debate, discuss and co-create plans for action, universities can encounter difficulties in directing resources toward different types of decarbonization projects. For example, individual knowledge and worldviews play an important role in which potential decarbonization strategies are seen as useful or desirable. On one hand, those who see markets as a powerful and efficient driver of change are inclined to endorse strategies like carbon offsets and renewable-energy credits as avenues for quick and relatively inexpensive progress. On the other hand, many in the campus communities endorse the notion that transformative change involves “walking the walk” and reducing one’s own carbon emissions rather than paying someone else, somewhere else, to reduce emissions in their place. Those who endorse this worldview are inclined to see market-based mechanisms as “greenwash” and as detracting effort and resources from the “real” work of campus decarbonization. Without opportunities to collaboratively make decisions about decarbonization paths for UC campuses, fundamental differences such as these will serve as a barrier to transformative change (Antadze and McGowan, 2017).

Differences in ideas about *organizational culture* and how to approach challenges like campus decarbonization have complicated progress for UC. Efforts like the CNI have often been seen as top-down mandates imposed on a community with a preference for consultative, deliberative, and collaborative decision making. While some see financial and technical commitments made exclusively by those in leadership positions as an efficient pathway to change, many in the university community are looking for shared governance and inclusion of academic and resource-management perspectives in the context of such decisions. As others have noted, “command and control” approaches neglect the systemic processes that produce transformative change, and are likely to result in controversies and resistance (Voulvoulis et al., 2022). Rather, governance systems for social innovation should eschew top-down prescriptions in favor of generative rules that encourage evolution and adaptation (Mugan, 2012).

Beyond organizational culture, there are also issues related to *territories, conflicts, and competition*. In our study, there were some campus-based personnel who perceived the CNI as an effort by systemwide leadership to take credit for emissions-reduction progress that individual campuses had been working to achieve prior to the launch of the CNI. Within campuses, there were reports of competition between sustainability staff, facilities staff, and administrators over who “owns” particular projects, and therefore who controls funding and direction for them. Also at the campus level, there was concern about the zero-sum nature of funding for sustainability projects and competing priorities both within and outside of sustainability programs that could decrease access to funding. Finally, there were also reports of competition between campuses as a barrier to collaboration on certain types of projects. While many identified collaboration (e.g., between sustainability offices, facilities departments, and leadership) as critical to progress on campus decarbonization, questions arose about who was given opportunities to collaborate (and who was not), and about what structures and rewards were needed to make collaboration more desirable.

Can universities generate the social innovation necessary for their own decarbonization?

The integration of our observations with previous work on social innovation leads us to propose two stages of decarbonization-focused social innovation possible for UC and other universities: the first stage being a prerequisite for the emergence of the second. The first stage is reasonably well-prescribed by current understanding of the interplay between organizational culture and governance, the catalyzing conditions for social innovation.

Challenge 1: organizational change to create enabling conditions for inclusive socio-technical experiments

Can universities redesign their organizational cultures and governance processes, including communication and information sharing, inclusive decision-making, resource allocations, and reward structures to create context and opportunities for energy-focused social innovation to emerge? We are optimistic that the answer is yes, but such change will require courage on the part of university decision makers, and building of trust across all sectors of university communities.

Opportunities for institutional change

Multiple leaders in higher education have called on the twenty-first century university to encourage academically relevant work that simultaneously meets campus goals and societal needs such as decarbonization (Duderstadt, 2000; Douglas, 2016). With the appropriate organizational structures and incentives for faculty, staff, and students, the university's contributions to society can serve additional missions—such as sustainability or climate action, while enhancing the primary missions. Campus energy use or decarbonization projects can be viewed as “experiments” or “case studies” aimed at reducing carbon emissions. Because members of the campus communities are engaged in designing, implementing, observing, and documenting these projects, they have potential for achieving campus decarbonization goals, furthering the primary university missions of education and research, and providing scalable solutions for the benefit of society.

To enable societally relevant socio-technical experiments that reflect the values, goals and perspectives of the campus communities, university administrators would need to initiate dramatic changes in the ways in which their campuses make energy-relevant decisions, integrating research and education aspects into energy system selection, implementation, maintenance, and improvement, and doing so in a way that involves broadly inclusive co-design, co-creation, and co-evaluation. In addition to inclusive and deliberative decision making and development, administrators would need to allocate resources to these projects, or foster collaborations focused on procurement of funding (e.g., extramural grants) to support these socio-technical experiments and associated educational activities.

A decarbonization “collaboratory”

We described above the opportunities and challenges we observed in our study of UCs community engagement and governance readiness for transformative innovation for decarbonization; we now turn to describing a potential “Collaboratory” initiative for UC (and other universities) that has potential to mitigate many of the barriers we identified. At the same time, we recognize that there is much still to be learned about the intricate relationships between organizational cultures and dynamics and social innovation.

Across the campus community, our findings point to opportunities to better align decarbonization activities with the core missions of teaching and research by using our campuses as classrooms and laboratories for sustainability. This transition could go much further in taking up the moral and ethical case for transformative change within the university (Green, 2021), addressing societal challenges related to energy transitions in a way that more naturally risk-averse and constrained governmental and philanthropic organizations may not (Nicholls and Murdock, 2012; Chalmers, 2013).

Our findings reinforce those from previous studies pointing to a need for engagement of the campus community, evolving the “living laboratory” concept toward a “collaborative laboratory,” or “collaboratory.” Leveraging the university's strengths as research, teaching, learning, and innovation, a collaboratory could be used in this context to develop energy, sustainability, and climate solutions. The term “collaboratory,” in use since the 1980s, has recently been defined as “an open-space, creative method for hosting meaningful conversations where various stakeholders tap into the collective intelligence to generate solutions to complex problems” (Muff, 2014). It is an inclusive implementation, research and learning environment where action-learning and action-research meet, and where formal separation of knowledge production and knowledge transfer dissolves. The related term, *living laboratory*, appears in multiple reports of successful engagement of campus communities, transforming campus cultures to embrace sustainability, and enabling the creativity of students and faculty (St. Clair and Chiang, 2016). It has been reported that a living-laboratory framework can help transform a campus from a passive to an active environment for teaching and learning (Evans et al., 2015) and foster a cyclical process of co-design, co-production, and co-evaluation involving members of academic and practitioner communities (Wanner et al., 2018). We propose the term collaboratory, however, as the *living-laboratory* term lacks the explicit horizontal and vertical integration implied by *collaboratory*, which places emphasis on co-equal sharing of decision making and resources across sectors, disciplines, and roles.

In contrast to other decarbonization approaches that mandate change (and often fail to provide the resources or authority necessary to make those changes), the collaboratory approach positions campus decarbonization as an opportunity to advance the university's teaching, research, and sociotechnical-innovation missions. Such an approach complements and builds upon existing awareness-raising efforts by offering an explicitly inclusive, dialogue-based, engagement-centered effort. Beyond active engagement of campus communities in pursuing solutions, a campus-based, system-wide collaboratory would help involve

a broader segment of the campus communities by linking decarbonization to other synergistic campus initiatives.

Transformative research

Collaboratory projects are qualitatively different from simply doing societally relevant research, with results provided to external groups. To develop societally relevant insights into complex socio-technical energy systems, researchers can no longer work in isolation from “real-world” implementation, and they need to co-design, co-create, and co-evaluate with the communities and individuals that the energy systems serve. The collaboratory approach embeds academic work “in” society rather than just “for” society. It builds on the suggestion that given the existential threats we now face, “universities might now fully embrace the unprecedented challenge of helping eight billion people live on a planet that is wholly unprepared for them (Latour, 2016).”

Challenge 2: inclusive socio-technical experiments that can lead to energy systems transformation

Once universities redesign their organizational structures and governance to encourage and support inclusive socio-technical experimentation, will campus communities be able to catalyze the transformative change needed for their own decarbonization?

Although there is much yet to be understood about the factors and contexts that lead to the emergence of transformative change, we are once again optimistic that the answer is yes. At the very least, creating the conditions for more-resourced and rapid development of potentially transformative social innovations increases the chances that one of them has the power to change our relationship with energy. And if they don't? Then we will have at the very least a new generation of university graduates who have a deep understanding of the decarbonization challenge our society faces and a hard-earned appreciation for the difficulty in making change.

A Collaboratory provides time and space for creative problem solving, and for everyone to have a space “at the table” when developing ideas and planning for energy transitions. Small but important changes in resources, communication and transparency can unleash this creativity and create champions who can lead on energy transitions, and climate solutions more generally. One large university system like UC making these types of innovations in energy systems governance could represent a social innovation that spills over into other institutions of higher education, expanding the number of social innovation-focused experiments, and increasing the chances that a truly transformative innovation will emerge and move beyond the borders of the university into broader society.

“the foundation of social innovation is a belief in people’s capacity to create, to shape and experiment, in tension with the present, but also with a bias against both over-confident top down control or planning, and the fatalistic view that nothing works.”

—Geoff Mulgan, *The Theoretical Foundations of Social Innovation*, 2012.

Data availability statement

Original data are available in the supplementary material of Bales et al. (2018), and at <https://escholarship.org/uc/item/0r05944j>.

Ethics statement

The studies involving humans were approved by Human Subjects Committee, University of California, Santa Barbara. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

SR-H and RB planned and coordinated data collection, carried out analysis, and wrote manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Artificial intelligence literacy in sustainable development: A learning experiment in higher education

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Introduction: The purpose of this empirical research was to map the capabilities and perceptions of undergraduate business administration students about artificial intelligence (AI) and its potential to answer questions related to sustainable transition in society, and to obtain information about the suitable pedagogical solution to increase the knowledge and understanding related to these themes.

Methods: The data was gathered among higher education (HE) students in a workshop that consisted of introductory lecture, answering surveys, questionnaire, group discussions, and reflective narratives on the relationship and possibilities of AI and sustainable development. In data analysis an abductive qualitative research methodology was adopted.

Results: Through abduction new insights were obtained and new knowledge was created new knowledge regarding AI literacy in the context of sustainable development. This brought new knowledge in the context of HE studies. The taxonomy of AI literacy in sustainable development created a new reference framework for learning tasks, and course planning in HE. The findings showed that the students had difficulties solving the actual problem because they lacked knowledge and understanding of the basics of AI and sustainable development. However, in groups where one person had a deeper understanding of the concepts, the whole group began to understand the task and work on both meta-level ethical questions and practical examples.

Discussion: The assistance of AI potentially creates opportunities for developing solutions supporting sustainable development. However, utilizing this potential requires AI literacy. In this task HE plays a significant role. This study contributes to the pedagogical approach where AI and sustainable development are integrated in HE curricula.

KEYWORDS

artificial intelligence literacy, sustainable development, higher education, pedagogics, artificial intelligence

1 Introduction

The escalating global crises have created a remarkable threats to civilization. Human-induced climate change, all the depletion of natural resources, and declining biodiversity call for actions. Effective solutions are needed at all levels of society and the global community. The versatile utilization of Artificial Intelligence (AI) and fast development of AI literacy have raised both hope and fear. This study is motivated by the question we have asked ourselves: what pedagogical solutions should be developed within Higher Education (HE) to incorporate the needs of the 21st century whilst embracing AI literacy?

The definition of AI literacy is still evolving and there is no generally accepted definition thereof (Laupichler et al., 2022). One definition suggests it could be “a set of competencies that enables individuals to critically evaluate AI technologies; communicate and collaborate effectively with AI; and use AI as a tool online, at home, and in the workplace” (Long and Magerko, 2020). Thus, AI literacy refers to capability that enables people to deal with artificial intelligence, enhanced solutions or products, thus enabling them to use basic AI-powered software and evaluate its impact on humans, societies and the planet.

It is difficult to recognize the operation of artificial intelligence in everyday life. The development of artificial intelligence has been fast, and it brought about consequences, not yet understood. Following AI uncritically may lead to dichotomous thinking and one-dimensional solutions. Awareness and knowledge of AI helps to guide its use for ethically weighed purposes. For example, privacy concerns while using digital services can present dangers while AI is used (Alamäki et al., 2023). On the other hand, awareness and knowledge of AI may help to guide its use for ethically weighed purposes. The task of education is to correct biases and increase inclusion in utilizing AI. The use, awareness and development of AI is still the activity of a small group, although the use is extensive. The application of AI is also globally very unevenly distributed.

This study focuses on challenges from the viewpoint of AI literacy in sustainable development in the context of HE. Prior research on AI literacy is scarce, and there is little or any study about the characteristics of AI literacy in the context of sustainable development. Therefore, in this study we focus on the state of AI literacy in the context of HE institutions with the aim of obtaining not only a situational picture but also with the aim of creating pedagogical models that will help promoting artificial intelligence literacy in teaching and learning. The purpose of the study is to map the current capabilities and perceptions of the HE students about artificial intelligence and its potential to answer questions related to sustainability transition in society. The study also aims at obtaining information about the suitable pedagogical solutions for increasing the knowledge and understanding related to these themes.

2 Theoretical framework

2.1 Sustainable development

Sustainable development is an imperative of our time. Humans' pursuit of good life permanently changes the socio-ecological system on which our everyday life depends (Steffen et al., 2015;

Figueres et al., 2017; Ripple et al., 2017). This is a reason the period between 2005 and 2014 marked a decade of “Education for Sustainable Development” (UNDESD), which emphasized the role of education in global sustainable development. After that period, in September 2015, the United Nations (UN) formulated and adopted the 17 Sustainable Development Goals (SDGs). Whereas the former promoted implementation of overall quality of education that would ensure a sustainable future, the latter (SDG 4) called for quality education for all, rooted in the Universal Declaration of Human Rights.

SDG 4 calls for ensuring “inclusive and equitable quality education” and promoting “lifelong learning opportunities for all.” It also calls for ensuring that the acquisition of skills and knowledge, vital to leading sustainable lives, is available to all. Therefore, the role of education, especially in promoting communication, research and innovations, access to information and networking opportunities are critical strategies for achieving the SDGs. HE faces fundamental questions about re-skilling and updating people's competencies and ways of pursuing a good life without compromising future generations' ability to meet their needs (Redecker et al., 2011). In practical terms, this means ensuring the pedagogical solutions for acquiring key competencies of 21st century, such as sustainable lifestyles, work, and habitat (Van den Branden, 2015) whilst utilizing fossil-free renewable resources.

Research on the integration of AI and sustainable development has rapidly increased during the last few years (Leal Filho et al., 2023). The advancements of AI provide several significant technological opportunities to sustainable development and its initiatives (Goralski and Tan, 2020; Vinuesa et al., 2020), and their integration is also a main priority of policymakers (e.g., Gailhofer et al., 2021).

2.2 Artificial intelligence literacy

Gašević et al. (2023) raise key questions regarding AI literacy: (1) the knowledge of AI among students, teachers, faculties, and general public, (2) the potential of AI, (3) AI's implications on individuals and societies. Most definitions of AI literacy focus on diverse types of “literacies” and those definitions have skill sets in varied disciplines (Ng et al., 2021a). Ng et al. (2021b) classified AI literacy into four aspects which are: to know and understand, to use and apply, to evaluate and create, and to be aware of ethical issues. Those four aspects represent also the level of capabilities that individuals have whilst dealing with AI applications. A challenge in the current conceptualization of AI literacy is its application and usage-orientation and their lack of pedagogical guidance. However, individuals should also have capabilities to critically evaluate the impacts and effects of AI as a part of social, economic, and environmental context, not only from ethical viewpoint but also a broad perspective, as AI will be an integral part of our everyday life in any sector. AI is often referred to as a computational agent (Alamäki et al., 2019), thus it is not just a technological application, but a significant actor of communities, environments, and societies. Yi (2021) connects metacognition as a primacy competence to AI literacy, whose aim is to assist individuals in anticipation of the future of AI by adopting functional, social, and technology literacies in this process.

Educators and teachers should have awareness and understanding of the AI literacy skills, essential abilities for AI-human interaction in developing and integrating curriculum into educational practices (Nguyen et al., 2022). AI literacy is seen as a generic learning skill in education (Laupichler et al., 2022; Su and Ng, 2023). In addition to educators and teachers, students should develop awareness and understanding related to AI from various viewpoints. For example, AI literacy improves students' abilities to evaluate fairness, accountability, transparency, ethics, and safety of AI (Ng et al., 2021b). Yi (2021) defines AI literacy as the basic ability that helps individuals to become independent citizens in the AI era. Hornberger et al. (2023), in a study in Germany, found that students with prior experience in AI or studies in computer science or STEM studies had a higher level of AI literacy than students with other backgrounds. They also revealed that most students were interested in learning more about AI and they had a positive attitude toward AI.

The capability of AI literacy should be seen as the end of education which aims to increase students' capability to evaluate AI's various features and consequences. Students already have an opportunity to adopt AI solutions in their studies (e.g., Mononen et al., 2023) which requires technological capabilities to use AI in their studies and daily life. AI literacy requires technological capability which is the combination of ability and motivation (c.f. Kimbell et al., 1996) that promotes understanding and enables use of AI in responsible and sustainable ways.

Technological capability, as a concept, is embedded in many areas from equipment to human skills (Archibugi and Coco, 2005). It is also seen as the potential for efficient, practical, and quality work in designing technological solutions (Petrina, 1998). Further, it is also associated with knowledge-based competencies at the firm level (Bustinza et al., 2019). Technological capability combines technological knowledge and understanding about concepts and principles, and personal qualities and technological skills (Alamäki, 2018). Thus, a technologically capable student is a technologically literate one. Similarly, a student capable of understanding basic concepts and principles related to AI, and responsible for using or adapting AI can be considered as an AI literate person.

In this empirical study we were interested in the level of awareness and knowledge of the role of AI among young undergraduate HE students. Secondly, we were interested in gauging the participants' awareness of the future of AI and its role in their future professional life. We also wanted to identify how the participants valued the ethical impact of AI in the future professional life. As there are no established learning goals for AI literacy yet, we utilised the already defined learning goals of technology literacy ITEA (2007). ITEA has defined the standards of technological literacy for K12 education in the United States and they are widely used taxonomies across western countries. ITEA's definition contains 20 standards for technological literacy that are the main learning objectives for students' skill acquisition. These standards are formulated in five generic learning goals: (1) understanding of the nature of technology, (2) understanding of technology and society, (3) understanding of design, (4) having abilities for technological world, (5) understanding of designed world in selecting and using various technologies. These learning goals are adapted to our AI literacy model. In addition to utilizing ITEA's (2007) model of technological literacy, we adapted the revised Bloom's taxonomy (Krathwohl, 2002) in

our conceptualization of AI and sustainable development in education taxonomy. The Bloom's taxonomy provides cumulative hierarchy of learning objects where students proceed from basic knowledge and understanding to higher level of capabilities such as analyzing, synthesizing, creation, and evaluation. This revised Bloom taxonomy emphasizes the meta that is essential in ensuring continuous learning and self-directed critical thinking and reflection.

Our specific research questions were: Q1: What do undergraduate students understand of AI? Q2: How did the workshop promote understanding of the potential of artificial intelligence in solving challenges related to sustainable development? Q3: What are the greatest challenges in enhancing AI literacy in higher education context, and what pedagogical solutions could be useful?

3 Methodology

3.1 Data gathering

The participants of our study were 22 first semester undergraduate business administration students following a BBA English language program. The group was multicultural and multigender. We assured the students of the data's confidentiality and obtained permission to use it for the study's purpose.

The research data was gathered in a workshop that consisted of several parts. At the beginning of the workshop, the students were asked to fill in a questionnaire where they answered several questions concerning their current knowledge, understanding and perceptions of artificial intelligence and its use in solving challenges related to sustainable development. The students were also asked to assess the visibility of these themes in their studies, as well as their expectations for their future employers regarding sustainability issues.

After that, the students were introduced to the basics of AI and the concept of AI literacy. We described the concept of AI to students by presenting it as the capability of a digital computer or computer-controlled robot that performs tasks commonly associated with intelligent beings (Copeland, 2023). We also extended this definition by presenting three other practical short definitions of AI which described AI as intelligent entity, independent executor and rational actor. In addition, we presented the following abilities of AI: it performing human-like tasks, enables creation of real-time controlling and monitoring systems, ability enables building automatic guidance and support for humans and making predictions and recommendations for decision-making (Table 1).

The goal of presenting the practical definitions and abilities of AI was to make sure that the students have similar understanding of AI and its abilities. Then, in groups of 4–5 students were asked to share and discuss their answers related to various levels of understanding and application of artificial intelligence.

In defining "definition in sustainable development context" (see column 3 Table 2) we suggested the students get familiar with UN Sustainable Development Goals 1–17 and ideate a definition for it in small groups. The students were able to create concrete examples of how AI could provide value for sustainable development. We

TABLE 1 The generic illustrative examples that we presented to students to assist them to accomplish the group work assignment.

How can AI help people in general?	Example outcomes of AI for sustainability:
1. Performs human-like tasks (physical and virtual robots, chatbots, machine-vision, AI-apps, etc.)	1. Energy savings and optimization
2. Enables creation of real-time controlling and monitoring systems (warnings, alarms, security checks, etc.)	2. Minimizing waste of resources
3. Enables building automatic guidance and support for humans (instructions, question-answer machines, etc.)	3. Optimization of resource use
4. Makes predictions and recommendations for decision-making (analytics, modelling, statistics, etc.)	4. Improved efficiency
5. Other	5. Predictive maintenance
	6. Robots and machine-vision
	7. Guidance and monitoring
	8. Support and training applications

used the levels of AI literacy and their definitions according to the study of Ng et al. (2021b).

In the final part of the workshop the students filled out another questionnaire inquiring into their learning experiences. The questions asked for the students' reflections and evaluations on their current experiences, knowledge, skills and expectations regarding artificial intelligence and sustainability. They were also asked to reflect on their learning experiences, in short narratives. Their answers gave us insights and allowed us to assess their knowledge of the role of AI in everyday situations.

3.2 Data analysis

We adopted an abductive qualitative research methodology approach while analyzing data (Dubois and Gadde, 2002). The characteristics of abduction in research are logical and scientific inferences that extend into the realm of profound insight which generates new knowledge (Reichert, 2004). In practical terms, through the perspectival approaches of explanatory abduction (Alvesson and Skoldberg, 2009) we simultaneously processed the theoretical framework and analyzed empirical data in an iterative manner. Thus, through abduction, we created insights regarding AI literacy in the context of sustainable development, and such knowledge has not before associated with each other in educational studies.

The reflective learning narratives were analyzed using thematic analysis, and following method suggested by Gioia et al. (2013). The themes were first identified, coded (Saldana, 2009), and categorized into first level categories. Thus, analyzing open-ended responses of the pre- and post-questionnaires, open coding was applied without pre-defined coding categories for the literature review. This facilitated an understanding of AI literacy in the sustainable development context (Strauss and Corbin, 1998).

In practice, we carried out the data analysis in such a way that first, we carefully read through all the writings to understand them as complete narratives. After this, we identified thoughts, sentences, or parts of sentences related to the same themes from the respondents' writings. We combined these thoughts, sentences,

or parts of sentences into categories. After that, we continued by breaking down the categories identified from the material into subcategories, generic categories, and further into main categories, which form the answers to our research questions (Elo and Kyngäs, 2008). We did not quantify the material while analyzing it. We did not count the number of expressed thoughts, sentences, or parts of sentences. Still, we identified the differences and similarities of the expressions used by the respondents when comparing them to others (Silverman, 1993).

In the beginning of the first data analysis round, we had an initial conceptual understanding of the AI literacy and sustainable development literacy. From this perspective, we started the data analysis by analyzing the pre-questionnaire and the workshop results. The current understanding and capabilities of the students' AI knowledge and understanding in sustainable development redirected our study both theoretically and empirically. Based on our empirical observations from the workshop and students' material produced in the workshop, our interests turned to the designing of the AI literacy taxonomy in the sustainable development context. First, we used the results of empirical workshop where the students applied their current AI understanding to sustainable development cases. In the second phase of the analysis, we focused on specific educational goals, learning objectives and perspectives of sustainable development of AI literacy whilst forming the new taxonomy in this field. Based on the created AI literacy in sustainable development taxonomy (Table 3), we developed pedagogical model that identified distinct types of teaching practices that relate to education of AI literacy in sustainable development.

4 Results

4.1 What do undergraduate students understand about AI?

The thematic analysis of the learning narratives completed at the beginning of the workshop revealed the following categories.

Limited knowledge of an important subject. The students' assessments of their own skills in relation to artificial intelligence were realistically critical. The importance of the matter was recognized, but the limitations of one's own skills were also acknowledged. The skills identified by the students were limited to awareness of the role of artificial intelligence, and the usage of the skills in some contexts. The lack of deeper understanding was clearly recognized. The students who followed additional courses in AI evaluated their skills to be better.

"Occasionally we use tools that utilize AI to handle information." I like to think about philosophical way of it but not any competence whatsoever." "I don't think I've really consciously done anything AI related." "I have no expertise related to AI whatsoever." "I have done a course on AI."

Acknowledgments of both the value of AI and human agency. The students' reflections conveyed an enlightened understanding of the effectiveness of AI, but also its dependence on human

TABLE 2 Artificial Intelligence (AI) literacy (Ng et al., 2021b) for sustainable development with the example ideas of student groups.

The levels of AI literacy	Definition in sustainable development context	Requirements (examples) for private life	Requirements (examples) for work life
Know and understand AI	"know how to use resources efficiently" "collect data about how and where the climate action is necessary" "SDG4. Quality education" "use of AI to solve the problems to related to SD"	"chatGPT – chatbot" "seeing the condition of public parks." "personalized Learning with AI- Duolingo or Coursera" "use ChatBot for studies"	"know how AI helps with city transport" "identify the need of solar panels in a proper area." "AI tools can be used to analyze student performance data in universities and schools" "use of AI to solve work problems"
Apply AI	"evaluate sustainable cities and environments" "guidance and monitoring" "identify the areas of improvement and how should it be threatened." "Language Translation AI- to overcome language barriers" "CO2 and Energy optimization to minimize waste"	"efficiency" "noticing the areas that need maintained or renovated." "speech recognition software can be used to make education more accessible to individuals with disabilities." "use AI to plan your optimal day"	"unbiased application review" "support and training" "making the infrastructure." "AI- training to deliver training to employees, improve their skills and knowledge." "use AI to solve repetitive tasks, and automization"
Evaluate and create AI	"predict city traffic in the evening" "AI can speed up the building and the changing the tools for climate action." "check if the AI is fair, predicting what will happen if we use AI" "risk evaluation"	"design an efficient caloric intake" "get in touch with people nearby and taking action in the necessary place." "evaluate AI educational apps to make sure they are accessible for all learners, regardless of their background or abilities." "predict sustainability of a machinery" "use AI to solve menial tasks"	"evaluate and manage a better design work schedule for teams" "choose the right design and using and optimizing the right resources." "evaluate AI grading systems to ensure that they are not biased against certain students and that they are providing accurate assessments." "predict solutions based on customer data" "optimize existing products or services"
AI ethics	"ethics regarding the location of individuals (privacy)" "helping people to take action for climate more efficiently and providing guidance." "AI should be designed a way that aligns with ethical principles and values, respect for human privacy." "evaluate pros and cons"	"transparency in how data is used and evaluated" "informing the situation and taking care of the public parks." "social media -misinformation on their platforms." "AI solutions should be fair and ethical for all"	"predict the outcome of a project's impact on individuals/groups" "make the energy more renewable." "keep the information of users safe in recruitment applications like Linked In" "work done by AI should be transparent"

thinking. Although the students believed in the usefulness of artificial intelligence, they also emphasized the importance of human decision-making.

"I would not consider AI to be the absolute solver of world problems. AI is only a tool for professionals to help them solve problems." "AI is a tool to execute the plan." "AI is programmed intelligence." "Yes, partially AI can help solving these problems, but I think we need also human creativity."

Absence of AI in the curriculum. The reflections clearly conveyed the view that AI has not been discussed in the studies. A few students mentioned elements of AI in their studies, but their learning took place outside of the regular studies included in the curriculum.

"We do not have any classes or studies on AI. All I know is coming from individual research." "I started to need AI more, so I got better. "I have learned a lot from my classmates during these three months." "Schools could do a much better job at teaching and increasing our knowledge of AI." "Nobody talked about AI until today."

Varied levels of presence of sustainability in the curriculum. The reflections showed strong disagreements about the impact of the studies on the understanding of promotion of sustainable

TABLE 3 Identified themes and pedagogical implications.

Identified themes	Pedagogical implication
Critical and realistic assessment of understanding AI.	Joint discussion needed regarding the zone of proximal development.
Prior knowledge turned out to be decisive.	Need for definitions and practical examples.
Varied levels of presence of sustainability in the curriculum was acknowledged.	Curricula need to be developed from the point of view of sustainability literacy.
Importance of sustainability promoted by future employers was recognized.	Sustainability issues need to be highlighted in HEI and working life co-operation.
Theory vs. practice gap was a challenge.	Exploratory learning is crucial in the context of AI and sustainability.
Brainstorming in groups was found useful.	Well prepared workshops may be extremely useful in constructing understanding on new concepts and bridging theory – practice gap.

development. Some students gained a lot of understanding of sustainable development from their studies, some none at all. The explanations suggested that those students who were interested in the issue both recognized the related themes in their studies

and applied for courses that focused specifically on the themes of sustainability.

"I have learned about methods much." "Since I started my studies I learnt a lot about sustainable development." "It is always appreciated but my studies are not related to the matter." "Most projects are based on sustainability." "Maybe a little bit." "In every subject, teachers always emphasize on the importance of developing sustainability and how to make it effectively." "Sustainable development hasn't been a hot topic during my studies."

Importance of sustainability promoted by future employers. Some reflective narratives showed strong positions for and some against the impact the future employers should exert on sustainability. In general, the employer's actions were considered especially important. On the other hand, the students were ready to compromise their ideals when faced with the realities of life. They stressed the importance of the opportunities to choose potential employers, whilst applying for work. If they need work urgently, the students are more ready to compromise on the demands regarding the employer's actions to promote sustainable development.

"It would be a decisive feature for me because it shows the value of the company." "It is a hard decision that I can make based on the situation." "As a jobless student the main motivation is to find work no matter what the company is." "It would be a positive metric but not something I consider a priority." "It will certainly be a plus."

Our analysis also revealed the students considered their future employer's actions to promote sustainable development to be important. The importance of the issue was also emphasized when the ratings were lower, but the lower rating was based on scepticism about companies' desire to promote sustainability or emphasizing the issue as a positive addition, but not necessary.

"... I do not know much about such topic. But it is important for my future employer to discuss sd for me." "Of course, I hope they take those things seriously, but it is not mandatory." "It is definitely important, But not the biggest factor for me." "Employers actions do have direct influence on earth." "I want to... promote sustainability by the best of my ability."

4.2 How did the workshop promote understanding of the possibilities of artificial intelligence to solve challenges related to sustainable development?

During the part of the workshop where the students worked in groups the students were asked to elaborate on the connections between AI and sustainable development. They were able to create concrete examples of how AI could provide value for sustainable development. However, they did not link them to the SDGs except for two of the groups. The students also had difficulties ideating definitions based on the hierarchical

levels of AI literacy, namely knowing, and understanding AI, applying AI, evaluating, and creating AI and AI ethics. This showed that we should put special focus on the hierarchical levels of AI literacy if we use the same template in the same way. The ideas for the requirements for private and work life provided concrete suggestions (columns 4–5 in [Table 2](#)). This indicated that the students can create innovative ideas for AI-based value creation opportunities in sustainable development. Although the connection to the hierarchical levels of AI literacy was missing in most outcomes, the examples showed that the students were able to define how AI will create value for different SDGs.

4.3 What are the greatest challenges in enhancing AI literacy in higher education context, and what kind of pedagogical solutions could be useful?

When asked about the value of the workshop in knowledge creation and understanding of the potential of AI to enhance sustainable development twelve students (out of 22) acknowledged gaining more knowledge about AI. The examples below illustrate the students learning.

"I came to know the different abilities of AI that we can use to prevent climate change and to enhance sustainable development". "I did some research about AI and see it extremely fascinating." "Yes, I learned about it through my discussion with my teammate."

On the other hand, ten students described their learning as follows:

"I did not really (learn). I would need to learn about the whole concept first before I can combine sustainability to it." "The workshop confused me."

When asked about their assessment of their learning on a scale 1–5, on average the students rated their learning as 2, 1. When asked for suggestions for workshop improvement from the learning perspective, the students pointed out a lack of prior introduction to the subject. They assessed the introductory lecture as general and expressed the need for more in-depth lecture on AI and sustainability in general. They also mentioned confusion due to the lack of clarity of the instructions and questions in the assignments. The following excerpts illustrate the students' suggestions:

"Give us more examples on how AI is used in real life. Define AI better for the ones of us who have no knowledge of it, so working on the issues would be easier." "I think it is a clever idea to have a lecture about AI before this workshop."

When asked about the most useful parts of the workshop they mentioned the possibility of opening the topic, learning

about it, as well as brainstorming, researching, and discussing it with their peers.

“The evaluation part because it helped me to reflect on ways AI could help with sustainable development.” “The part where we had to invent ideas, because it made us think more.”

The students evaluated the importance of future employer's relationship to sustainability and responsibility on average as 3, 2 on a scale 1–5. Some students expressed the importance of caring about the future generations, some expressed the need for earning money as their primary focus.

“I think it's really important because the issue otherwise is going to be there forever.” “It shows their (employer's) values when they care about sustainable development.” “I need the work, so sustainability isn't that important.”

As can be seen from the examples above the students' learning about AI and sustainability was somehow compromised because of a combination of two factors: students' various initial knowledge of the concept, and the unclarity of the knowledge and the instructions implemented during the workshop. It can be therefore concluded that when introducing a new concept, a more in-depth, and illustrated by examples lecture should be delivered prior to the workshop. Moreover, the results of the post-evaluation questionnaire showed that the concept of sustainability and its connection to AI was new to the students. However, it must be considered that artificial intelligence and sustainable development are exceptionally difficult topics, for which it can be difficult to assess the depth of the introduction.

Based on identified themes we formed the following pedagogical implications (See [Table 3](#))

The main problem from the pedagogical point of view to be the great variation in students' prior knowledge. This was a presupposition regarding artificial intelligence, but the weak knowledge of the concept of sustainable development came as a surprise. This was visible in the students' additional questions and need for help during the workshop. This finding is a result of public debate focusing on the concept of climate change instead of sustainable development.

5 Discussion and concluding remarks

5.1 Conceptual model for AI literacy for sustainable development

The opportunities of artificial intelligence and the goals of sustainable development are not mutually exclusive but rather complementary. AI is a significant technological advancement in information and communication technologies. AI will also significantly change work, education and health care in the near future. From the perspective of sustainable development,

many expectations are placed on the opportunities of AI. It can produce new necessary information that otherwise could not be found or analyzed in the environmentally oriented processes. Thus, it will be an important method and tool in sustainable development. This sets new requirements for HE as it is essential to provide skills, such as how AI and sustainable development could be combined in innovative ways. In this study, we have conceptualized this phenomenon through the concept of AI literacy in sustainable development.

Since there is no widely accepted consensus or guidelines for defining learning goals of AI literacy, we adapted the relevant learning goals of technological literacy to our conceptualization. Whilst defining the taxonomy of AI literacy for sustainable development, we adapted the ITEA's (2007) standards that were widely accepted taxonomies across western countries. [ITEA \(2007\)](#) defined the standards of technological literacy for K12 education in the United States, which implemented them across the states in the USA. They defined 20 standards for technological literacy that are the main learning objectives that students will know or master to fulfill their main goal. The standards are crystalized to five generic learning goals: (1) understanding of the nature of technology, (2) understanding of technology and society, (3) understanding of design, (4) abilities for technological world, and (5) understanding of designed world in selecting and using various technologies.

We adapted those learning goals to our AI literacy model ([Table 4](#)). Interestingly, ITEA's (2007) standards fit well to our model but they did not contribute much to the higher level of goals and objectives in our model. Unlike ITEA's (2007) standards that are for K12 education, our model is primarily designed for higher education. In addition to ITEA's (2007) conceptualization of technological literacy, we adapted the revised Bloom's taxonomy ([Krathwohl, 2002](#)) in our AI literacy in education and sustainable development taxonomy. The Bloom's taxonomy is a widely used taxonomy that provides levels to conceptualize the learning objects into the cumulative hierarchy where students first need to learn basic knowledge and understanding in order, they can learn higher level of capabilities such as analyzing, synthesizing, creation, and evaluation. The revised Bloom's taxonomy emphasizes the ability to metacognition that is the highest-level capability that ensures continuous learning and self-directed critical thinking and reflection.

5.2 Pedagogical model for teaching AI literacy for sustainable development

We adopted the problem-based learning approach in the experiment. Successful problem solving requires basic knowledge and understanding of the phenomenon to be solved. The results of this study showed that the students had difficulties solving the actual problem because they lacked knowledge and understanding of the basics of artificial intelligence and sustainable development. As the revised Bloom's taxonomy ([Krathwohl, 2002](#)) shows, a basic knowledge and understanding of the topic are needed before a solution can be found. Those basic elements of AI literacy help

TABLE 4 The taxonomy of AI literacy in education and sustainable development.

Educational goals of AI literacy	Learning objects	Perspective of sustainable development	Examples
Students will develop the basic understanding of AI	Characteristics of AI Basic concepts and terms of AI Role of AI in digital world	Knowledge about key of concepts, opportunities and use cases of AI in developing more sustainable world	Knows that AI can be used for energy savings and minimizing waste. AI enables real-time analytics, monitoring, and recommendation
Students will learn about the relationship between AI, nature and environment	The effects of AI on nature, built environment, society and economy	Understanding of how AI creates value for sustainable development processes and what kinds of effects it has on sustainable development processes	Understands key principles in using AI for energy savings, such as optimizing heating costs based on the weather forecasts
Students will develop abilities to work with AI for gaining value from its usage	Usage and application of AI solutions to support the accomplishment of work tasks	Ability to select a proper AI-based solution and using it to solve an end-user need related to a sustainable development goal	Uses AI-based energy optimizer for one-family house by selecting, registering, and applying it for a selected case
Students will develop critical thinking skills for AI-enabled world	Analyzing, synthesizing, and evaluating the ethics and impact of AI from different perspectives	Ability to analyze AI-based sustainable development solutions for evaluating their ethical impacts, and environmental and social responsibility	Authors a report about the adoption of an AI-based solution saves environment and impacts on the life of humans in an area
Students will develop abilities to innovate new AI-enabled solution and value propositions	Co-creating new innovative, ethical, and sustainable AI-enabled solution and value proposition for selected sectors	Ability to create innovative ideas how AI could improve sustainable development in a specific area, and ability to predict ethical, economic, and social consequences	Creates a concept plan about the ways AI will create value for a specific environmental problem in developing its sustainability
Students will develop their metacognitive skills to be able to manage AI-enabled world in the future	Developing learning to learn and reflective thinking skills for life-long learning that is needed in rapidly developing AI-based environment	Personal staff will to develop their one's own thinking and learning to learn skills in order to be able to that they will be able to follow the development trends of AI in the field of sustainable development	Follows critically influencers and professionals of AI in sustainable development, and is interested in applications and publications that enables continuous learning in this field

students to further analyze and evaluate the phenomenon, and question its current situation critically. This is also a prerequisite for creating a new solution which was also a learning goal in the workshop. In fact, the students were able to create new use cases and thus solve problems, but they still felt that they should have had better basic technological capabilities regarding the opportunities of artificial intelligence.

Our findings also pointed out to the students' need of more time to solve similar learning assignments, which would make it possible to find out needed knowledge base through self-directed learning and instructor-led teaching. The difference between the groups was noticeable when the understanding of artificial intelligence was clearer. This was reflected in the ability to answer meta-level questions and in finding practical examples. When the basic concepts were unclear, the groups could not move forward and became frustrated. This was reflected in the answers. Instead, in groups where one person had a deeper understanding of the concepts, the whole group began to understand the task and work on both meta-level ethical questions and practical examples.

In higher education pedagogy, it is essential to teach students higher-level thinking. The findings show that students can evaluate their competences and shortcomings in relation to the workshop's assignment. Such metacognitive skills are important learning objectives. The assignment in the workshop made the students reflect on their own knowledge in relation to a very current social and environmental topic, namely AI-related problem solving in the sustainable development context. This study revealed that similar problem-solving-oriented methods could work elsewhere. The taxonomy of AI literacy in sustainable

development brings a new reference framework for learning task and course planning in higher education, which also helps to prepare scaffolding-type learning methods where students solve problems in this context.

AI literacy is a fascinating concept in the context of sustainable development. For example, the relationship of technology to, for example, the themes of climate change and social justice is contradictory. On the one hand, it has been the accelerator of many unfavorable developments, but also a savior in the field of medicine, for example. The possibilities and dangers of artificial intelligence are an emerging field, and therefore a particularly important and fascinating subject of research and pedagogical development.

An essential starting point of our study was to get an overview on the capabilities university students have regarding the operation and role of AI in society, as well as AI's possibilities to solve the great challenges of our time. Complex social-ecological challenges such as climate change, biodiversity loss and global social inequality require in-depth sustainability transformations, across all sectors, scales and actors. It was expected that the skills would vary, but the uncertainty about the concepts and the variation in the skills were surprising. This is a strong signal that there is an urgent need for further research and new pedagogical ideas. More research is needed on how to develop learning to learn and critical thinking skills for life-long learning that is needed in rapidly developing AI-based environment. We also encourage educational researchers to study how students could develop their metacognitive skills to be able to manage AI-enabled world in the future.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical approval was not required for the studies involving humans because the questionnaires were delivered anonymously. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

AA: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft. CN: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft. AK: Methodology, Analysis, Writing – review & editing. AS: Formal analysis, Methodology, Writing – review & editing.

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Conflict of interest

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Seven years of embracing the sustainable development goals: perspectives from University of South Africa's academic staff

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As this article was being finalised, the world was left with less than 7 of the 15 years of Sustainable Development Goals (SDGs) implementation to 2030. There were still huge gaps in the attainment of the SDGs in institutions of higher learning globally, especially that COVID-19 brought a barrier leading to a known pushback. However, the pandemic did not imply there was no work done prior, during and after COVID-19. This article investigates the extent to which the University of South Africa's academic staff activated and mainstreamed the SDGs in their core mandates between 2016 and 2022. Data was generated through a survey ($n = 121$), participatory action research, and document analysis. It emerged there is a greater degree of awareness of the SDGs, with 78% of academic respondents confirming this. However, the percentages drop across the four core mandate areas when it comes to SDGs implementation. About 52.6% of academics indicated they were promoting SDGs in their teaching, research (63.3%), community engagement (55.5%) and academic citizenship (54.5%). Findings further reveal key enabling institutional policies like the SDGs Localisation Declaration, and the Africa-Nuanced SDGs Research Support Programme. Large gaps remain on the publication front, where over 60% of the responding academics had not published an article explicitly on SDGs. There is also bias in publications towards certain SDGs. The work recommends that University of South Africa management continue raising awareness on the SDGs and systematically address barriers identified in the main article to enhance the mainstreaming of the SDGs across all core mandate areas.

KEYWORDS

quality education, SDGs, stakeholders, sustainability, higher education, academic staff

1 Introduction

The fourth Sustainable Development Goal (SDG) makes it clear that there is a need to “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all” (United Nations, 2015, p. 14). This brings all education entities, including Higher Education Institutions (HEIs) at the epicentre of the attainment of SDG 4 by 2030 (Filho et al., 2023). Within the HEIs setup, there are mainly three groups of key stakeholders: (1) academic (teaching) staff, (2) non-teaching staff, and (3) the students. Target 4.3 from SDG 4 stipulates that by 2030, the world should ensure that there is “equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university” (United Nations, 2015, p. 17). In their earlier writings,

Filho et al. (2017) portray several challenges to overcome from HEIs in terms of embracing sustainable development. Gaps were identified in the mainstreaming of sustainability across two core mandates including teaching and learning, and research (Filho et al., 2021). However, what was clear was that the SDGs presented clear new opportunities (Filho et al., 2019).

While the 2030 Agenda for Sustainable Development (AfSD) does not exclusively mention academics in the set target of SDG 4, by default, any reference to higher education means they are included. It is important to note that academics fit into the four core mandates of most universities that include: (1) teaching and learning, (2) research, innovation and commercialisation, (3) community engagement (engaged scholarship) or third mission (Fia et al., 2022), and (4) academic citizenship and leadership. While teaching and learning is traditionally a default set-up in many universities, especially those that are less resourced, the other three core mandates have been a challenge to fulfil. Yet global university ranking agencies like Times Higher Education (THE) are including many aspects from all the core mandate areas more and more (Bautista-Puig et al., 2022). After all, HEIs have a pivotal role to play in sustainability (Zaleniene and Pereira, 2021).

Alfirevic et al. (2023) present a bibliometric analysis of productivity and impact of SDGs-related academic research for the years 2017–2022. The work is based on SciVal. The overview shows a sharp growing trend on SDGs publications, from recording only 121 publications in 2017, to a massive 1,511 in 2022. Drawing from the geographical distribution of the publications, the USA takes up the lion's share with 275 publications, followed by the United Kingdom sitting at 230 publications. India, Germany, Australia, China, and Spain all trail at a distance with between 75 and 100 publications. South Africa, Canada, and Italy brings up the last cohort of the top 10 countries with between 60 and 74 publications recorded. When it comes to the top 10 institutions, only the University of Cape Town (South Africa) makes it to the list from Africa. The top five journals hosting the publications include Higher Education (ranked first), Nature Sustainability (second), Nature Energy (third), Marine Policy (fourth), and Politics and Governance (fifth).

There are several publications focusing on how the University of South Africa (UNISA) has been addressing the call by the United Nations to activate the SDGs at the local level, thereby attempting to leave no one behind (United Nations, 2015; University of South Africa [UNISA], 2022a). However, the focus of the publications has not narrowed down to isolating how UNISA's teaching staff have been embracing the SDGs over time. Mawonde and Togo (2019) looked at the UNISA science campus in Florida, Johannesburg (South Africa) and interviewed campus operations managers and sustainability office managers, surveyed environmental science honours students and made observations to determine practices that contributed towards SDG implementation. Key findings were that while UNISA was aligning several practices to SDGs implementation, being an open distance and learning (ODEL) entity made it difficult to involve students in projects. Additional work reached similar conclusions as it was also focused on students (Mawonde and Togo, 2021).

Nhamo (2020), looked at how UNISA was engaging SDG 7 (sustainable energy) with a key finding that the university had embraced solar energy as one of its key interventions. The same author later focused on UNISA's whole institution, all goals and

entire higher education sector approach (Nhamo, 2021a), before narrowing down to how UNISA was involved in sustainability reporting through the United Nations Global Compact (UNGC). The work further elaborated on how the UNGC framework presented opportunities for the mainstreaming of the Global Reporting Initiative (GRI) standards and the SDGs (Nhamo, 2021b). Follow-up work by Nhamo and Chikodzi (2021) magnified how UNISA was scaling up its engagement with SDG 6 (water and sanitation) for general environmental conservation and building climate resilience and adaptation. Yet another publication by Nhamo and Malan (2021) investigated the role of the UNISA library in promoting the SDGs. As indicated earlier, all these studies have not exclusively focused on the academic staff. Hence, this research gap justifies the existence of this article. The work, therefore, spells out an objective to investigate the extent to which UNISA's academic staff have activated the SDGs in their core mandates within the 7 years marked from January 2016 to December 2022.

The work brings together methodological combinations including ongoing participatory action research (PAR) that was initiated by one of the authors from 2011, and a survey that was done to gauge the status quo and progress towards SDGs localisation by academic staff. However, this work draws more from the survey that took a diagnostic-evaluative nature, than the PAR. The PAR is a focus in an earlier publication (Nhamo, 2021a). Although some work is emerging globally on how academic staff are getting involved in SDGs localisation, a gap still exists in South African HEIs.

With regards to originality and contribution of the work, the University of South Africa has joined several players to advance the localisation of SDGs. Since we are halfway through the SDGs implementation period, it is novel to reflect on what has been achieved so far. Academic staff at universities play an important role in facilitating the domestication of SDGs through teaching, research, and innovation initiatives. They can be important agents of change within communities in addition to holding the future of the country's economic, social, and environmental fortunes.

The rest of the article outline is highlighted herein. The next section is dedicated to providing a brief literature review. This is followed by a description of the materials and methods used. After the methodology section, the work presents the key findings drawn mainly from a survey of academic staff and lived experiences. A separate section is reserved for the discussion of the findings, interfacing it with additional global and local literature, before concluding the work.

2 Literature review

2.1 SDGs domestication in HEIs: an overview

It will be inadequate to consider SDGs localisation in HEIs without touching on the theory of SDGs domestication and localisation. As the SDGs were pitched at the global level by the United Nations, governments, local authorities and organisations had to drop them to their level. Although the term domestication is at times interchanged with localisation, the former remains

at the national level, while both imply movement towards implementation (Alcántara-Rubio et al., 2022). For example, in Rwanda, the domestication of the SDGs included translating them into local Kinyarwanda language and integrating them into its national development plans and strategies (Malonza and Brunelli, 2023). Among the key policy documents that mainstreamed the SDGs are National Strategy for Transformation 2017–2024 and Rwanda's Vision 2050. Part of the SDGs domestication involved auditing the global indicators on SDGs and seeing how these could either be adopted as they were or amended to suit national conditions. The same approach was also taken in Zimbabwe (Mutambisi and Chavunduka, 2023), with institutional challenges vivid in the process. The authors picked that there remains “no alignment of policies, structures, and strategies with urban local authorities” as national and urban local authorities are inadequately integrated for the “whole-of-government harmony on SDG implementation” (Mutambisi and Chavunduka, 2023, p. 1). Ndlovu et al. (2021) then focuses on the localisation of the SDGs in the City of Bulawayo and discover that although there is little taking place, the city had potential to embrace the SDGs as it put in place a detailed plan to localise the global agenda.

On considering SDGs localisation in Tanzania, Jönsson and Bexell (2021) find that localisation works well with statistics and indicators. In addition, there is also the need for awareness raising among several actors, including HEIs. Some of the agents of localisation include national government, civil society organisations, the United Nations, and members of parliament. However, the authors pick several challenges to localisation that are relevant to HEIs, including “unclear allocation of responsibility, insufficient co-ordination, high turnaround of people in key positions, a lack of data availability, low awareness of the SDGs among citizens, a shortage of resources and shrinking democratic space” (Jönsson and Bexell, 2021, p. 181).

Sustainable Development Goals localisation has also been taking place at universities and in other organisations as appropriate. Athlapheng et al. (2020) consider the implementation of the SDGs at the University of Botswana. It emerged that the university established the SDGs Hub to assist the institution in implementing the SDGs across the core mandates of the university that include teaching and learning, research and innovation, and community engagement. What emerged from the case study is that:

Stakeholders are central to all initiatives – student community, non-academic departments, teaching faculties and their priorities in academic programmes. Research agenda and engagements such as panel discussions, workshops, sensitisation events, are some of the activities undertaken to advocate for SDGs implementation. Collaborations with various stakeholders also play a crucial role in achieving SDGs activities within the university (Athlapheng et al., 2020, p. 265).

Alcántara-Rubio et al. (2022) articulate that as the universities seek to localise the SDGs, there is a need to know and identify what is already in place. This is so because many universities have programmes in place that focus on several SDGs. However, the desire to have quality educational programmes remains a priority across many universities. Zeleni and Pereira (2021) are of the view that while HEIs contribute significantly towards the

attainment of the SDGs implementation, there are selected SDGs that these institutions must focus on for global impact. Kioupi and Voulvoulis (2020) portray HEIs as engines of community transformations. To this end, future citizens can be easily directed and re-directed towards sustainability from programmes offered. Going back to Zeleni and Pereira (2021), the authors identify six SDGs for global and societal impact namely: SDG 1 (ending poverty everywhere), SDG 3 (health and wellbeing), SDG 5 (gender equality), SDG 8 (decent work), SDG 12 (sustainable consumption and production), SDG 13 (climate action), and SDG 16 (peace and security). Since HEIs have students at their disposal for relatively long periods, following deliberate frameworks to change the culture in terms of the world's view remains in the hands of academics. To this end, many facets of the SDGs should have been, and should be embedded in the curricula.

2.2 The challenges and prospects for SDGs localisation in HEIs

There is no disagreement that the United Nations' 2030 AfSD and its 17 SDGs have placed HEIs as co-partners in resolving the perennial and future societal challenges including poverty eradication, environmental stewardship (Shava et al., 2020), seeking peace and prosperity, and enhancing livelihoods (Franco and McCowan, 2021).

Since publications are at the centre of how academics have rapidly harnessed their energies towards the attainment of the SDGs, it is prudent that space be accorded to deliberate on this. Drawing from the Web of Science (WoS) database, Sianes et al. (2022) undertake a scientometric analysis of the academic production on the SDGs between 2015 and 2020. In the relatively short period of time, scholars are said to have published more than 5,000 research papers. These publications mainly cover the areas of climate change (SDG 13), as well as health and the burden of diseases (SDG 3).

While acknowledging the challenges brought up by the COVID-19 pandemic, Useh (2021) highlights that the SDGs can be utilised as a framework for future postgraduate research. This posturing is proposed as a new norm for developing countries. From the author's perspective, master's and doctoral research projects should be purposefully directed towards addressing the SDGs, thereby making positive contributions to communities. While as authors we partially agree to this proposal, we wish to add that the posturing should be for all HEIs worldwide, regardless of whether institutions are from the developed northern hemisphere, or the developing southern hemisphere. This view is further supported by the fact that many research projects are global, cutting across the binary highlighted herein. Projects remain global in terms of their spatial location, funding, expertise involved and the application of the results. Furthermore, COVID-19 has taught us that nobody is safe, until everyone is safe.

From the Netherlands, Kopnina (2018, p. 1268) looks at how the integration of the SDGs lectures at a vocational college, and at the undergraduate and postgraduate university levels. The results revealed that “the students were able to develop a certain degree of critical, imaginative, and innovative thinking about sustainable development in general and the SDGs in particular.” Apart from

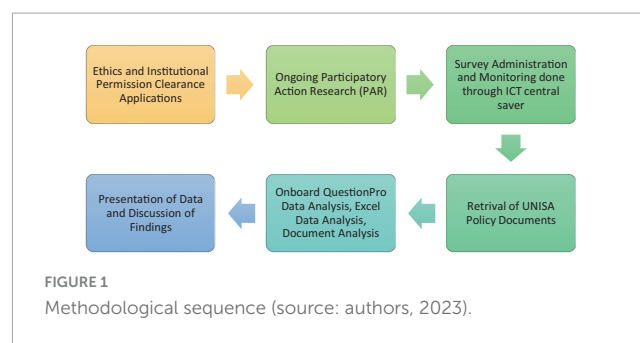
providing a platform to enhance teaching and learning, [Filho et al. \(2019\)](#) are of the view that the SDGs further provides a link for universities to pursue their mission on engaged scholarship linking them to communities and other stakeholders. While this was possible, the authors reveal that many HEIs had not grabbed the opportunity and were being left behind.

3 Materials and methods

This work was conducted at UNISA, an open distance and e-learning institution based in Pretoria, South Africa. However, the university has campuses across the country and two outside the country in Ethiopia and Ivory Coast. In terms of the executive management, UNISA is led by a Principal and Vice Chancellor. Below this office are eight portfolios, including six Vice Principals. The portfolios for Vice Principals are namely: Teaching, Learning, Community Engagement and Student Support; Research, Postgraduate Studies, Innovation and Commercialisation; Strategy, Risk and Advisory Services; Information and Communication Technology; Institutional Development; and Operations and Facilities. The remaining two portfolios are for the Registrar, and Chief Financial Officer. From the academic programme, there are nine (9) colleges and their equivalent namely¹: Accounting Sciences, Agriculture and Environmental Sciences, Economic and Management Sciences, Education, Graduate Studies, Human Sciences, Law, Graduate School of Business Leadership, as well as Science, Engineering, and Technology. The colleges are headed by Executive Deans and Deputy Deans.

The study design fell within the mixed methods approach that focused on UNISA as a single case study ([Yazan, 2015](#); [Dorta-González and Dorta-González, 2023](#); [Tolettini and Di Maria, 2023](#)). As a case study, the boundaries could easily be identified as UNISA academic staff. However, given the nature of case study, findings from this work could not be generalised to apply to other institutions. Within the case study design, the main research method used to generate data was an online survey and this method has been used in similar studies elsewhere globally ([Filho et al., 2023](#)). Surveys assist in getting broader perspectives on subject matters, in this case SDGs localisation uptake by UNISA academic staff. This was complemented by document analysis and the ongoing PAR that draws from 15 years of experience at the same institutions by one of the researchers ([Nhamo, 2020, 2021a,b](#)). [Figure 1](#) shows the methodological sequence for the study while [Figure 2](#) shows the elements of the PAR applied for over 15 years.

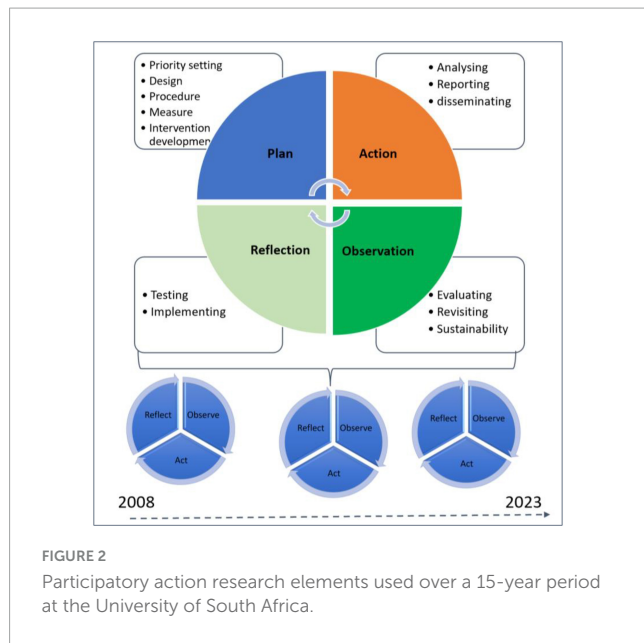
As shown in [Figure 2](#), the PAR included long term planning, action, observations and reflections regarding the participation and involvement of teaching staff in the localisation of SDGs within their fourfold mission of teaching and learning; research, innovation, and internationalisation; community engagement (engaged scholarship), and academic citizenship and leadership. Throughout the process, the change evaluation indicators assessed included the number of academics with publications on SDGs, community-based interventions focused on championing SDGs implementation, and changes in the content of the modules to



address SDGs. Several cycles of observations, action and reflections were done over the period. Documents used were obtained from the institution's library guide on SDGs found at: <https://libguides.unisa.ac.za/c.php?g=1005449&p=7283895>. Other research articles published by staff members were also used as source documents to understand the dynamics of SDGs localisation at the institution. Primary focus was on content dealing with academics' activities aligned with the SDGs. Drawing from one of the author's 15 years of experience within UNISA, including work on the localisation of the SDGs and associated publications, the survey instrument was developed to address gaps identified with regard to academic staff's involvement in the entire process. The questionnaire survey was administered online on the QuestionPro platform. Prior to undertaking the fieldwork, an ethics clearance certificate, as well as an institutional permission letter had to be granted. Further details pertaining to the methodological orientation are presented in [Figure 1](#). What is of interest to the reader is that the survey link was emailed through to all academic staff from UNISA's central server. A total of 632 academics viewed the survey online and this became our population (N). From this figure, 127 academics started to complete the survey, with 121 (n) completing it. This gave a return rate of 19.15%, which is significantly high in terms of surveys. Although the survey did not solicit feedback regarding where the responding academic staff set across the colleges (faculties) in UNISA and the branches of knowledge, as indicated earlier the survey link was emailed to every staff member from the university's central server. There was also a good representation of both males and females in the respondents as will be discussed under the demographics. Regarding the extent the levels of representativeness of the sample by years of experience from the academic staff, it emerged that all the five cohorts in the survey were well represented. Further analysis is done under the demographics section. As for previous experience in working with SDGs, it was one of the main matters investigated by the article.

The survey instrument had two major sections. These included Section A, which focused on the demographics. From this section, questions raised sought to generate data on gender (with an option "wish not to disclose" inserted), age, position held at UNISA, status of employment, and number of years as employee at UNISA. In Section B, the work sought to generate data mainly on SDGs awareness and localisation/implementation. Questions included looked at perceptions on SDGs localisation in HEIs, whether UNISA had localised the SDGs, if the respondents were familiar with the SDGs and the Millennium Development Goals (MDGs), as well as determining frequency of teaching staff participation

¹ In many universities across the world, the colleges are equitant to faculties.



in workshops, seminars, conferences, and other platforms dealing with SDGs localisation prior to answering the survey.

There were other questions from Section B focusing on the promotion of SDGs across the key mandates of UNISA such as teaching and learning; research, innovation, and internationalisation; community engagement (engaged scholarship or service to community); and academic citizenship and leadership. The question probing the number of publications explicitly mentioning SDGs was also raised. A five (5) point Likert scale was used for some of the questions to ease the evaluation of the level of SDGs localisation readiness at UNISA on the scale, from total rejection (Strongly Disagree) to total acceptance (Strongly Agree).

To have academics assess the extent to which UNISA was engaging with the 17 SDGs on a day-to-day basis, a question was also included in the survey with options to select from, “High Engagement,” “Moderate Engagement,” and “Low Engagement.” The “Not Sure” option was also provided for ticking. Before the last question asking for any comments, the teaching staff were asked to rank selected matters in terms of how such were a barrier or not a barrier in terms of SDGs localisation. A scale allocating scores from 1 (Not a Barrier at All) to 10 (A Serious Barrier) was used. To determine the internal consistence and validity of the constructs in the question, the Cronbach alpha was computed in Xlstat. The Cronbach alpha is premised on the following formula:

$$\alpha = \left(\frac{K}{K-1} \right) \left(\frac{S_y^2 - \sum s_i^2}{S_y^2} \right)$$

where, α , Cronbach alpha; K , number of items; and S^2 , variance between items.

Several data analysis methods were applied. For triangulation purposes, further analysis on SDGs publications was done using data obtained through Elsevier's SciVal platform.²

In earlier publications, three PAR cycles were identified by Nhamo (2021a, p. 63) including “the development of a UNISA

Management Policy Brief calling for the SDGs Localisation Indaba in 2017 (Cycle 1); the development of an SDGs for Society Research Stream as part of the UNISA Annual Interdisciplinary Academy and Summer School in 2018 (Cycle 2); and the SDGs Localisation Indaba in 2019 (Cycle 3).” Effectively, the current cycle under which this work is falling was triggered in 2020 as the SDGs Localisation Indaba took place on 29 November 2019. As is now common knowledge, COVID-19 hit and disrupted everything. The findings from this process are now presented in the next section.

Regarding the survey instrument, pilot testing was done prior to rolling it out. This included internal and external expertise going through the instrument before it was forwarded to academic staff from non-participating universities in South Africa. Furthermore, the survey instrument as also rolled out in seven universities in Zimbabwe with additional pilot testing and the incorporation of any observations made requiring clarity on questions and the removal of any online glitches.

The emerging data were analysed through in-built capabilities in QuestionPro, including such capabilities on word cloud. Furthermore, generic qualitative data analysis protocols were applied, with some data imported to Excel for further processing.

4 Presentation of findings

This section is dedicated to presenting the key findings from the study. It is structured in five sub-sections namely: presentation on demographics, awareness of the SDGs, promotion of SDGs work across core mandates, SDGs localisation Barriers, and institutional engagements. Further details will now be considered in the next sub-sections.

4.1 Demographic setup

From the 121 respondents, 42.99% indicated they were males, 53.27% were female, while 3.74% wished not to disclose their gender. These data shows there was a good balance between gender from the respondents. As for the age groups, the majority (29.51%) came from those between 55 and 64 years. Further details are shown in Figure 3. What also emerges from the data is a potential challenge with research staff pipeline, with only 20.49% of the academics that responded aged between 18 and 34 years.

The respondents were asked to indicate the positions they held at UNISA. The majority (28.69%) were at Senior Lecturer position, followed by those at Lecturer grade (26.23%), and Full Professors (13.93%). Associate Professors comprised 11.48%, with Junior Lecturers sitting at 4.92%. There were also postdoctoral/research fellows (0.82%), Teaching Assistants (3.28%) and those that indicated other, to include associates, at 10.66%). Given that globally, academics at Senior Lecturer grade and above are expected to undertake serious research work, an estimated 54.1% of those surveyed fell into this bigger group. This remains particularly interesting given that a question specifically asking research outputs on SDGs was pitched in the survey.

On status of employment, the bulk of those surveyed (78.23%) were permanently employed. This was followed by 5.65% that indicated they were part-time, while 8.87% were temporary full-time. The remaining category of “other” had 7.26%. This category

² <https://www.scival.com/overview/sdg?uri=Institution/716596>

possibly includes research associates and postdoctoral fellows used by UNISA. As for the number of years employed at UNISA, the majority were in the cohort 6–10 years. Further details are shown in [Figure 4](#).

What is encouraging from the respondents' data and the number of years employed at UNISA is that all of them have been employed in the time of the SDGs. In fact, 70.16% had been in their posts for six or more years. This posture presents the majority of UNISA academics as having a chance to engage with the SDGs from their inception in 2015. The next sub-sections now focus on the materiality of SDGs localisation at UNISA.

4.2 Awareness of the SDGs

A question was raised seeking responses as to whether the concept of SDGs localisation in higher education was one that all institutions in Southern Africa and worldwide should implement. The majority of the academics responding (47.15%) indicated they were in agreement. This was followed by 30.89% that strongly agreed with the notion. While 11.38% remained neutral, 8.13% strongly disagreed with the proposal, with the remaining 2.44% in disagreement. Overall, 78.04% of the respondents either agreed or strongly agreed with the sentiment. Coming closer home, the teaching staff had to indicate if UNISA had localised the SDGs. The results were a bit shocking, as 60.66% revealed they were not sure. Up to 31.97% indicated the institution had localised the SDGs, with 7.38% indicating to the contrary.

Requested to share if they were (1) familiar with, and (2) have read the United Nations document “Transforming Our World: The 2030 Agenda for Sustainable Development” that embeds the 17 intertwined SDGs, 55.74% of the responding academics indicated “Yes.” While 9.84% indicated they were not sure, the other 34.43% were clear to say “No.” Having this high percentage of academics not having read the 2030 Agenda for Sustainable Development makes an interesting finding and further discussions will follow. A similar question was raised regarding the MDGs. Up to 66.94% of the respondents indicated they were familiar, and they had time to read the MDGs. This was 11.2% points higher compared to the SDGs. Effectively, fewer respondents (25.81%) indicated “No,” while the remaining 7.26% indicated not sure.

The academics were also asked to indicate their participation in such awareness raising platforms that included workshops, seminars, conferences, symposiums, and other. The bulk of the academic staff (47.97%) had not done so since the inception of the SDGs in 2015. This is a worrying discovery. Further results are shown in [Figure 5](#). While less than 6% of the respondents indicated having attended six or more platforms, 41.46% indicated they had been to at least 1–5 SDGs localisation platforms.

To conclude the awareness probing, the respondents were requested to reveal their awareness of the SDGs prior to the survey. The bulk (69.17%) revealed that they were aware. Up to 18.33% indicated they were not aware, while 12.5% had a rough idea on the SDGs. A percentage of 30.83% of academics not being aware of the SDGs 7 years down the road to 2030 is worrying. This question was included as a similar earlier question asked about familiarity and having read about the SDGs. Being aware of the SDGs does not necessarily include having read about them. This probably explains the higher percentage of respondents indicating “Yes.”

4.3 Promotion of SDGs work across core mandates

The promotion of SDGs across the core mandates of the academics remains paramount. To this end, the respondents were asked to indicate the extent to which they promoted the SDGs in four core mandate areas namely: (1) Teaching and Learning, (2) Research, Innovation, and Internationalisation, (3) Community Engagement (Engaged Scholarship/Service to Community³), and (4) Academic Citizenship and Leadership. Generally, there was more engagement in the research, innovation and internationalisation, mandate compared to the other three. This was followed by teaching and learning, with the least engagement under the academic citizenship and leadership mandate. More details are provided in [Figure 6](#).

What is emerging from [Figure 6](#) is that the majority of respondents agreed with the notion that they promoted SDGs in all their four core mandate areas. Up to 63.25% of the academics revealed they promoted SDGs in their research, innovation, and commercialisation work, compared to 55.45% on community engagement, 54.47% on academic citizenship and leadership, and 52.63% on teaching and learning. However, there was a disturbing trend of 23% or more of respondents across the mandate areas indicating they were “neutral,” meaning they could not evaluate their promotion of SDGs. Drawing from the Intercultural University of Veracruz in Mexico, the authors find that the university has been addressing SDG 4 through enabling access for marginalised communities. This is done through the university's engaged teaching, research and community engagement. Such activities have resulted in improved environmental stewardship (SDGs 13–15), health (SDG 3), livelihoods (SDG 1), gender equality (SDG 5), and a range of additional SDGs. These are all activities academic staff, and their students are engaged in.

A follow-up question on research and innovation was included. Academics were asked to indicate the number of publications they had that explicitly mention SDGs. A disturbing majority (63.56%) indicated they had no single publication to that effect. In a way, the findings shows that the promotion of SDGs in the research and innovation areas did not translate into significant publications. The 1–3 publications category attracted 26.27% of the respondents, while 6.78% had between four and six publications. A mere 2.54% of those surveyed had 7–9 publications, while only 0.85% of the respondents had 10 or more publications. With a focus on business academics, [Christ and Burritt \(2019\)](#) content that achieving the SDGs by 2030 remains a grand challenge. This is so because this special cohort of academics must work with business and their executives in reorienting corporate visions and missions to warm-up to the new global realities.

SciVal is a commonly used platform to analyse and measure publishing metrics. The results from Elsevier's SciVal show that, by the year 2022, academic staff at UNISA had written a total of 9,854 publications that directly mention SDGs. From the SciVal records, only SDG 17 is not explicitly mentioned in the publications. The other 16 are directly stated in the publications. [Table 1](#) presents the statistical information on the publications with regards to the

³ Referred to as the third mission in other global environments.

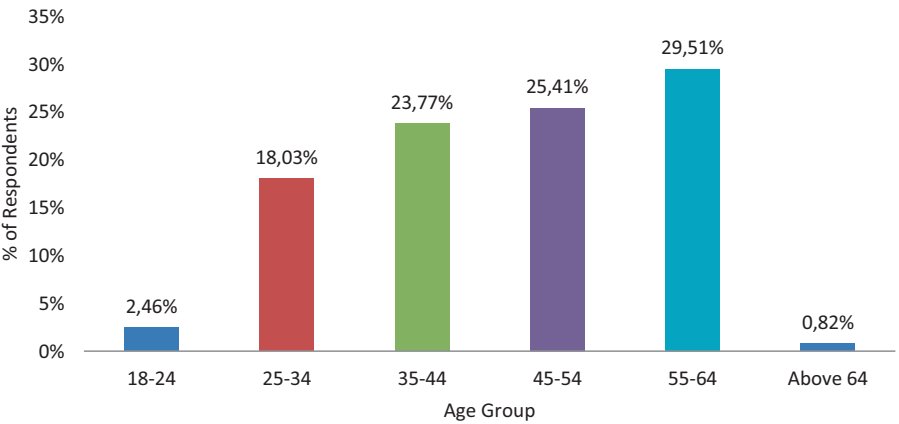


FIGURE 3
Age groups of respondents (source: authors, fieldwork 2022).

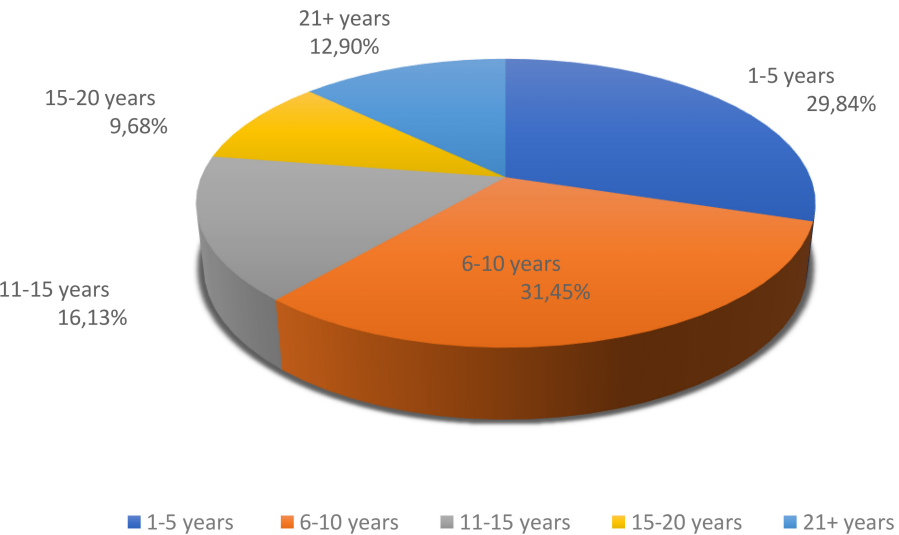


FIGURE 4
Number of years respondent employed at UNISA (source: authors, fieldwork 2022).

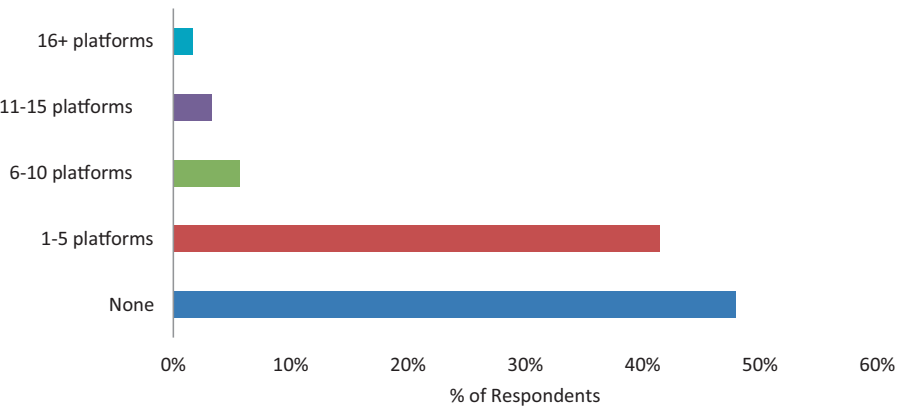


FIGURE 5
Participation in SDGs localisation workshops (source: authors, fieldwork 2022).

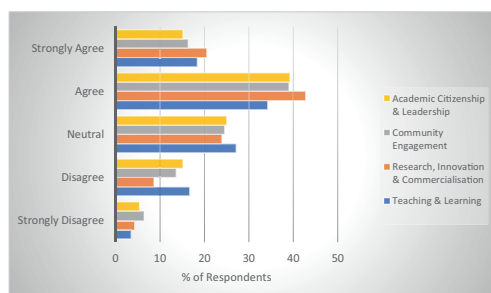


FIGURE 6

Promotion of SDGs in core mandates (source: authors, fieldwork 2022).

scholar outputs, the field-weighted impact of citations, and the total number of citations for each SDG.

As shown in [Table 1](#) the top five SDGs with regards to scholarly outputs include SDG 3 (good health and wellbeing), which has 1,262 publications, SDG 4 (quality education) with 1,087, SDG 8 (decent work and economic growth) with 907, SDG 10 (reduced inequality) sitting at 851, and SDG 16 (peace, justice, and strong institutions) with 798 scholarly outputs. The least number of publications are on SDG 14 (life below water). SDGs 2 (zero hunger), 13 (climate action), and 15 (life on land) are receiving almost similar levels of attention from academics at UNISA, with 329, 333, and 335 scholarly outputs, respectively.

Surprisingly, the SDG with the least number of publications (SDG 14) is the one with the highest field weighted citation impact of more than 1.7. This SDG has also been included in UNISA's Principal and Vice Chancellor's 10 catalytic niche areas of 2020.

UNISA's publications on SDG 3, SDG 6, SDG 9, and SDG 12 appear to generally have similar impact in academia with citation impact of 1.38, 1.38, 1.28, and 1.22, respectively. SDG 4 and SDG 16 have the least field weighted citation impact. The only SDG that has not explicitly received scholarly attention is SDG 17 (partnerships).

4.4 Institutional engagements

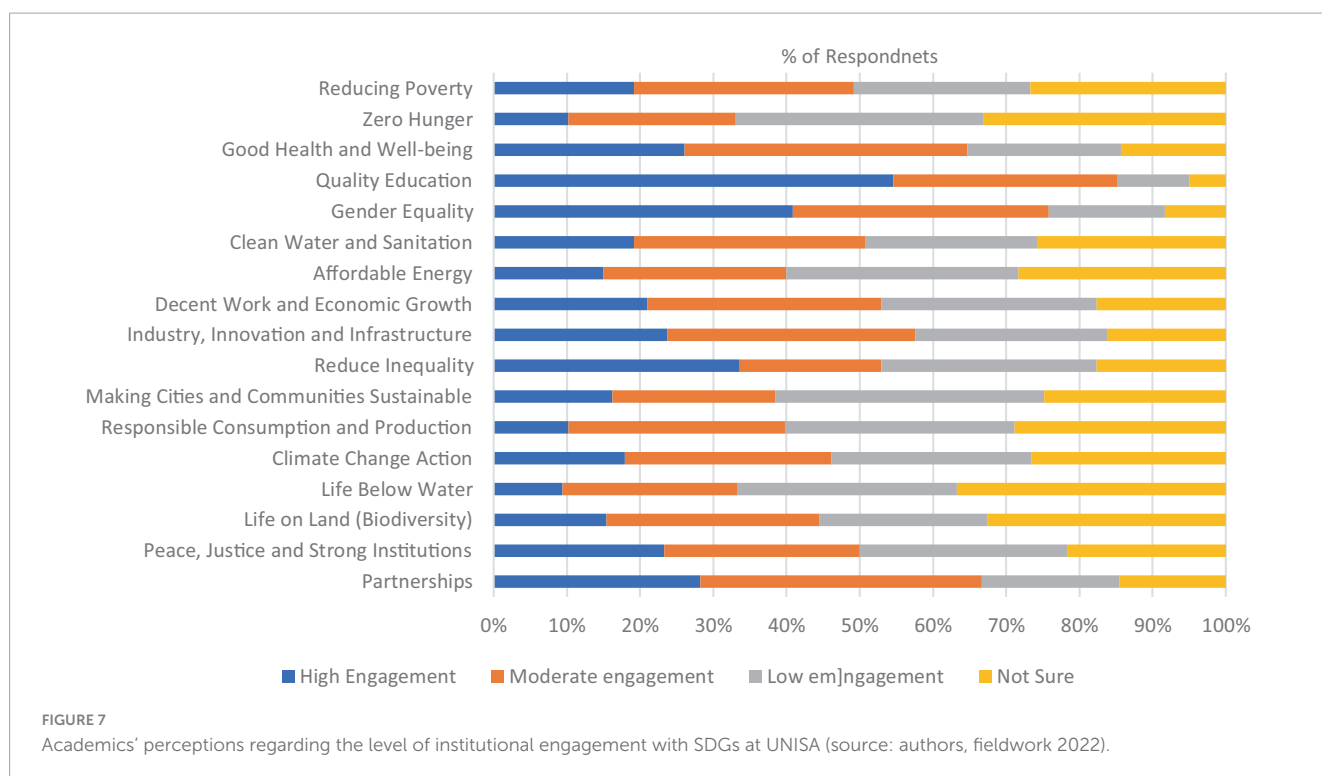
The institution's strategy can have an impact on the degree of participation of university academic staff in initiatives connected to the localisation of SDGs. Academics can participate and progress the localisation of SDGs based on the institution's ideology and strategies. As a result, top management must play a crucial part in creating an enabling environment for academics. Lack of support from senior management may stifle individual academics' attempts to further the SDGs. Results for the teaching staff's perceptions of UNISA's level of engagement with each SDG are shown in [Figure 7](#).

As shown in [Figure 7](#), for each SDG, there are several academics who feel that the institution is highly engaged with its implementation. SDG 4 (quality education) is the leading SDG with more than 50% of the respondents opining that the university's level of engagement with this SDG is high. This is followed by SDG 5 (gender equality), with more than 40% of the respondents indicating that the university is highly engaged with the implementation of the SDG. SDG 10 (reduced inequality) is the third highest SDG with regards to perceived high level of localisation at UNISA, with slightly above 30% of the respondents confirming so. The rest of the SDGs have less than 30% of the academics with the opinion that they are highly implemented. SDG 14 (life below water) has the least percentage (<10%), showing that it has not been highly prioritised by the institution. Other SDGs

TABLE 1 Publication metrics for UNISA academic staff by 2022.

Name	Scholarly output	Field-weighted citation impact	Citation count
SDG 1: no poverty	503	0.94	3,381
SDG 2: zero hunger	329	0.9	3,220
SDG 3: good health and wellbeing	1,262	1.38	19,022
SDG 4: quality education	1,087	0.82	6,026
SDG 5: gender equality	532	0.99	3,861
SDG 6: clean water and sanitation	697	1.38	13,670
SDG 7: affordable and clean energy	615	1.06	8,092
SDG 8: decent work and economic growth	907	1.12	7,657
SDG 9: industry, innovation, and infrastructure	726	1.28	6,713
SDG 10: reduced inequality	851	1.07	6,511
SDG 11: sustainable cities and communities	329	1.22	3,169
SDG 12: responsible consumption and production	454	1.08	4,456
SDG 13: climate action	333	1.2	3,763
SDG 14: life below water	96	1.76	2,272
SDG 15: life on land	335	0.86	3,291
SDG 16: peace, justice, and strong institutions	798	0.77	4,129
Total	9,854	1.1	99,233

Source: authors, data from SciVal 2023.



with the lowest percentage of respondents regarding them as highly localised include SDG 2 (zero hunger), SDG 7 (affordable and clean energy), and SDG 15 (life on land), respectively, all with less than 15%.

On average, most (29.26) of the respondents opined that the level of SDGs implementation by the institution is moderate. About 25.88% are of the view that the level of implementation is low while 22.65% aver that there is high level of localisation and implementation. However, 22.21% indicated that they are not sure. If the principle of majority rule is applied, one would conclude that the level of engagement with SDGs at UNISA is moderate.

4.5 SDGs localisation barriers

The respondents reported on a number of barriers which they think are affecting their commitment and determination in the localisation of SDGs. Some barriers are hinged on governance issues, others on institutional strategic direction, while others are linked with access to resources. Figure 8 shows the computed mean scores for each barrier as presented by the respondents.

As shown in Figure 8, the leading barriers include insufficiently trained staff (mean = 6.71), the perception that SDGs bring extra work (mean = 6.68), lack of SDGs champions and buy-in from top management (mean = 6.64), SDGs not part of key performance indicators (KPIs) (mean = 6.62) and lack of funding (mean = 6.59). The Kruskal-Wallis test reveal that the computed p -value (0.0001) is lower than the significance level alpha (0.05), meaning that there are significant differences in the impact of the stated barriers, with lack of training, extra work that comes with SDGs, lack of management buy-in, and SDGs being not part of

the KPIs as the leading factors inhibiting effective localisation of SDGs by academics. Hence, each barrier requires a unique level of attention and strategies in order to improve the level of SDGs localisation.

Examining the major terms that emerged from the general comments was one method to reflect on important concerns regarding academics' engagement with the SDGs. Word clouds were employed to identify the prominent terms that might refer to some important localisation trends and dynamics. Figure 9 shows a word cloud developed from the additional comments made by the respondents.

The prominent terms, as shown in Figure 9 include SDGs, research, awareness, teaching, champions, training, Africanisation among others. The terms reflect on the trends, dynamics, divergencies, and intricacies associated with the localisation of SDGs at the institution. The following excerpts from the study participants capture the diversity of views as well as the main issues around SDGs at UNISA.

"There is a growing desire, appetite and commitment to see SDGs integrated in all teaching and learning materials in the institution."

"I regard the SDGs and MDGs as part of the socialist agenda that seeks to undermine the values that I find important. As such, they are to be resisted, not encouraged."

"Training, development and awareness forums must be more visible."

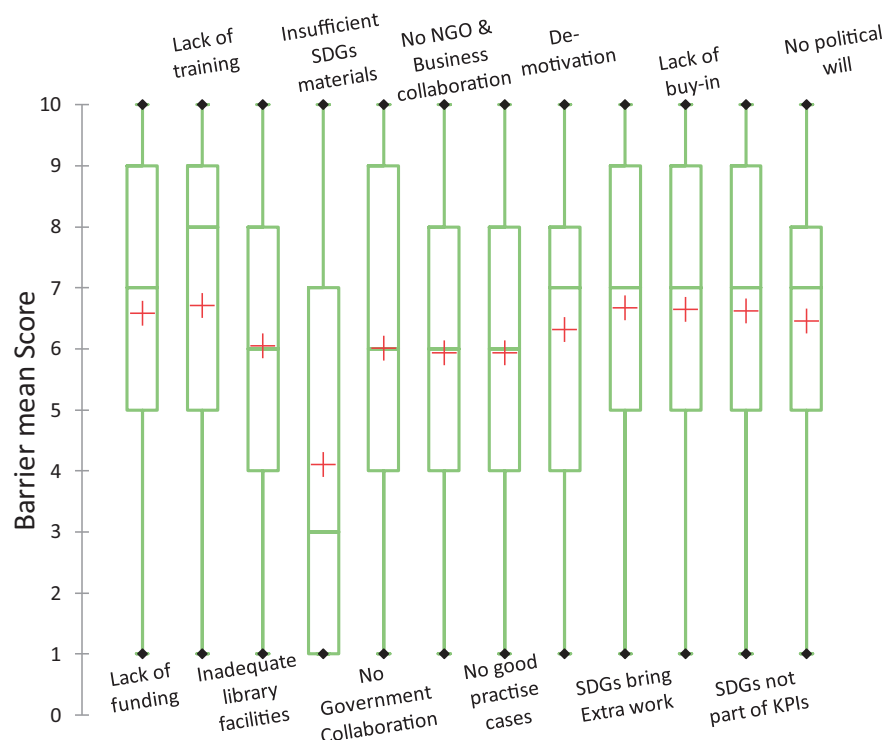


FIGURE 8

Academia perceived barriers to SDGs localisation at UNISA (source: authors, fieldwork 2022).

“The SDGs are forced on research staff in an unnuanced and unhelpful way by university management teams that have no clue how different fields work.”

The above extracts reveal the diversity of academic opinions based on one's ideological position, exposure and probably academic background or discipline. An approach that bridges the ideological divide and advances the understanding of SDGs has potential to bring academics to the same level of understanding and sharing of similar philosophical positions that can help to spur the implementation of SDGs at the institution. The next section is devoted to the discussion of the key findings.

5 Discussion

When asked about awareness of the SDGs, up to 78.04% of the respondents from the survey either agreed or strongly agreed with the sentiment. This figure is almost the same from the findings by [Filho et al. \(2019\)](#) who surveyed 167 respondents from 17 countries probing SDGs and sustainability teaching at universities. Asked if the academics promoted the SDGs in their teaching, 52.63% indicated they did, with 27.19% remaining neutral, while 20.18% did not. Once more, the results for those that indicated they did not promote SDGs in their teaching mirror similar findings by [Filho et al. \(2019\)](#) who had an 18% of respondents indicating a “not really” response on the application of SDGs in university teaching. In follow-up work, [Filho et al. \(2021\)](#) bring up a framework for the implementation of the SDGs in university programmes. The

authors believe there should be a systematic and suitable way of mainstreaming the SDGs into HEIs teaching and learning, and research programmes.

While access to resources was highlighted among the main barriers by the academics surveyed, there has been great movement in addressing this by UNISA. In 2022, the Research Directorate ratified a policy exclusively focusing on promoting SDGs research across the UNISA in partnership with external researchers across the African continent. The policy is entitled “Africa-Nuanced Sustainable Development Goals Research Support Programme (ASDG-RSP)” ([University of South Africa \[UNISA\], 2022b](#)). The ASDG-RSP provides the basis for research collaboration aimed at promoting transdisciplinary and transcultural work. Prior to the ASDG-RSP, UNISA ratified the Declaration on SDGs Localisation in November 2019 following a 1-day awareness raising workshop ([Nhamo, 2021a](#)). The workshop was attended by staff members drawn across all departments in UNISA, as well as other guest from other universities in South Africa. The objectives of the ASDG-RSP, which acknowledge progress made in having the SDGs localisation declaration, are presented in [Box 1](#). The objectives also touch on community engagement in drawing up research projects.

As this article was being finalised, the call for applications had gone out with a deadline of 17 July 2023. This cohort covered January 2024 to 31 December 2026. Part of the call indicated the expected outputs for a 3-year project duration that included: (1) at least 18 accredited research output units, (2) 3 articles published in *The Conversation*, (3) 5 graduated master's students, and (4) 5 graduated doctoral students ([University of South Africa \[UNISA\], 2023](#)). In terms of eligibility, among other criteria, there should



FIGURE 9
Prominent terms emerging from the respondents (source: authors, fieldwork 2022).

BOX 1 Objectives of the ASDG-RSP.

- Accelerate the development of collaborative research projects on the SDGs and build capacity for conducting cross-cultural research within the SDG Framework.
- Respond to the UNISA November 2019 commitment to get involved in localising the SDGs.
- Increase public engagement and participation in addressing the SDGs through initiating and facilitating cross-sectoral dialogue and activities that are most commonly associated with service based on community engagement, but additional to work carried out in the research process.
- Facilitate and grow a network of researchers for knowledge exchange, scholarly visibility, and cross-sector partnerships for addressing common SDG challenges at local and global level.
- Provide collaborative structures and forums to encourage interaction, idea generation, and interdisciplinary and transdisciplinary research on SDGs.
- Improve UNISA's rating as a significant African institution partner on SDGs.

Source: University of South Africa [UNISA] (2022b, p. 10).

be a principal researcher who is a permanent UNISA academic staff, with a doctoral degree and SDGs expertise. The principal researcher needs to have identified an appropriate team composed of a co-investigator, co-researchers, and collaborators. Among the collaborators could be postgraduate students and postdoctoral fellows. There should also be at least an international or regional established scholar from a recognised university or research entity. Five grants of three million Rand⁴ will be offered.

Another development towards the localisation of the SDGs came in 2020 with the arrival of the new Principal and Vice Chancellor. The Vice Chancellor introduced 10 catalytic niche areas that speak to the SDGs. Academic staff are now required to report progress in terms of their research's response to the catalytic niche areas twice annually in their Key Performance Areas (KPA's). Some of the niche areas include Marine Studies (SDG 14), Aviation and Aeronautical Studies (SDG 9), Energy (SDG 7), and Health Studies (SDG 3). While Filho et al. (2017) identified the lack of support from top management as the top barrier in SDGs localisation out of 25 that emerged, this seems not to be an issue with UNISA (Nhamo, 2021a). The other prominent barriers identified include the lack

of appropriate technology, the lack of awareness and concern, the lack of an environmental committee, and the lack of buildings with sustainable performance (Filho et al., 2017). Again, all these barriers seem to have been addressed at UNISA drawing from both the survey and earlier work. For example, the SDGs Liaison Committee (Nhamo, 2021a) is in place and capacity building of SDGs Champions has been ongoing since 2022.

To check the response of the UNISA curricula to the SDGs, a case study was performed in the college-equivalent, the Graduate School of Business Leadership (GSBL). The GSBL was selected based on prior work by Nhamo and Nhamo (2014) that had revealed the GSBL lagging behind its South African peers in terms of integrating sustainable development and sustainability issues through the United Nations Principles of Responsible Management Education (PRME) in its programmes. As of 2022, the GSBL was offering seven programmes namely: Executive Education (Short Learning Programmes), Postgraduate Diploma in Business Administration, Master of Business Leadership, Master of Business Administration, Doctor of Business Leadership degree, Postgraduate Diploma in Project Management, and Postgraduate Diploma in Supply Chain Management. The positives since 2014

⁴ US\$1 was ZAR17.60 as of 29 July 2023.

include the fact that the entire Postgraduate Diploma in Supply Chain Management and the Postgraduate Diploma in Project Management both have been re-oriented to include sustainability matters in the context of the SDGs. A course focusing on Strategic Sustainable Marketing (MBA5910) has also been included in both the Master's programmes. The reorientation of the GSBL curriculum is supported by the earlier findings by Miotto et al. (2020). Through such moves, the GSBL is likely to acquire the legitimacy it requires as it is now operating in an appropriate and desirable manner that fulfils its key stakeholders' needs and expectations. The SDGs were becoming the most cited in annual reports of 50 top business schools studied by the said authors worldwide (Miotto et al., 2020).

The survey also looked at the third mission (community engagement). Up to 55.45% of the responding academics at UNISA promoted SDGs in their engaged scholarship work, with 24.55% indicating they remained neutral, while 20% indicated they did not. Fia et al. (2022), highlight that universities cannot effectively address their third mission without society and the co-creation of both the teaching and research agendas. Knowledge transfers, professional short courses and other extension services remain fundamental spaces of engagement for third mission mandates. However, lived experiences of the authors of this article reveal that community engagement came to a standstill during the COVID-19 pandemic as hard lockdowns meant no body moved. In some way, COVID-19 had a severe pushback of HEIs' engagement with communities. One could easily talk of three "wasted" years of the universities' third mission mandate. Possibly, this could be the reason why Filho et al. (2023) find many HEIs still battling with the localisation of SDGs in the core mandate areas.

6 Conclusion

Based on the findings from this work, one may conclude that there exists a high level of awareness of the SDGs among UNISA academics. Although academics seem to be mainstreaming SDGs in the four core mandates, there is no visible systematic and sustainable way of doing so. Regarding the main barriers that include funding, UNISA seem to have addressed this to some extent. The Africa-Nuanced Sustainable Development Goals Research Support Programme stands out in this regard. The main drawback comes from the failure by UNISA academics to publish more work with SDGs focus. While the newly instituted 10 catalytic niche remain relevant, there is a need to align them to the SDGs to complement ongoing work. Although academics would have wished to get into the communities and engage them, this was not possible for a while due to the COVID-19 pandemic.

The work recommends that UNISA management institute a systematic framework to mainstream SDGs into its four core-mandate areas. In doing so, the top SDGs localisation barriers including insufficiently trained staff on SDGs, perceptions that SDGs bring extra work, engagement with SDGs not part of staff Key Performance Indicators, lack of champions and top management buy-ins on SDGs, and lack of or poor funding should be addressed. While the SDGs champions have been inaugurated in 2021, their work has not filtered through to a level where academics can get more help. Overall, UNISA is on the right track as has been

witnessed by its continued improved ranking on the Times Higher Education platform.

This work has implications for potential replication of the survey instruments to study other similar set-ups across the higher education both within and outside South Africa. In fact, eight other universities have been identified in Zimbabwe, with the same survey rolled out. One university from Zimbabwe send a delegation to understand how the localisation of the SDGs and the entire research process to feed into the system has been implemented at UNISA. Some of the documents including the SDGs Localisation Declaration have already been shared, with one of the authors to this work being invited to present the PAR process that has been taking place at UNISA. Four other universities in South Africa have agreed to have the survey and similar research rolled out. Overall, there is a potential to repeat the survey after 2030 when the SDGs first commitment period comes to an end.

Data availability statement

The raw data supporting the conclusions of this article may be made available by the authors, on condition that the user keeps them secured and not for onward third party use.

Ethics statement

Ethical approval was granted by the University of South Africa's College of Economic and Management Science Research Ethics Review Committee, reference number 2021_CREC_032 (FA). Approval to collect data from the institution's academic staff was also granted and Informed consent was obtained from each participant who completed the survey.

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Developing a minifesta for effective academic-activist collaboration in the context of the climate emergency

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Justice-oriented climate activism is proliferating. Many scholars aspire to deliver research that supports activism. However, measures of impact for research evaluation and funding purposes place little weight on the use of research by activists. Here we consider how academics and academia might effectively support and enable climate activism. We report outcomes from a series of online deliberative workshops involving both activists and academics from several European countries. The workshops were facilitated to create space for discussion, sharing of experiences and the development of proposals for the future. The outcomes take the form of a set of principles (a “minifesta”) for academic-activist engagement generated by the group. In discussing the process and outputs, we argue that a focus on inclusion can support politically transformative change of the scale and urgency required. We suggest that this also demands a shift in attitudes toward the role of activism and activists in collaborative processes. We further discuss the inevitable incompleteness of this process, arguing that incompleteness is, itself, a feature of inclusive engagement. We conclude that scholars working on climate issues in any discipline could benefit from increasing mutually supportive collaboration with activists; and that such collaboration and inclusion could help liberate democracy from authoritarian tendencies and market influences. Collaborative engagements generate legitimate, rich, and impactful outcomes even with the limitations posed by COVID19. We, therefore, commend both the model of engagement and the principles it generated for our colleagues and peers.

KEYWORDS

climate justice, climate activism, minifesta, academic responsibilities, deliberative engagement, academic-activist collaboration, democracy

Introduction

“If you are neutral in situations of injustice, you have chosen the side of the oppressor” (Desmond Tutu).

Recent years have been marked by a multiplication of justice-oriented climate activism across much of the world. Fridays for the Future and school strikes have spread widely amongst youth. Green New Deals have provided a focus for action in several countries. And Extinction Rebellion (XR) and other activist groups have brought direct action to the fore, with multiple high-profile (and often contentious) interventions, in many European countries. Their demands for immediate action have, as typified by XR, been matched with a concern for scientific honesty, a call for truth-telling about the scale and nature of the challenge. Yet this activism has been met with continued political resistance, and in several countries, by moves to suppress and criminalize it.¹ Dunja Mijatović, Commissioner for Human Rights of the Council of Europe, has called for elevated social dialog to turn back this repressive tide (Mijatović, 2023).

The sense that political leaders have failed to “tell the truth” about climate change and thus delayed and prevaricated on real action toward climate justice is shared by many academics, even those who may not sympathize with the tactics of climate activists (Hagedorn et al., 2019). Climate justice activism, however, poses challenges for scholars who, beyond engaging with truth-telling, may take a more patient approach to climate action.

Some academics have been themselves wrestling with the challenge of what constitutes an adequate response to the climate breakdown and what kind of activism is needed and justifiable. How can academics and academia effectively support and enable climate activism? Rather than turning to academic studies of activism (de Moor et al., 2021; Fisher and Nasrin, 2021; Pohlmann et al., 2021) we sought to engage with activists to deliberatively explore how academia could best work with climate activism, drawing on lessons of deliberative participation (Fiorino, 1990; Stirling, 2008; Chilvers and Kearnes, 2019; Willis et al., 2022).

Our hypothesis – following these scholars of participation and deliberation – was that by making space for deliberation in a mixed group of activists and academics, new knowledge could be created which might facilitate future productive collaboration, helping overcome some of the barriers and obstacles currently preventing it. We convened a series of deliberative workshops involving both activists and academics from several European countries (mainly the

United Kingdom and France)² to create space for discussion, sharing of experiences and the development of proposals for the future. This short paper revisits the experience and the context for our work, then reports the process used and the set of principles for academic-activist engagement that the group generated. Subsequently, it reports some of the activities undertaken by participants to further effective activist-academic collaboration, and reflects on some of the issues raised in these principles, and the discussions around them.

Context

In addition to the context set by the demands of contemporary activists, it is important to outline several contextual factors which motivated this intervention. First, the convenors shared a sense that there is significant tension regarding academic-activist relations, a lack of communication, and even widespread distrust on both parts. In preliminary discussions with activists and academics, the lead author heard repeatedly that, for example, activists “do not respect academic objectivity”, while “academics just use activists for their research” in exploitative and extractive ways.

Although many academics express aspirations to deliver research that benefits activism, academic incentives do not necessarily support such outputs. The academy has long privileged an abstract rationalist pursuit of knowledge over active engagement with publics to promote action on global problems (Maxwell, 2021). In most countries and academic institutions the dominant orientation of incentives is to focus on academic impact through frequent and well-cited publications, and in addition to undertake research that leads to commercial applications in industry, or serves the directly expressed interests of policymakers. Measures of impact for research funding purposes place little weight on the use of research by activists, and while interest or involvement by non-governmental organizations can be helpful in soliciting funding, it is relatively rare for the needs of environmental activists or campaigners to lead research choices. This is in stark contrast to the growing involvement of publics in *conducting citizen science projects* on environmental matters (see, e.g., Shirk et al., 2012), and the established norm of patient involvement in setting goals for *health research* (Price et al., 2018; Greenhalgh et al., 2019).

These form part of wider moves toward public engagement in both politics and academia, reflecting all the motivations identified by Fiorino (1990): that public engagement is normatively the right thing to do, that it can substantively improve outputs and can lend greater legitimacy to the process. Many academics engage in public

¹ See recent news reports on human rights concerns, for example: <https://www.theguardian.com/environment/2023/oct/12/human-rights-experts-warn-against-european-crackdown-on-climate-protesters>

² Academics understood as professional researchers and educators in higher educational institutions; activists as typically voluntary (but including workers at non-profit organizations) campaigning and mobilizing for political or social change.

engagement and communication efforts, some even exhausting themselves in already busy schedules by moving beyond their comfort zones. A prominent example of public engagement drawing on academic inputs in climate politics has been the convening of climate assemblies in countries such as the United Kingdom and France that have enabled diverse publics to discuss climate science and policy (Smith, 2022; Willis et al., 2022; Smith, 2023). Public participation and deliberative engagement have become key research tools in many spaces, including climate and energy topics (Whitmarsh et al., 2013; Pidgeon et al., 2014; Pallett et al., 2019). These trends have also generated process innovation and reflexive questioning about the extractive tendencies of scientific practice (Chilvers and Kearnes, 2019; Willis et al., 2022), and the development of good practice guides (National Coordinating Centre for Public Engagement, 2020; OECD, 2021). The “EDGE” tool (National Coordinating Centre for Public Engagement, 2020), for example, focuses on the institutional level and how institutions might support more and better public communication and engagement.

This body of research, however, has paid little attention to the voices of citizen activists in exploring the relationship between academia and activism. Since knowledge production involves power differentials, a balanced evaluation of the relationship between academia and activism requires redressing those differentials by directly challenging the epistemic privilege held by academics. At the same time, we believe citizen activists could benefit from a broad recognition of the multiple roles that academics can play in activism. Their role is too often reduced to “providing guidance” yet many academics have a nuanced perspective on the deployment of scientific knowledge that challenges simplistic assumptions of objectivity, neutrality and a linear relationship between science and policy (Bluwstein et al., 2021). This paper articulates some of the terms of such a nuanced perspective on the dynamic relationship between academia and activism.

Methods and process

In May 2021 we convened three half-day deliberative virtual sessions for activists and academics working on climate concerns, largely based in the United Kingdom and France, as part of a networking project funded by the French National Scientific Research Centre (CNRS). Participants were recruited through a snowball technique beginning with contacts of the organizers, and through advertisement of the sessions on social media. Those interested in participating were requested to hold the dates, commit to attending all of the sessions if possible, and to put forward suggestions regarding experiences of collaboration they would be prepared to present. Twenty-four people attended one or more sessions. Outside of the convenors, ten participants were primarily academics, and nine primarily activists, although several of the latter also held, or had previously held academic positions. The activists involved experienced more practical difficulties in participating fully. As a result the outcomes of the process were directed primarily at academics, and this paper – led by academic writers – focuses on academic responsibilities and possibilities. During the sessions we heard and discussed nine short presentations about experience with collaboration. With the support of a paid professional facilitator, the convenors formulated the detailed agenda for each session in a reflexive and iterative process

using feedback and input from the participants. The opening session was dedicated to surfacing and exploring presuppositions held by participants, or more broadly attributed to the groups involved. The second session focused on identifying principles for good practice in collaborative working, rooted in dialogic consideration of arguments that might be posed against such activities. An aspiration to produce a declarative document was introduced by the convenors as a desirable output from the sessions, and endorsed by the group, with the description and orientation of the product as a “minifesta” (Padan et al., 2020) being a direct product of the discussion. The third session focused on the drafting of the minifesta, as a reflection of the group learning and an expression of the principles for effective collaboration revealed in examination of the experiences presented by participants.

An outline account of the deliberative methods used in the workshop sessions is provided in Box 1.

A minifesta is a collective statement from a group that recognizes its incompleteness, and that actively seeks to represent diversity and provisionality – as a temporary and situated stage in a larger process of recognition and change (Padan et al., 2020). A “minifesta” provides an alternative to a grand manifesto statement in two ways: first, by being “mini-” instead of “mani-” a minifesta recognizes that theorization is useful for activism, but the kind of minor theorizing that, instead of universal generalizations provides grounded observations for the world around us (Katz, 1996). If a manifesto in its linguistic origins strives to bring to the fore *the obvious*, a minifesta reflects on the lack of clarity about the realities of action. Moreover a minifesta is provocatively feminine, because it is constructed from a feminist engagement with the situated and plural nature of knowledge (Haraway, 1988).

The text shared below (Outcomes and Results) was generated in draft form in the workshops in both small group and plenary sessions, and subsequently collectively further refined as a living document.

Rather than striving for representativeness of a complex heterogeneous academic world, our discussions aimed to focus on the importance of particular experience as a means to redefine academic practice. Our outreach and recruitment targeted academics and activists with experience of working together. The discussion raised, however, concerning insights about presumptions, incentives and structures prevalent in academia that place obstacles in the way of effective collaboration. In the next section we report the “principles” produced by the group for effective collaboration that might overcome such obstacles.

Outcomes and results

The text in this section consists of a set of 11 principles with a short preamble and afterword, generated in the workshop process and subsequent collective editing. This was the agreed, co-produced outcome of the deliberative process, reflecting an emerging consensus amongst the group about critical steps to support effective collaboration. As participants, we discovered a shared consciousness that current ways of engaging and modes of expression on each side face limits. While some of those limits can be overcome through more collaboration, others may be inherent to the operation of separate realms of action. In suggesting this text as a product of consensus we do not intend to indicate that every participant had experienced all the issues covered, rather that these represent the collective

Box 1: Deliberating on academic-activist collaboration.

Each of the three sessions was scheduled for approximately 4 h, and took place in three consecutive weeks. Each session was followed by a debrief meeting between the convenors and the facilitator, to consider participant feedback, and finalize the brief for the following session.

Session 1 began with an ice-breaker exercise, surfacing motivations and expectations, compiled into an online profile wall (using online whiteboard software). The convenors then presented a summary of a short online survey completed by participants, which reviewed experience with and motivations for engagement activities. The session continued with mapping of engagement experiences and discussion of three examples presented by participants. Initial views on good practice, poor practice, barriers and spaces for improvement regarding engagement activities were compiled on the shared whiteboard. We then broke into smaller groups to “trade places” between activists and academics and try to surface barriers to engagement and collaboration. Before closing the session, participants were invited to share initial learning and identify aspirations for future session content.

The whiteboard, and recordings of the experience presentations remained accessible to participants between sessions, enabling reflection, annotation and feedback on content, and process.

Session 2 continued with the mapping of engagement experiences, with four further 10 min presentations from participants. These were followed by group discussion. The group then divided into pairs to identify and seek to rebut, arguments against engaged research; these arguments and rebuttals were compiled on the whiteboard. After feedback and reflection on the previous exercise, we broke into groups of four to compile proposed principles for successful collaborative working. In the following plenary discussion the proposed “output” – some kind of group opinion paper – solidified into the idea of a minifesta.

Between sessions 2 and 3 participants were encouraged to access the whiteboard, to comment on the text, and rank the principles involved.

Session 3 began with two final sharing experience presentations, followed by small group discussion focused on common themes emerging from the experiences, and obstacles to effective engagement that had not already been surfaced. Following a prioritization exercise on the draft principles, the group subdivided again to work on detailed drafting. Here participants drew on the previously compiled learnings and best practices, alongside the record of arguments and rebuttals as well as the initial text of principles. Text was collectively drafted and edited directly on the shared whiteboard, allowing the group to elucidate a series of principles defining and advocating productive engagement and the conditions, learning and support it requires. Before closing, participants were given a further opportunity to reflect on the process, their hopes for its development, and what they would take away from it.

A further round of editing and text revision was undertaken using the whiteboard, coordinated through email, to produce the agreed final draft presented here as “outcomes”.

End box

experience of participants, and that there was agreement on the desirability of addressing them in a public-facing document. Guided by the activist participants, the co-produced outcome emphasizes action in ways that transform current understandings of “the academic.”

“During May 2021, motivated by a deep sense of urgency of action to address climate change; emphasizing the critical importance of collective responses that challenge and transform economic and political structures; in a spirit of honest and open reflection, and holding a common belief that inclusive collaboration could help better define and articulate the problem as well as delivering more inclusive and rapid responses ... several academics and activists came together virtually to explore the opportunities for and obstacles to effective inclusive collaboration on climate change concerns. Our discussions generated commitment to collaborate to find new ways to understand, communicate and act upon climate change concerns so as to reflect care, responsibility and justice, embodied in the following principles directed at ourselves, and our colleagues and peers in academia:

1. Commit to honesty and transparency

We commit to communicate honestly, both publicly and privately, regarding not only the state of the climate, but also our expectations, opinions, emotional responses, and understanding of the power, politics and interests (including our own) involved in diverging claims

about climate change and potential responses. This is essential if we are to engage with the root causes of climate problems, help prepare for the turbulence ahead and support the skills and knowledge needed for our communities to flourish in the future. By contrast simplistic ideas of academic neutrality or impartiality leave academics complicit with the powerful elites that have failed to take adequate climate action. In collaborative activities honesty must be matched with transparency about expectations, procedures, concerns and constraints on all parts and purposes, funding and other interests involved.

2. Recognize and embody the urgency

Action to tackle climate change and support climate justice is urgent, and morally demanded from those with the capacity to act. As academics we must act swiftly to deliver good quality research that is responsive to the opportunities that activism can open up. In the face of the collective trauma of climate change, visible, urgent and proportionate responses help us to better communicate the reality of the situation and empower others to join in. Whilst climate change cannot be addressed purely through voluntary, individual change, we support academics adopting and demonstrating personal behaviors that are coherent with the necessary structural, political change, as well as undertaking research and other collaboration to expose the political and commercial interests that resist collective action and promote delay.

3. Promote collaboration and engagement

We believe that collaboration and participation between academics and activists is not only ethically desirable but also offers practical benefits. Effective collaboration takes time, preparation and thoughtful communication, but brings in diverse perspectives, different approaches and new knowledge, and engages and mobilizes new actors. It thereby generates substantively better outputs that are more productive in delivering transformation. For academics, collaboration with activists also helps us work more effectively in contested and confrontational spaces. Collaboration between academics and activists should be promoted, but also defended, by a code of conduct to ensure that research is done with communities (and activists), and not on them.

4. Create safe spaces for collaboration

To facilitate collaboration safe spaces are needed where both activists and academics can express themselves freely without fear of physical, cultural or emotional violence, come together to share and learn about each others' experiences, mindsets, challenges and constraints, and provide mutual support in the face of abuse, populist climate denial and political oppression. For junior and precarious academics, such spaces also offer freedom from the expectations and constraints of academic institutions that can otherwise limit effective collaboration. Safe space is also needed to explore forms of knowledge that are devalued in the contemporary world (see point 10), express emotion (see point 9), to support experimentation with unconventional practices, and to enable mentoring of those with less experience in collaboration by those with more.

5. Support for activism supports healthy democracy

For both practical and ethical reasons, transformative change must be democratic. Activists are passionate and mobilized members of the public, and provide a key gateway to broad public engagement, helping communicate new understandings to their fellow citizens. Yet collaboration with activists is not widely recognized as legitimate academic activity, unlike routes to public engagement via policy and business. Academic engagement and collaboration with activists can reinforce participation and support critical and active citizenship. Such collaboration also helps counter the power of disinformation, and can reduce people's vulnerability to manipulation.

6. Stand up for activism

In many countries activism and rights to protest are under threat. Academics wishing to support climate activism must also support and endorse collective action to resist trends such as the criminalization of protest, and the listing of social and environmental activists as extremists under anti-terror initiatives. We should aim to make academia open and welcoming to climate activism in teaching, research and management. As collaborators we should provide mutual support against other threats (such as abuse and victimization) that arise when activists challenge the status quo.

7. Support multiplicity and inclusion

We recognize and see as equally valid diverse forms of academic-activist engagement including (but not limited to) collaborative projects, joint campaigns, public dialogue and communication, personal behavior change and student activism. We also assert the multiplicity of our identities as activists, academics, humans of diverse

genders, ethnicities, sexualities etc. and resist pigeon-holing and stereotyping. Effective collaboration involves discussing, agreeing and defining a common purpose and inclusive process across this diversity. Academics must respect what different people can bring to collaboration, and the limitations they face, such as restricted time and resources, and develop collaborative engagement processes that are inclusive and fair to all those prepared to commit to equal inclusion and recognition. We recognize, nonetheless, that there are significant structural inequalities in power and resources between and amongst academics and activists. Collaborative engagement processes need to challenge discrimination and structural exclusion and instead lift up voices that are not usually heard or able to be heard.

8. Value emotion

Effective action and transformation demands emotional as well as intellectual engagement. In the face of the threats and trauma climate change poses to our fellow humans and other species, working together offers real personal and emotional benefits. Collaboration should explore and enable participants to be open about their emotions and the emotional implications for others, and offer mutual support. As academics we must recognize the validity and power of emotional knowledge. By openly engaging with emotional trauma and fear we can help combat the temptations of everyday forms of climate denial in which we acknowledge climate change but fail to act; or in which we take only those actions that match our own interests, rather than also considering the needs of the most vulnerable and other species.

9. Combine diverse knowledges and ways of knowing

Narrowly focused disciplinary specialization in academia is a part of the problem we face in addressing climate change. As academics we must accept, encourage and value multiple ways of understanding and talking about climate change and its impacts (within and beyond academic disciplines). This is not about sharing academic knowledge with activists, it means learning from activists, indigenous, affected and vulnerable communities. Science cannot be divorced from politics, nor intellect from emotion. Moral intuition and ethical judgment are valid and useful forms of knowledge. Broad systemic thinking using multiple perspectives helps us get to the root cause of the problems we face and acknowledge where we face uncertainties or ignorance. Combining knowledges also requires active listening and effective communication between collaborators with different ways of conveying information, expertise, passions and concerns to each other and to publics.

10. Work to remove institutional obstacles

We must help enable academic institutions (including universities, funders, publishers and learned societies) to more broadly and consistently recognize the value and importance of timely collaboration with activism. We – and in particular, more senior academics with more influence and capacity to act – must work to remove institutional obstacles and establish positive incentives and supportive practices. The expectations and metrics used by institutions in decisions on employment, promotion, tenure, funding, curriculums and evaluation should include public engagement and measures of “impact” that do not rely on commercial uptake or direct policy influence. Practical steps toward a supportive environment should include measures such as targeted funding programs for collaboration, rejecting fossil industry funding,

divesting endowments of fossil fuel investments, greening the campus, and increasing security of employment.

11. Follow-through to support participants and outcomes

Good quality collaboration involves follow-through by the convenors, to sustain impact, and to support participants to explore personal implications. Care for participants, especially with potentially traumatic topics like climate change, should extend throughout and beyond the formal engagement. Good follow-through involves building networks and mechanisms for mutual support amongst participants. Effective follow-up tools and resources can help provide confidence to both academics and activists to get involved or to initiate new collaborations. They also make it more likely that the outcomes of collaboration spread and endure, thus justifying the initial investments of time and energy.

In this minifesta we have sought to learn from our colleagues in activism. But the focus here is placed on ourselves and our responsibility as academics. With knowledge of planetary crisis, comes responsibility to take part in effecting a just transition, not just writing about it. From our privileged position as academics we must stand up, speak out and act accordingly. We challenge our peers and colleagues across academia to join us. We share with Alice Walker the belief that “*activism is our rent for living on the planet.*”³

Discussion and reflections

In this section we reflect briefly on three issues raised by the process and the text it generated, which have implications for the effectiveness of the process as a facilitator of productive collaboration. We also present (in Box 2) some of the subsequent activities and experiences participants have reported. First, we consider the focus on inclusion and the extent to which it might lead to transformative change. Second we turn from the broad principles of engagement and collaboration to examine some specific implications regarding the role of activism and activists in collaborative processes. And finally we acknowledge the inevitable incompleteness of this process and indicate some of the strengths and limitations of this work.

Collaboration and inclusion

First, we suggest that the outcomes of this process cast new light on demands for inclusion. The minifesta text reinforces existing arguments for broader inclusion in collaborative and participatory action, notably in the preamble and in Principle 7. But the emphasis here goes beyond the inclusion of activists to promote multiplicity in processes, participants, forms of knowledge and ways of knowing (Principles 4, 7 and 9). These do more than suggest an extension of participatory research to collaboration with activists, and when read in combination with other demands in the text they pose a serious challenge to established practices and structures in academia, exposing shortcomings in institutions, funding, methods, and knowledge politics.

This is not so much to suggest that academics must somehow all become activists (*cf The role of activism and activists*, below), as it is to promote changes in the practices of academia so research (and teaching) can genuinely support activism. In particular, it seems essential to overturn the common assumption that activists are ill-informed about technical issues, and that the principal task for academics is to close that knowledge deficit. Nor is it merely about extending the knowledge-deficit model to the question of how change can be achieved, adding academic analysis of power and politics to technical scientific knowledge about climate change (Pohlmann et al., 2021). However unintended by well-meaning academics, the idea of collaboration as a sharing of academic learning is in effect itself a power play, setting the terms on which collaboration happens. Even if the academy were to pivot from the pursuit of rationalist knowledge to public-oriented practical wisdom (Maxwell, 2021) such power relations would remain largely untouched. This minifesta suggests instead that both power-awareness, as highlighted in David Tyfield’s work on phronesis (Tyfield, 2020) and commitment to agonistic struggle are necessary. In turn this requires acknowledgement that both academics and activists can contribute not only in terms of knowledge or information, but in the forms and ways of knowing, thus also collectively establishing the grounds for engagement. In this challenge we see echoes with decolonization movements in academia and beyond where the emphasis has shifted from procedural mechanisms to increase diversity and inclusion to the knowledge politics of black, indigenous, and often also queer theorists and scholars (Chalmers, 2017; Omarjee, 2018; Begum and Saini, 2019). We also see echoes of – and potential exceedances of – the relatively limited ways in which activism has helped make lay patient knowledge visible and legitimate in healthcare (e.g., Epstein, 1995).

In the text the principles addressing collaborative *process* reinforce in several respects (inclusion, transparency), those promoted for public engagement in the National Coordinating Centre for Public Engagement (2020) EDGE tool, and for deliberative democratic processes by the OECD (2020). Many of these practices are already recognized as crucial for the democratization of knowledge and, with respect to decision of public authorities, enshrined in conventions such as the Århus Convention.⁴ However, they have been less widely acknowledged in academic institutions, and climate change debates with a growing sense of urgency, and demands to “listen to the science” have revived simplistic assumptions about the relationship of science and activism. The emphasis placed here on working with activists (for normative goals such as climate justice) and on the inclusion of different knowledges and epistemologies from outside the academy hint strongly at a more transgressive shift in practices (a Rancièrian view of politics in which the inclusion of unheard voices leads – through novel contestation – toward transformation of political processes and institutions; Rancièr, 2004). This takes us well beyond reformist approaches that sustain conventional liberal democratic institutions while broadening participation within them.

The recommendations of the minifesta indicate obstacles in academic institutions (common across the different national contexts involved here) that must be removed, as well as more targeted encouragement and incentives that should be provided, if effective collaboration is to result, in

³ From *Alice Walker: Beauty in Truth*, a documentary film directed by Pratibha Parmar, released in 2013.

⁴ The Århus convention provisions can be found here: <https://unece.org/environment-policy/public-participation/aarhus-convention/text>

BOX 2: Inspirations and Reflections.

One activist notes: “I’m excited to recall how much we all cared to find ways forward... Subsequently I was invited to Norway to make the point to a group of academics, that their work needs to be not only on behalf of funders but for the benefit of society; I think of academics as the sharers-of-knowledge and yet they are often tied down with limitations and secrecy because funding dictates it (as we found in the case of fracking). Some academics argued that they needed to remain neutral – I countered that perhaps now is not the time for that as time is running out and we need the full picture in order to hold any chance of success.”

Academics have also reported continued experience of some of the challenges highlighted, particularly balancing truth telling with organizational objectivity as well as general lack of awareness around the climate crisis in leadership. One participant anecdotally reported being told to “not be seen to be too political” when developing a climate related project partnership, with a simplistic notion of impartiality seemingly taking precedence over the project-relevant qualities of the perceived “controversial” potential partner. The same participant also reported observing a “less than enthusiastic attitude” amongst institutional leaders “treating sustainability investments and improvements as a trend or a box to be ticked” and exhibiting “a tendency to combine every environmental consideration together into – as one leader put it – “green stuff”, with little to demonstrate them taking any of these issues seriously.”

Our facilitator commented: “Gratifyingly, Public and Citizens Assemblies are being used quite a lot now in the environmental arena. However, unless questions are carefully constructed, and the people asking questions and holding the pen really know what they are about, sessions can fall flat. Both experts and publics are so used to formalized processes of “market research” or Council meetings – where publics are not richly participating, that sometimes these sessions can end up feeling like a wasted opportunity, with no follow up or action, when, if handled well, relationships and joint activities could bloom after such events.”

Several participants have been involved in practical next steps in the United Kingdom, Ireland, and Belgium. One is “launching a new collective action project at Faculty for a Future, partially inspired by our conversations, and embodying the principles outlined in the minifesta. We’re supporting groups at local universities to bring staff, students, and local communities and activists together in action-focused people’s assemblies as a first step in democratically redistributing power at their institutions, to galvanize collaborative action for climate and social justice.”

Another helped develop the Democracy Network, and collaborated in producing a guide to Collaboration for democratic change for practitioners and academics (<https://democracynetwork.org.uk/resource/collaboration-for-democratic-change-a-guide-for-practitioners-and-academics/>). More than one has been involved in the development of the Knowledge Network on Climate Assemblies (KNOCA) (<https://knoca.eu/>), which aims to improve the commissioning, design, implementation and impact of climate assemblies, using evidence, knowledge exchange and dialog. In Belgium, one has since launched a “science shop” in their university, to support master theses and other short-term projects aiming to answer urgent questions raised by local associations and activists.

In Ireland, one of our participants helped convene the first “Popular Assembly” at the university, on what the institution should be doing in relation to the climate and ecological crisis in November. This prioritized a demand for a mandatory co-designed sustainability and climate module that all students should take regardless of degree program should take, and a staff-student “Climate Action Group” has been established to progress this. Our participant also co-organized an all-Ireland event on the same topic (<https://www.qub.ac.uk/research-centres/SECA/MediaOutputs/Outputs/What%20should%20Higher%20Education%20Institutions%20do%20about%20the%20Planetary%20Crisis%20Event%20Report.pdf>).

contrast to proposals such as EDGE which emphasize better institutional support for public engagement. For example, the provision of “safe spaces”, the removal of pressures on precarious and untenured staff, ways of valuing transdisciplinarity in practice (Principles 4 and 9), and – with respect to climate concerns – establishing coherence in other policy and practice (such as fossil divestment) (Principle 10) all go well beyond the procedural agenda of EDGE. In this respect we would particularly note the connotations of care, and the ethics of caring or taking care for participants (both academics and activists), highlighted in Principle 11. As suggested by one participant and supported in the workshop, we envisage that the audience for the minifesta consists of people who might see themselves as “caretakers”.

The process and its outcomes also highlight some limitations of existing research ethics procedures in terms of inclusion. For example, the expectations of many Ethics and Internal Review Boards that researchers define engagement procedures in advance and in detail conflicts with the ethical goal of fully involving participants in emergent procedures, and with the goal of them being able to play a full role in defining the desirability and direction of research. Different others might be included as a source of information, but in a process which excluded

them from any role in its design. In this context it is no wonder that academia can appear extractive in nature, rather than inclusive.

The role of activism and activists

The minifesta calls on academics to acknowledge the urgency and ethics that drive activism, and moreover to stand up for, and act to support activism. Behind these calls, however, the discussions surfaced numerous commonplace misunderstandings of activism, and offered insights that might help overcome them. First, in some respects, the dualism of activist and academic is a false one.⁵ It would be incorrect to presume that a role as an academic precludes activism, and vice versa. Many of our participants quite reasonably rejected being

⁵ This has long been false: Eunice Foote, now credited with first measuring carbon dioxide increases in the atmosphere was also a women’s rights activist (Bell, 2021).

labelled as only one or the other, but the framings identified as “presuppositions” echo our previous experiences of significant and sustained rejections of the validity of activist beliefs (and epistemologies) by academics, and vice versa. Whilst it is likely that those least willing to entertain collaborating with the other would be those least prepared to join our sessions, and our results therefore reflect less polarized views, we believe they show ways forward in mutual respect for other forms of action and ways of knowing. However, there are important dimensions of variation revealed by surfacing the power relations involved. While some academics appear to believe that activists have too much political influence, in practice it is academics who are much more likely to be embedded in relations of privilege and influence within the power structures of business and politics. However, as our text highlights, there are also power imbalances within academia, and junior, untenured and precarious scholars enjoy only limited power and influence in the absence of established models for scholarship outside of state-supported, philanthropic and research (council) funded work. Acting to expose and rebalance power relations can therefore facilitate productive and inclusive collaboration.

Secondly, while a rebalancing of power relations might imply targeting change in the academic institutions involved, within this group there was amongst a small minority, some reticence about the extent to which academic institutions should be understood or treated as a legitimate target for activism, rather than as a potential ally. Most however recognized that regardless of the views of individuals, the structures of such institutions make them unlikely to change willingly. For many academic activists themselves, changing their own institutions is an important career or life goal. Once again this issue reflects something of a false dualism: institutions can be both targets, and potential allies, indeed at one and the same time activists outside the institution may target it, whilst those within the institution seek to reform it. Active collaboration between such groups of activists can be especially productive. The minifesta suggests multiple ways in which such collaboration can be facilitated.

Thirdly, the process bears on broader perceptions of the legitimate role of activism in democratic society. In contemporary liberal democracies, activism is normally understood as a legitimate expression of discontent, if often dismissed as parochial rather than enlightened (Sebastien et al., 2019). However, activism is also increasingly perceived as a threat to societal security, and thus something that should be limited in scope, and subject to fairly strict regulation. The current trend in the countries represented here, and more broadly across the world seems to be toward stricter constraints on civic space (Anderson et al., 2021; Civicus, 2021), and more powers for police to counter activism and protests. The minifesta presents instead support for a normative position that sees citizen activism as a desirable check or additional form of accountability for political or corporate power, and one where the ethical basis for activism would override concerns about social disruption or even legality. Such a conclusion is perhaps unsurprising given the participants, yet still important given the wider social legitimacy provided for academics. The text drafted in the sessions explicitly suggests ways in which academics might better assist activists in playing such a normative role.

Incompleteness

A process like this, with limited time and participation inevitably leaves much still unresolved. For example the preparation of the minifesta generated debate over whether it would be most effective to challenge unhelpful academic practices or to model better behavior. Even this limited question would have taken more capacity than we had to draw a conclusion. Critical strategic and tactical questions regarding the “correct” or “most appropriate” responses to climate challenges, or the best tactics to motivate and mobilize action remained largely untouched. There is, however, good reason to question whether such matters can ever be resolved: these involve situational ethical judgments, not sweeping universal rules.

Nonetheless, it is important to acknowledge the limitations arising in this process. While we often noted similarities between experiences in the countries involved (all of them European), on reflection, the French co-convenors suggested that differences in circumstances between France and the United Kingdom had not been adequately surfaced. Similarly, on reflection, the inputs from academics and activists were substantially asymmetric, and while this text takes account of that by directing its recommendations at ourselves as academics, and our fellow scholars, a more complete engagement with activists might well generate distinctive outcomes.

Having acknowledged this incompleteness, the approach of offering a minifesta is important, because in this model, incompleteness is explicit and valued as a generative opportunity (Padan et al., 2020). In contrast to much previous scholarship on the role of academia, here knowledge is understood as necessarily partial, embodied and situated (as well as inherently entangled with power), and thus we argue that academics should go beyond merely acknowledging multiple perspectives to prioritize the points of view of the vulnerable, overlooked and ignored. Moreover, once again we see here a likely benefit of enhanced collaboration between academics and activists, such that the tendencies of academia (especially in the sciences) toward seeking universal laws and explanations or of activists to assume that ethical standards are universal in nature, are challenged by putting both into a setting where their positionality is exposed and the incompleteness both of their knowledge and of the process are made explicit.

Experiences and activities

In preparing this paper for submission, participants were encouraged to share subsequent experiences, activities and reflections. Those summarized here (Box 2) are inevitably an incomplete sub-set of all relevant activities. They suggest an inspiring proliferation of efforts to improve collaborations, but also highlight continuing obstacles. These responses also further emphasize the incompleteness, and the desirability of more consistent follow-up than was possible within the resources available. Further opportunities, collectively, and bi-laterally, to discuss and reflect upon the draft principles, to interrogate how they relate to the experiences we heard about, and to consider their implications for us, as academics and activists, would clearly have been desirable.

Conclusion

In this article, we have summarized the outputs and implications of a novel participative deliberation regarding climate activism and academia, and also reported some of participants' subsequent activities inspired or strengthened by it.

The richness and breadth of the principles elaborated by this group, and the activities supported, suggest that scholars working on climate issues in any discipline could benefit from increasing collaboration with activists. In the light of the discussion of inclusion, and (mis)perceptions of activism, the principles offered here offer constructive ways in which such relationships could become genuinely mutually supportive, rather than extractive and exploitative, and their outcomes better oriented toward climate justice.

This work also offers some useful insights on the role of participation, and participation involving activists in advancing democracy, in an era when it otherwise seems more consistently under threat from authoritarian tendencies and market influences.

Finally, and reflexively, looking at the process we convened, by engaging collaboratively, we believe we generated more legitimate, richer, and more impactful outcomes than if we had simply (as a handful of academics) written a paper offering our analysis and opinions on activist collaboration. We therefore commend both the model of engagement and the principles it generated to our colleagues and peers.

Data availability statement

The datasets presented in this article are not readily available because the data collected took the form of recordings and transcripts collected under conditions of anonymity. Requests to access the datasets should be directed to mclaren@law.ucla.edu.

Ethics statement

The studies involving humans were approved by Lancaster University Research Ethics Review Committee. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

DM: Conceptualization, Methodology, Project administration, Writing – original draft, Writing – review & editing. CA: Writing – review & editing. JB: Writing – review & editing. VC: Writing – review & editing. SC: Writing – review & editing. JC: Writing – review &

editing. AC: Methodology, Writing – review & editing. J-MH: Writing – review & editing. LK: Writing – review & editing. OL: Funding acquisition, Writing – review & editing. TR: Writing – review & editing. AN: Funding acquisition, Writing – review & editing. NO: Writing – review & editing. JR: Writing – review & editing. GS: Writing – review & editing. GrW: Writing – review & editing. GoW: Conceptualization, Funding acquisition, Methodology, Project administration, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

DM, GrW, JB, NO and J-MH declared that they were an editorial board member of Frontiers, at the time of submission. This had no impact on the peer review process and the final decision.

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Academic activism: learning and self-transformation through collective action taking

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Activism, as a manifestation of citizen engagement for social purposes, can be practiced by individuals and communities alike, such as communities of professionals and, in this case, professionals in academia. Academic activism is a novel form of socio-political engagement in scholarly communities. Recently, communities engaged in academic activism have multiplied, mostly due to the climate emergency and increased awareness on human-induced climate change. This paper focuses on the learning elements and self-transformative potential of becoming an academic activist. This is done by analyzing three key areas: (a) the perceptions of self, (b) the learning component, and (c) the educational component, namely teaching the very activities that activists carry out at their universities. To serve these objectives, we conducted eight semi-directive interviews during the summer of 2022 in which participants drew upon their personal experience and life trajectories in their journey to becoming academic activists. Using a Discourse Analytical framework, we scrutinized the semantic fields summoned and the discursive spaces mobilized by the interviewees. The findings of this study highlight the participants' determination for activism, depicting it as a conscious act, a duty. Moreover, three types of learning have been depicted, demonstrating the wealth of learning trajectories experienced. The potential impact of academic activism on teaching practices (societal role of education) has also been depicted.

KEYWORDS

academic activism, learning, technology-mediated communities, identities, climate change

1 Introduction

Alongside the democratization of science and its results, scientists play a key role in enabling access to knowledge (cf. open science) and engaging citizens in the shaping of science (citizen science). It can be claimed that scientists are able to catalyze the relationship between academia and society, either by directly involving citizens in scientific knowledge production (citizen science, community science, public participation in scientific research (PPSR; [Haklay et al., 2021](#)) or by getting involved themselves in various forms of science advocacy. This communication of science goes beyond simple reporting of scientific findings. Hence, science advocacy is a tasking pursuit that touches upon the value systems of scientists and their audiences ([Schmidt and Donner, 2017](#); [Pereira and Völker, 2020](#)). For instance, it is often the case that contemporary societies show signs of mistrust in science due to political and socio-economic reasons ([Druckman, 2022](#)). Furthermore, politicians have attempted to disregard scholarly work in climate emergency discussions ([IPCC, 2022](#)). This in turn compels academics to embrace more direct, even radical, forms of activism to make their voices heard, especially when

addressing issues related to the climate emergency. Thus, we define academic activism as a means for science advocacy that can take various forms, from science communication, to non-violent civil disobedience (Ratamäki et al., 2019).

In this paper, academic activism is understood as a dynamic process that influences the identity spheres (individual, social, and academic) of the scholars engaged in it. To examine this phenomenon, we adopt a discourse analytical framework to study interviews that bring forward the personal accounts of academic activists who are engaged in climate justice movements, or communities that are active in the democratization of scientific research.

The paper is structured as follows: it begins with a literature review that contextualizes academic activism in the broader socio-digital landscape, drawing from the Learning sciences. Subsequently, the methodology is outlined, followed by an analysis of the interviews conducted, and conclusions drawn. Finally, potential areas for further academic exploration and research are discussed.

2 Literature review

2.1 Socio-digital engagement in climate emergency and the role of academics

Scientific evidence of the climate emergency, coupled with an increasing number of extreme climate phenomena, have facilitated the realization of human-induced climate change and the need to take immediate action to mitigate its effects (*The Lancet Planetary Health*, 2022). However, it seems that the impact of scholarly work in policymaking (e.g., for climate change and biodiversity) has been overlooked, forcing academics to engage in more active forms of citizen engagement (Thierry et al., 2023), including acts of non-violent civil disobedience. This boundary-crossing activity, from mainstream academic activity to science advocacy and non-violent civil disobedience (Kenny, 2021), will be the focal point of our contribution.

Technological mediation plays a key role in this process, with digital technologies affecting local and global networking, participation and outreach of academic activist communities (Koc-Michalska et al., 2016; Kaun and Uldam, 2018). In this context, we argue that these digitally-enhanced forms of action for social cause have made academic activism a source of self-transformation, affecting learning and teaching practices in academia. Despite the wide acceptance of citizen engagement as a democratic activity to be fostered by all citizens, it is often overlooked that academics embrace multiple social roles and identities, including that of “active citizens” (Gardner et al., 2021). Since their work is connected with the advancement and wellbeing of humanity and the environment, it should come as no surprise that academics and researchers are often engaged in climate action.

Therefore, in this paper, we claim that academic activism should be understood as a practice adopted by informed and responsible citizens, and no discrimination should be made against them on account of their professional position. On the contrary, it is because of their work in various scientific fields, that the academic’s knowledge and actions should be seen as a contribution to bridging

the gap between science, society and policy (Urai and Kelly, 2023). Finally we suggest that academic activism be seen as a journey of self-transformation for the academics themselves.

2.2 Academic activism

Activism refers to a series of actions designed to draw public attention to pressing social issues in order to generate social change. According to this notion, Parsons (2016) argues that “activism can play a vital role in society, raising awareness of important issues, such as environmental or conservation threats or civil rights issues.” In academia, a growing number of academic staff engaged in socially motivated actions has led to the emergence of the term “academic activism” (Parsons, 2016; Kenny, 2021). The forms of action-taking can range from advocacy and public talks, to marches, boycotts, and occupations of public and private spaces. Non-violence is a principle that is common to all communities observed in this study. Chenoweth (2020) describes non-violent civil disobedience as “the act of non-cooperation with some system or regime by social, economic, and political means.”

Aiming to reinforce academia’s civic and social objectives, academic activists are often driven by their (moral) commitment to work toward a just future. As the dire consequences of climate change on human societies and the environment become more and more apparent (IPCC, 2022), academics and researchers have begun to question their role in tackling this socio-environmental calamity. In this context, a scientific paper and call for action, by Ripple et al. (2019), boldly states that “Scientists have a moral obligation to clearly warn humanity of any catastrophic threat and to ‘tell it like it is’.” The paper soon gathered more than 11,000 signatures from scientists worldwide signing up to its cause (Ripple et al., 2019). Similarly, climate emergency community action groups in which academic activists are involved, usually adopt the role of “science communicators,” thus promoting public trust in climate science and the environment (Rödger, 2022).

Although research on academic activism is in its initial stages (Racimo et al., 2022), there are already studies that question the broader societal role of academics, thus raising awareness of the need for more socially-responsible academic attitudes. For instance, Berné et al. (2022) analyze the carbon footprint of the academic activity of different disciplines, as a means to demonstrate the harmfulness of some of these activities, such as frequent travels. Furthermore, tools to measure the impact of academic activity on the environment at national level are starting to emerge. Mariette et al. (2022) present a framework for collecting and analyzing large amounts of homogeneous carbon emission data in a network of research entities, on a national scale (France).

Regarding issues of outreach, being an academic activist often includes collaboration with community groups to which the “message of change” should be conveyed. To reach a wider public without succumbing to a top-down and sterile approach to learning, academic activists seek to encourage knowledge exchange with citizens, while often creating “discussion spaces” to deliberate on respective topics. As highlighted by Ratamäki et al. (2019), activism is about “the relationship between the messenger and the audience;” a statement that acts as a guiding

principle to academic activists too. In this context, it has been argued that academic activism can foster transformative learning processes in individuals through service-learning projects and active, collaborative learning (Ramasubramanian and Sousa, 2021). The following section presents an overview of communities best known for their academic activism.

2.3 Outline of academic activism communities

The three most widely known communities of academic activism are Scientist Rebellion, Sciences Citoyennes and Organization Scientists for Future. The list is not intended to be exhaustive but rather indicative of groups who are actively involved in connecting like-minded academics.

2.3.1 Scientist Rebellion

Scientist Rebellion (SR) was founded in 2020 and has since become one of the widest trans-disciplinary communities of academic activists, with a nexus of representations at country level (Denmark, Germany, Italy, Netherlands, Spain, Sweden, UK, Mexico, Australia) and at regional level (Nordic countries, US/Canada, and Latin America). Additionally, discipline-specific SR communities have also been initiated in 2022 (see #HistorianRebellion). SR emerged from the Extinction Rebellion environmental movement that was formed in 2018 with the aim of using non-violent civil disobedience to compel government action to avoid tipping points in the climate system, biodiversity loss, and the risk of social and ecological collapse. SR, whose motto is “We are scientists, calling for a climate revolution” (Scientist Rebellion, a), organized its first major public intervention during the COP26 in Glasgow, UK, in November 2021.

During this time, SR formulated its objectives: (1) to achieve decarbonization, (2) to make the wealthiest pay the costs of the transition period, and (3) to utilize the wealth of the 1% of the population to build a sustainable and just socio-economic system for everyone. Their actions include marches, strikes, boycotts, occupations, hunger strikes, and blockades (Scientist Rebellion, b).

2.3.2 Sciences Citoyennes

Sciences Citoyennes (SC; citizen science in English) is a French-speaking, trans-disciplinary community established in 2002. SC calls for the democratization of science and public participation and engages in different forms of face-to-face and digital activism. The group organized a 2-day event in August 2022 called “Summer Days of Engaged and Related Knowledge” (Journées d’été des Savoirs Engagés et Reliés, Sciences Citoyennes, 2022) during which citizens, researchers and civil society representatives were engaged in sharing insights into social and climate action while co-creating scientific knowledge that is open and accessible to the public.

2.3.3 Organization Scientists for Future

Organization Scientists for Future (OS4Future, a,b) is a movement founded in 2019 by organization and management

scholars. It aims to raise awareness of climate change and promote urgent action to tackle its effects. The movement pursues its mission in four ways: research, teaching, practice and leading by example. OS4Future seeks to promote change at individual and collective level, as their educational approach is coupled with hands-on activities that can serve as a paradigm shift in society, influencing both its members and its structures. One of the more prominent actions of OS4Future is the pledge to drastically cut CO₂ emissions when traveling for academic purposes (conferences, meetings, etc.). The movement has since embraced traveling by public transport or no-emission traveling (e.g., cycling) as a symbolic act (Delmestri, 2019). Moreover, OS4Future is connected to the international movement of scholars “Scientists for Future” that came into being in 2019 (Delmestri et al., 2021).

2.4 Framing academic activism as an identity shaping and learning process

By studying the personal trajectories of some of these academics, it becomes apparent that academic activism is a complex and multifaceted phenomenon that influences the nature of individual identity as a scholar and as a citizen. The experience of academic activism is also notable from a learning perspective. More broadly, academic activism is manifested through various actions ranging from blockading bridges and streets, to protesting outside the offices of public or private institutions, to organizing peaceful but disruptive mobilizations on university campuses. These actions are fuelled by the academic activists’ perceptions of what constitutes the identity of an “active citizen” and their role in society.

In this context, academic activists are viewed as citizens that embody multiple social roles, who want to positively impact their social environment, while acknowledging the influence and limitations that their social surroundings impose on them (Kenny, 2021). Constructing or shaping one’s identity, or negotiating it, is a process of assigning meaning and is constructed diachronically (Baldauf et al., 2017). It is the “traces of experience” identified in the process of shaping one’s identity that are central to this study. Baldauf et al. (2017) adopt Ricoeur’s conceptual framework of identity construction, as “this philosophical perspective allows us to consider the dialectic between permanence and change over time in the construction of an individual’s identity (n.p.).”

Indeed, Ricoeur (1990) introduces a major distinction between identity *idem* (*mêmeté*), and identity *ipse* (*ipséité*). An individual’s identity is a combination of the two. However, the identity *idem* never changes. It remains constant and doesn’t ask “who am I?” but rather “what am I?” In the present study, this difference is of major importance: the individual scientists of the study are more than ordinary scientists, and this “elevated” identity has developed over time, given that their regular research activity was not sufficient for them to be heard. Therefore, it is the identity *ipse* that allows the identity *idem* to move on, question itself and not prevail as an imminent, absolute, closed and confining identity.

In *Temps et récit* (Ricoeur, 1985), Ricoeur introduces the notion of “narrative identity” which allows the two poles of identity, *idem* and *ipse*, to interact with each other in a dynamic continuum. Narrativity is not to be understood “literally,” as the individual narrating their own story, whether in writing or orally. Rather,

it is the result of reflecting on one's personal journey and their interaction with others. According to Bucholtz and Hall (2005, p. 598), the construction of identity through discourse "always acquires social meaning in relation to other available identity positions and other social actors." Thus, it is argued that if evolving narratives and transformative identities are made possible by the social standing of human beings they can only be revealed as such by those who have gone through this learning experience (see also Blondeau et al., 2020).

3 Method

Among the disciplines that study academic activism (e.g., sociology, management studies, political sciences, and life sciences), this paper is grounded in the Learning sciences, by focusing on the learning process and identity forming dimensions of the engaged academic activists. Ultimately, this is a study of academic activism as a boundary-breaking activity that originates from mainstream academic activity and extends to unconventional forms of action, including acts of non-violent civil disobedience.

The paper is anchored in the Learning sciences, and adopts the epistemological paradigm of lifelong and life-wide education (Colin and Le Grand, 2008). We thus consider that any experience constitutes a source of learning about oneself and others, or about Oneself as Another (Ricœur, 1990). Of particular interest is the extent to which academic and civic engagement becomes a source of existential (re)discovery and characterization of one's identity (Ricœur, 1990) through social interaction; its reflexive distancing and the narrativity reflected in the interviews.

The three research questions (RQs) of the paper are:

1. (RQ1) What are the perceptions of academic activism by those practicing it?
2. (RQ2) How does learning unfold between different academic activists?
3. (RQ3) How does academic activism affect academic activists' teaching practices?

From a methodological viewpoint, the nature of our research is qualitative and grounded on a sample of eight individual interviews. A ninth interview was incomplete and did not take place due to personal matters, and so, was not included. We adopt a thematic analysis and a discourse analytical framework (Lesourd, 2009; Pineau and Le Grand, 2013; Maingueneau, 2014, 2021), to highlight the individual conceptions, perceptions and opinions of the interviewees. To do so, we relied on the study of the mobilized semantic fields, the objects of discourse evaluated positively or negatively and the intensity of this evaluation, the certainties, beliefs, doubts and hesitations expressed and the positioning of the interviewees in relation to these. With regards to academic activism the interviews were analyzed in relation to the academics' own ethos, knowledge, know-how, interpersonal skills and gradual evolution over time. Finally, we examine the turning point in the interviewees' lives that led to move from research to action.

The interviews were designed to allow time for building trust between the interviewee and the interviewer, as well as to allow for the interviewer's understanding and the interviewee's reflexivity

to develop. Indeed, as the table below shows, the majority of the interviews lasted ~45 min. The interviews were conducted one-to-one in June–July 2022. They were done remotely (by videoconference) and in English.

Due to the geographic dispersion of interviewees, located in different countries spanning from Europe to Australia, interviewing in physical presence was impossible and thus online meetings were mandatory. At the same time it is considered an advantage of technology that made these interviews a reality. Interviews were both audio and video recorded, with the consent of participants. Even though English was not the mother tongue of all the researchers, English is widely used by them as a lingua franca; a language of teaching, research and activism. Indeed, the use of this language during the interviews did not interfere with the interviewees' (as well as the interviewer's) ability to express the subtleties of their reasoning, as they are all highly fluent in English.

All participants were invited to the interview after being informed of the scope of the research, the interview protocol and the interviewee questions. Prior consent was obtained from all participants, with regards to how the interview material would be exploited. Participants had the right to withdraw if they felt that the use of the interview was inappropriate. The reason for communicating the questions beforehand was to give participants sufficient time to prepare for the interview and to allow for more in-depth reflections.

Our interview guide was composed of four questions which matched the three research questions (RQs):

RQ1: What are the perceptions of academic activism by those practicing it?

- *What is academic activism for you?*

RQ2: How does learning unfold between different academic activists?

- *What is the learning value (in terms of knowledge, know-how, interpersonal skills) that you retain from your experience as a digital activist?*
- *What is the role of social networks in your activist trajectory?*

RQ3: How does academic activism affect academic activists' education practices?

- *What is the impact of this experience on educating future generations?*

During the interviews, the questions were presented in a different order, more appropriate for an initial first contact and oral exchange. A semi-directive interview modality was chosen, with questions serving more as a reference than as a strict guide. Regarding transcription and analysis, interviews were transcribed by an automated transcriber, transforming verbatim the audio into text. This automatic transcription was then reviewed and corrected manually. Pauses and hesitations have not been considered significant in this particular context. Once the interviews had been adequately and entirely transcribed, with the help of a color code, the authors carried out several readings to identify and classify, by means of a thematic analysis, the responses in line with our RQs.

4 Participants

The study relies on a non-exhaustive yet purposive sample of activists belonging to SR (6), SC (1), and OS4F (1), with six male and two female participants, all of them defining themselves as academic activists for several years. The proportion of interviewees per community (more numerous for SR) is justified by their track record (SR being the oldest and most numerous community of the three). The specific academic activists were chosen based on (a) their direct and ongoing engagement in activism for climate emergency, (b) their role within their activist communities (cf. organizers; founders; facilitators), and (c) being part of thriving academic activist communities in the Global North and South.

The interviewees originate from different disciplinary backgrounds and countries as shown in Table 1. For ethical reasons, the identities of our interviewees has been preserved.

TABLE 1 Disciplines and country of origin of the interviewees.

Interviewee	Country	Specialty
Int. 1	Denmark	Social and Economic Sciences
Int. 2	Germany	Economics and Human Cooperation
Int. 3	Denmark	Evolutionary Genetics
Int. 4	Mexico/Germany	Environmental Sciences and Health
Int. 5	UK	Public Health and Diseases
Int. 6	France	Biochemistry
Int. 7	Australia	Biology
Int. 8	Austria	Human Resources Management

5 Analysis

The analysis is organized and divided into three sub-sections, according to the three RQs outlined in the Methodology. Although the interviews were looked over by us in their entirety, we have identified and analyzed only those passages that are relevant to the paper's RQs.

5.1 How do academic activists perceive academic activism and their role?

Initially, we focused on understanding how academic activists may perceive and frame their role(s). In this context, our first observations refer to the level of certainty and assertiveness displayed in their answers. Whether defining academic activism or their role as academic activists, the viewpoints expressed are characterized by powerful and categorical statements. Even when expressions like “I believe,” “I think,” and “for me” are used, they seem to emphasize their personal point of view and not to question or doubt the necessity of their action.

Int. 1: And if you're an academic, what you say, write and do matters in ways that you might not be aware of. And so academic activism comes in [...] You write stuff that ends up somewhere. That someone might read. And **someone thinks**, actually, yeah, that makes me think. And then **they** do something.

Int. 4: So, **for me**, academic activism is, **if you know the truth, then tell the truth**. You have the responsibility to tell the truth.

Int. 3: **I do think** that if we as activists, if we as academics engage in activism, **we show how important** it is to organize and how little scientific advice is being followed by politicians around the world.

Int. 7: Scientists seek the truth. That's what the 10-year-old in me, and that's what I wanted to do.

Int. 2: [...] breaking the law, that is of course out of the ordinary. [...] **it is necessary** precisely to sound the alarm bell.

Int. 5: Academia currently is my life. And so, if I couldn't fit activism into academia, I don't see how I would be able to do it. So, I don't see that joining XR (Extinction Rebellion) as a separate thing would fit the way that I think I should be doing activism. **But also, my work as a biologist it's so intimately intertwined with the climate emergency that I don't think it would make sense to do activism separate from that. I think it has to be part of it. So academic activism for me is really being a little bit pushy and going further than that.** A lot of our scientific problems we look it under a literal microscope sometime, and our problems are kind of all, “Let's try and let's deal with this tiny problem here.” But, as I said, I've never been able to not see the bigger picture. So my academic activism these days begins with me, saying, “No, we have to look at the bigger picture.”

Even though not all of the interviewees provided a clear definition of academic activism, they explicitly expressed their perception of it and their involvement in it, as they semantically moved from the action to portraying themselves as actors. For these scholars, academic activism is perceived as a necessity, a matter of fact, a duty, or a part of the general mission of science, since the latter seeks the truth, condemns falsehoods, and alerts society to dangers. By looking deeper into academic activists' perspectives, we notice how academic activism encompasses a multitude of forms in which the social dimension of academia is brought forward (Ratamäki et al., 2019).

In addition to characterizing their activism as an “ethical duty” or a “child's dream,” we also noted that other semantic expressions were used by our interviewees: words such as “crisis” and “disaster” were used to describe the “looming

danger,” whilst “awareness” was used in relation to informing citizens and awakening other scientists not yet involved in these actions.

Int. 3: *We are in a crisis of giant proportions, and politicians are doing virtually nothing about it. The public remains uninformed or unconcerned about it.*

Int. 5: *And then academic activism in another sense, I think, means bringing some of the skills that I have learned in academia to the activism that people like SR (Scientist Rebellion) do. Bringing those things in both directions, I think. Being outspoken in academia and trying to drag my colleagues into acting. I think that's part of it.*

Int. 6: *I think there are 2 dimensions of it. One is inside the scientific community. You have to raise the awareness of your colleagues and your scientist fellows. The other dimension is outside the scientific community.*

Int. 2: *I believe the situation is so dangerous now that we need one step forward, in order to inform the public, we also needed to take action, so that would be out of the ordinary. [...] it is necessary precisely to sound the alarm bell.*

It was further noted that the term “the others” was vividly articulated in the discourse of the interviewees who did not wish to illustrate their differentiation but preferred to bring the inactivity or passivity of “the others” forward: the politicians who do not act, the public who are not informed and who cannot consequently act through words or actions, and finally of the other scientists who take comfort in an academic career and whose only objective is to nourish their symbolic capital. In relation to the latter, it is interesting to consider how two poles exist within the scientific community itself: “us,” who defy obstacles in the name of a scientific ideal, and “them,” who focus exclusively on fostering their own academic career. This distinction among scholars brings forward and testifies the issue of “pluralistic ignorance” and “business-as-usual” attitudes propagated within academia and identified in the latest literature (Thierry et al., 2023).

Int. 7: *I became a scientist and interacted with scientists; I realized that generally scientists want to get their grant renewed. That's what their major orientation is. To get published, to do some research. Get as much publications as possible out of that research, so that they can get their grant renewed.*

In terms of this initial analysis, it emerges that our interviewees see academic activism as a conscious, voluntary and justified act through which they seek to raise public awareness. Their goal is, therefore, achieved by advocating conscientious science. That is, generating knowledge with increased awareness and sensitivity to its role in society.

5.2 Academic activism and (self-) learning

Science communication and advocacy that are mainly beneficial to external audiences, are also considered beneficial to scientists themselves. Hence, the elements that the interviewees shared on the value of self-learning and the societal value of their engagement justifies the observations made by Schmidt and Donner (2017) and Pereira and Völker (2020), that practicing science advocacy is inextricably connected to the value systems of the engaged scientists and their audience.

The interviewees claimed that the way in which their activism unfolded, as well as its collective, digitally-enhanced nature, qualifies as a lifelong learning process. This dimension has been less studied by researchers of academic activism. Any action carried out, even if it is limited to disseminating knowledge, has a major impact on the actor in terms of (self-) learning. In this context, we have identified three main types of learning among our interviewees, namely (a) organizational and methodological know-how, (b) knowledge about oneself, and (c) socially-constructed learning.

In the first category, we particularly notice practical, organizational and methodological know-how, such as shaping, organizing and clarifying one's arguments to be better received and understood by a wider audience:

Int. 1: *What I have learned is a lot of social technologies and digital technologies, like the entire range of online platforms [...] the collaboration platforms, the different communication platforms that you use. [...] Organizational process; how to manage diffuse processes, that are normally horizontal and inclusive, but then also have to become hierarchical and very acute in terms of a non-violent direct action.*

Int. 2: *I already have learned something really about what is the best narrative, the best way to engage people.*

Int. 3: *I've learned a lot in terms of organizing meetings, facilitating meetings, [...]. And also, just learning new tools for outreach, as we were organizing scientific talks, especially at the beginning, during the initial stages of the pandemic, learning how to structure a Youtube video, how to coordinate among different people that might participate in a conference.*

Int. 5: *I learned communication skills I would never have had. I do have good communication skills as long as I get the chance to prepare something beforehand. But if you're in something like climate you get fired difficult questions at you all the time. You have to learn to think a bit quicker. Do you need to answer these questions? If so, how do you answer them? So, it's pushing my communication skills into a whole other kind of, you know, I'm certainly not there yet, but it is making me think quicker and think more on my feet, which is something I wasn't able to do. It pushes me to be more organized. This is so urgent, you know, we have such a short timeframe. [...] We don't have 4 or 5 years to deal with something, we have a couple of months to plan the next action.*

Int. 6: *And then, I have learned also how to phrase and to be concise, punchy, precise, and because that's the stake that's the goal of Twitter. Is to have an effect when people read you, you want to have an if on his mind, on her mind. And so, you have to choose the way you write what you want to say. What do you want to touch, and so that's a rhetoric exercise. You learn rhetoric, basically.*

Communication skills are mentioned the most in this first category. Here, we are moving away from the perception of the scientist as someone who only produces scientific results. In the aforementioned extracts, scientists act discursively (“an effect on people”). This demonstrates adjusting to the medium (“the goal of Twitter”), and to the audience (“be concise, punchy, precise”), as a way to democratize science and to address complex questions in a suitable, audience-oriented fashion.

Moreover, our interviewees also highlighted the transferability of these skills to their domain of expertise or to other fields:

Int. 1: *My social media use [...] was kind of low level. And now suddenly I'm engaging in social media, and that obviously also benefits my academic career.*

Int. 2: *So yeah, I feel like it's been very viable, and I've also been able to transfer some of these skills to my own research.*

Int. 5: *There is now such a focus to everything that we have to do, and that really helps prioritize. So that's a skill which is so important in science.*

Int. 6: *And these skills then can be used in other media and situations.*

The above extracts illustrate that certain skills and know-how are not as clear-cut and isolated as one would tend to believe. Below, we present a case where certain practices have evolved as a result of this engagement with activism. That is, skills mastered before joining academic activism are now put to its service:

Int. 3: *About maybe 2 years ago I would mostly use my Twitter to promote myself and my papers and my group's papers and now I rarely do that. I mostly use it to raise the voices of people that are protesting, to sort of promote scientific mobilization, to connect scientists. So, I'd say now, it's much more heavily, an account about the emergency than it is about my particular field of science.*

Furthermore, beyond these changes in perspective and praxis, we also observe a significant change in attitudes and a reconsideration of one's priorities, as scientists-activists focus on the urgency of taking action to preserve humanity, and not on self-promotion. The temporal (and conceptual) contrast between “2 years ago” and “now” highlights the impact of citizen and scientific engagement on one's perception of their mission in the world. Beneath this past-present contrast, there seems to be

a displacement from the individual self (“myself,” “my”) into a disobeying and protesting “we.” Indeed, it is highlighted in existing literature that scientists may become more aware of their role in enabling academia-driven change for socio-environmental wellbeing through citizen engagement (Haklay et al., 2021).

In the second learning category, knowledge about oneself, we highlighted expressions of knowledge about the self. These are instances of learning that can be qualified as existential, resulting from a process of distancing from and reflecting on oneself and one's internal experience prior, during and in the post-activism experience:

Int. 4: *I learned about acceptance, I learned about tolerance and I learned about ignorance, and not exactly because everybody's ignorant. But how ignorant I was! How ignorant we still are.*

Int. 6: *But It's more on the psychological point of view. It helps me knowing myself better also. The way I would react. The border lines I should not pass.*

Int. 7: *I have found that by doing something, by acting, by getting involved, I feel whether it succeeds or not, I feel better. It's easier to go from day to day knowing I'm actively involved.*

Int. 8: *And then to learn to deal with your emotions because being under pressure in the social environment in which they consider you ill is not easy. So, in parallel, I'll also engage in meditation. For instance, mindfulness meditation allows you to deal with emotional concerns. And which is very widespread in this social movement, XR (Extinction Rebellion) and so on. Then, especially in my participation as a normal citizen in XR (Extinction Rebellion), for instance, I learned some kind of stepping out of my status and my role in society. And being just one of any other.*

When interviewees refer to what they have learnt since their engagement in academic activism, their statements are particularly paratactic and enumerative. The discourse becomes dynamic, their eyes light up and their gestures accentuate this vibrant flow, almost like the effervescence that a scientific discovery produces in a researcher.

The extracts above imply that the interviewees gained considerable self-knowledge, drawing satisfaction from their involvement, and from managing emotions, learning to be simple and anonymous. Additionally, it seems that involvement in academic activism may also be a humbling experience. It almost seems like an oxymoron that it is through activism that one learns “to accept,” “to tolerate,” to “realize one's ignorance.”

This reality is a stark contrast to the stereotypical representations of the very word “activism” since in the collective unconsciousness collective action is often exclusively understood as “violent.” We have also noticed the frequent recurrence of verbs like “learn,” “know,” and “find out,” which underline not only the informal learning potential about themselves as a result of their

engagement, but also the fact that these learnings are experienced as scientific findings; as if their object of research has become their own self, their own identity, vivid, moving, just like science, and certainly not immutable.

Finally, the third category, socially-constructed learning, is inextricably linked to the second. It still includes learning that impacts on the individual level, but also involves learning that is constructed with “the social other” (scientist or general public). It is precisely the social dimension of learning which is highlighted and emphasized (underlined below) by adverbs of intensity and adjectives relating to enrichment, fulfillment and union:

*Int. 2: Learning from the people and listening to what their problems are, with respect to climate change, and then they would talk about their social day-to-day problems. I think that's tremendously enriching. [...] So, I find this way of engagement really fulfilling, although I must say that on many occasions, I don't agree with what my colleagues say. But I think this is an aspect of **enrichment** as well, because if we all thought in the same way, definitely that would be rather boring. So, I think this is also something that I have learned quite a lot.*

Int. 3: I've learned a lot in terms of [...] learning to listen and sort of make space for people with very different backgrounds.

Int. 4: [...] I think we need to nurture our knowledge, nurture ourselves, be more in contact with people, and be in contact with nature. I think when humans can join themselves together, and to know who are we and what's our purpose in the planet, then, it's a utopic momentum but then it would be when we will be in equilibrium with everyone, and I think that's what I've learned. To know people and to know who they are their purposes, their calls.

Here, the social, geographical, cultural or academic background of one's interlocutors is not of substantial importance. One learns to listen, to exchange knowledge and experience and to empathize. Despite the fact that the ultimate goals may still seem utopian or hard to reach, bringing people closer together and opening up to others is perceived as a significant step forward for humanity.

5.3 The impact of academic activism on educational practices

Prior to conducting the interviews, we questioned the motivations behind scientists' impulse to join academic activism movements. During the interviews' analysis we realized that it is activism itself that constitutes the real turning point in their lives. As pointed out in the previous section, this engagement has taught these scientists to be open to themselves and others. Regarding the academic duties of the interviewees, it seems that the focus is more on using their position as a (global) teacher to awaken, shape and mobilize the generations they are educating.

From this perspective evidence may be questioned, the established order is critically examined, and the traditional thinking patterns and transmissive, vertical teaching models are replaced by more horizontal, maëutical approaches.

Int. 1: And you give them different perspectives. [...] I don't just give them the received wisdom. But I push them, and I confront them a little, and I make things a little uncomfortable for them. So [...] academic activism is unsettling. It pushes the boundaries.

Int. 5: I am also involved in teaching. How is it that we can teach this master's degree when in 2- or 3-years' time these students will be coming out into a world where the biggest problem is the rising sea level, and you know, in the small island States. I teach on global masters, so the students may be from anywhere. They may be from Bangladesh, which is threatened by sea level rise. They may be from somewhere that is threatened by conflict that's exacerbated by this. So, there's nothing that we do now that isn't touched by this and so I now find it since that kind of snapping point a couple of years ago.

Therefore, their role as educators is not merely to transmit “ready” scientific knowledge, but to raise awareness of imminent dangers. The career-oriented priorities, such as the impact and dissemination of one's work and research, are therefore reversed. It seems that a certain transition occurs from being a scholar-scientist to adopting the role of a pedagogue-scientist.

Int. 3: I often interrupt my lectures to give teach-ins. And generally, I think, almost overwhelmingly, the response from my students has been very positive when I do this. Sometimes I get an applause which I almost never get at the end of a lecture. People are just tired of listening to me talk. Because it's a bit of like a release of energy, young people are constantly thinking about this completely affecting them.

Int. 6: If I had to speak with a student today, I clearly will try to lead them to some form of activism. And for many reasons, because I think also, I'm more confident with my own values, and I'm more able to assume the consequences of pushing them really far in interpersonal relation, but also in the political field. And also, for their own future.

Int. 8: Fundamentally through students you have probably the most direct impact on society. And also, because, in the German-speaking world, I am aware of the work of Max Weber. Yeah. He wrote about the value of neutrality. And reading his work, it speaks mainly of the value of neutrality in terms of the professors in teaching. So, when I teach student in a business school, I'm aware that I should not preach to them, so expose them to different ideas. So, I don't have an activist agenda with the students, I think. But I try to expose them to stuff that the more conventional teacher would not expose them to.

As seen in the above passages, the interviewees' positions are not exactly the same, but their viewpoint is one of engaged scientists addressing an audience of students already informed or ready to be informed. In this context, the interviewees have come to realize that they can no longer pretend that everything is in order. Interviewees 6 and 8 in particular feel the need to assert, directly or indirectly (e.g., the notion of "axiological neutrality" mentioned in the last extract), that scientific knowledge is no longer equal to wisdom but becomes an entirely political act. It seems that their commitment to academic activism and the collective momentum of such actions have been the driving force behind asserting their values, assuming their choices, and finally transmitting their convictions to their students.

Eventually, it becomes evident that they stand opposite their conventional peers, either by generating enthusiasm through their fervor (Int. 3), or by encouraging action taking (Int. 6), or even by promoting objective reflection while remaining committed (Int. 8).

6 Conclusion

By approaching academic activism as a learning and self-transformative process both on individual and collective level, this paper contributes to a more thorough understanding of this rising social phenomenon. Through a series of eight interviews with scholars actively engaged in academic activism, this study analyzed their experiences based on three dimensions: (a) the perceptions of self, (b) the learning component, and (c) the teaching component, namely the impact of activism on their educational practice. The presented samples highlight the process of interviewees generating meaning through engaging them in reflections on various forms of activism, spanning from science advocacy and public talks to acts of non-violent civil disobedience.

The analysis carried out in the study has highlighted deep-rooted perceptions and attitudes of academic activists engaged in collective forms of climate action. In particular, all interviewees defended academic activism, depicting it as a conscious act, a necessity or a duty to be fulfilled during the climate emergency. Furthermore, our analysis identified three types of learning experienced by the academic activists, namely (a) organizational and communication skills, (b) knowledge about oneself, with a particular focus on becoming tolerant toward different viewpoints or realizing one's own ignorance, and (c) a (self-)learning process that is constructed through meaningful interaction with "social others."

The analysis seems to convey that academic activism itself is a turning point in the lives of the scholars engaged in it. Their narratives imply with certainty that they have found true meaning and a sense of purpose in their personal and professional lives through academic activism. This transformative experience is one they seek to transmit and share with people of all ages, especially during their educational and teaching activities.

The narrative examined in this study allows us to highlight the strong social meaning of identity for the interviewees and

their role as researchers. In fact, the notions of identities *idem* and *ipse* transcend the individual actors and become part of a collective dynamic. That of a group of activists (*ipse*) who are radically opposed to the stereotypical conception of the scientist (*idem*) whose life is punctuated by the constant search for funding and publication opportunities. This restrictive, stereotypic, vision of the scientist reduces them to the sole dimension of an individual, that has limited concern over their social mission, and who remains reticent, preferring to promote their career rather than denounce and warn the wider public. By contrast, the *ipse* dimension encompasses a sense of responsibility toward revealing the truth together with a political and social commitment, and a long-term vision for the impact of current actions on the future of humanity. Although this quest to change the world is sometimes seen as a childish dream that accompanies the scientist throughout their life (*idem* identity), it is the *ipse* identity that ensures that the dream is not forgotten and the person persists in their quest, constantly rediscovering and reinventing their identity through regular interaction between the individual and the group. For most of the interviewed scientists, their commitment to activism seems to be a trigger for the *ipse* dimension of their identity. Through this commitment, their way of being, teaching and transmitting knowledge is no longer the same.

Reflecting on the insights generated from the interviews' analysis, it should be acknowledged that there is still a long way to go to uncover the multiple dimensions of self-transformation within academic activism. Specific limitations linked to our research include the overrepresentation of scholars of the Global North in the purposive sample as well as potential limitations posed by personal statements and trajectories that cannot be regarded as representative of academic activists' self-transformation characteristics. Moreover, the selection of the interviewees' was made from networking with academic activist communities and is not based on pre-defined selection criteria.

In summary, the current study suggests that engaging in collective action fosters a process of (self-)learning among academic activists. Through this process, they adopt a more open and inclusive identity, transforming into active citizens. Importantly, this transformation is not seen as an individual endeavor but rather as a consequence of their collaboration and interaction with others.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Katja Dupret, Roskilde University and an anonymous committee member of the Re:ERUA Project. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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“No one talks about it”: using emotional methodologies to overcome climate silence and inertia in Higher Education

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Higher Education (HE) is, at best, struggling to rise to the challenges of the climate and ecological crises (CEC) and, at worst, actively contributing to them by perpetuating particular ways of knowing, relating, and acting. Calls for HE to radically transform its activities in response to the polycrises abound, yet questions about how this will be achieved are often overlooked. This article proposes that a lack of capacity to express and share emotions about the CEC in universities is at the heart of their relative climate silence and inertia. We build a theoretical and experimental justification for the importance of climate emotions in HE, drawing on our collective experience of the Climate Lab project (2021–2023), a series of in-person and online workshops that brought together scientists, engineers, and artists. We analyse the roles of grief, vulnerability, and creativity in the conversations that occurred, and explore these exchanges as potential pathways out of socially organised climate denial in neoliberal institutions. By drawing on the emerging field of “emotional methodologies,” we make a case for the importance of emotionally reflexive practices for overcoming an institutionalised disconnect between feeling and knowing, especially in Western-disciplinary contexts. We suggest that if staff and students are afforded opportunities to connect with their emotions about the CEC, then institutional transformation is (a) more likely to happen and be meaningfully sustained and (b) less likely to fall into the same problematic patterns of knowledge and action that perpetuate these crises. This profound, sometimes uncomfortable, emotionally reflexive work is situated in the wider context of glimpsing decolonial futures for universities, which is an integral step towards climate and ecological justice.

KEYWORDS

climate and ecological crises, emotional methodologies, emotional reflexivity, climate action, connection, Higher Education

1 Introduction

“No one talks about climate or ecological crises in my department - not in work time, not at work meetings. Let alone their feelings. It’s an extraordinary taboo. I am always thinking about it, yet never feel ‘allowed’ to mention it” (Early Career Researcher, Swansea University).

In 2020, a 12-year-old Japanese pupil researching a class project asked co-author Murray, a glaciologist, a question that she had never been

asked in her decades-long, highly successful, scientific career: how do you *feel* about the changes you are seeing at the poles? This question momentarily floored her, and set in train questions of her own, about what would happen if more scientists were asked about their feelings regarding the dire consequences of the climate crisis that they engaged with on a daily basis. Scientists are traditionally expected to view the world through the lens of the scientific method with its requirements for objectivity, repeatability, and logic; they communicate via a precise language of data, graphs, and models. Most climate scientists also undertake public engagement to interpret their knowledge for a general audience and policymakers, but have, for decades, tended to “err on the side of least drama” (Brysse et al., 2013) in their communications—with some notable exceptions (e.g. Carrington, 2024). Within long-standing constraints and expectations, expressing personal thoughts and emotion about the climate (and ecological) crisis is still an extraordinary taboo. And yet, despite all the outstanding and unequivocal science, emissions continue to rise, and the pace of policy and behaviour change is too slow (IPCC, 2023; Stoddard et al., 2021). As Pancost (2022) points out, the failure is not necessarily from lack of trying—some climate scientists have been advocating for action for decades—but efforts are hamstrung by a profoundly conservative and neoliberal research culture that tends to favour only particular (politically-palatable) types of expertise and “advice.” Indeed, if the purpose of universities is to improve society and be agents of change, then it seems that (climate) “science-as-usual” is failing.

Climate Lab emerged from the intersection of our glaciologist’s epiphany and a generalised frustration amongst colleagues in other disciplines at Swansea University about the state of Higher Education (HE) and its seeming inability to drive meaningful climate action. It brought together an interdisciplinary team (from social sciences and humanities, biosciences, engineering, and physical geography) with artists and facilitators who had the skills and creative approaches to enable a “deep dive” into participants’ climate emotions. After an in-person pilot consisting of two, day-long workshops in 2022, Climate Lab evolved into an online space, with virtual workshops and international participants in 2023. In this article we draw on our experience of creating and participating in Climate Lab to make a case for the importance of emotional methodologies (EMs) that acknowledge the personal, psychological, even spiritual, dimensions of the CEC (Hamilton, 2020) for catalysing and sustaining meaningful action. Here we share our experience of bringing EMs into a university environment, and what might be learnt from this.

We first contextualise Climate Lab with an overview of the current predicament of universities (focusing on the UK where we are based) and how they (and we, as academics) might be made fit for purpose in an era of escalating climate and ecological crises. We then discuss the emerging field of emotional methodologies and their relevance for overcoming socially organised denial and climate action inertia in HE, before describing Climate Lab’s format and content, and briefly discussing the importance of art and creativity in the process. In the findings and discussion, we draw on our own, other participants’, and the artists’ responses to the workshops (recorded in post-workshop feedback via Google Docs, and completed by 10 participants), as well as observations made by co-author Pigott during the workshops and in subsequent

discussions about Climate Lab with team members, to explore the key themes that emerge from the Climate Lab process (Figure 1) in relation to wider literature. We consider how Climate Lab is a particularly distinctive and useful approach in a university setting: the sustained engagement with emotions that helps process disenfranchised grief, and the potential of emotional methodologies for catalysing personal and collective agency. We conclude the discussion section with some challenges faced in terms of our responsibilities, in a predominantly white and western context, to decolonise our universities.

As Climate Lab was primarily intended as an experimental space for changing ways of working in the university, and funding did not cover a research budget, no formal methodology or analytical framework is applied beyond a broadly thematic analysis of various material and sources of data that arose from the workshops. Rather, our preliminary reflections on Climate Lab in this paper are intended to open up conversations on this topic and demonstrate the value of further research, funding and action.

2 Contextualising Climate Lab

2.1 Why universities, why now?

Universities have taken a leading role in generating knowledge about the climate crisis over the last several decades, and although almost every government in the world acknowledges and pledges action to address climate change, the emissions curve trends ever-upwards (Stoddard et al., 2021). Given the scale of societal transformation needed, universities could be pivotal change agents (Giesenbauer and Müller-Christ, 2020). However, despite thousands of higher education institutes declaring climate emergencies, it seems that they are poorly-equipped to fulfil their responsibilities as part of societies’ critical learning infrastructure and contributors to public good (Facer, 2021; Gardner et al., 2021; Green, 2021). While some argue that this demonstrates that the science-society contract is broken and in need of reformulation (Glavovic et al., 2021), others go as far as accusing universities of betraying humanity (e.g. Green, 2020; Maxwell, 2021) and becoming “fraud bubbles” on account of the double reality that staff and students must live and construct in order to function in an environment that is maladaptive to taking the CEC seriously (Thierry et al., 2023).

There is clearly more that universities could do. A recent statement from the Independent Social Research Foundation notes that the current crises are “deepened by a knowledge crisis. Not enough research is funded, or is not of the right kind, or is not properly integrated across cultural, economic and scientific fields, or is ignored by the public, or refused by governments, or denied by industry, or distorted by the media. Many of us have become fatalistic about these problems in a time when research needs to address them.”¹ Others argue that tweaks to research agendas are not enough, given the scale and urgency of the emergency. A slew of recent papers urges academics to step outside their research roles and ramp up their public advocacy, peaceful civil disobedience, and even issue moratoriums on climate science until

1 <https://www.isrf.org/events/conference/> Last accessed 14 June 2024.



FIGURE 1

Photos from the Climate Lab pilot: (A) Climate lab participant undertaking a ceremonial walk on Swansea Bay beach at low tide; (B) drawings of each other made with our non-dominant hands; (C) the “fishbowl” Council method, whereby a few participants sit in the centre of a circle to talk, while those in the outer circle listen (some pebbles and sea water in a glass bowl placed in the middle add to the sense of ritual); (D) some of the participants’ descriptions of their personalities and emotions, recorded by Marega Palser.

politicians heed its advice (Gardner et al., 2021; Capstick et al., 2022; Racimo et al., 2022; Glavovic et al., 2021). These commentators argue that all these tactics are justifiable given the severity of our planetary circumstances and because academics have a moral responsibility to act in ways that are commensurate with what they know (Thierry et al., 2023). In short, academics are beginning to engage in the (climate) politics and values that most—especially in Western-scientific contexts—have been trained to put to one side in the interest of scientific neutrality, impartiality, and integrity (Green, 2020; Head and Harada, 2017). This imperative intersects with and is part of wider moves towards decolonising universities (Smith, 2021; Bhabra et al., 2020; Radcliffe, 2017), that are centred around responsibility and accountability, listening and reciprocity. Decolonising practices reject the highly colonial image of the

scientist/researcher as a detached observer, and instead argue that research/researchers ought to speak truth to power and become allies of the groups and causes with whom they work (Radcliffe, 2017).

The climate crisis (and intersecting ecological, racial, and inequality crises (e.g. Sultana, 2022)) therefore demands a wholesale reimagining of HE and what it should do (Facer, 2021; McGeown and Barry, 2023). Suggestions of what a climate-serious university might look like range from providing training in community engagement, advocacy, and media communication, to providing staff with security to engage in civil disobedience, and using campuses as hubs for community organising (e.g. Gardner et al., 2021). In her report, “Beyond Business as usual: Higher education in the era of climate change” Facer (2021) sums

up the changes required in terms of four overarching themes: “(i) Redesigning the day-to-day operations of universities and colleges to reduce emissions, nurture biodiversity and adapt to the impacts of a changing climate; (ii) Reinvigorating the civic role of institutions to build ecologically and socially resilient communities; (iii) Reshaping the knowledge structures of the university to address the interdisciplinary complexity of climate change; and (iv) Refocusing the educational mission of the institution to support students [and we would add, staff] to develop the *emotional*, intellectual and practical capabilities to live well with each other and with the planet” (Facer, 2021, p. 6; emphasis added). Such propositions and visions for the future of HE are exciting, and we support them wholeheartedly, although we recognise that they will not be easy. Given that the question of *how* these visions can be achieved is often overlooked (Owens et al., 2023; Card and Closson, 2023), our focus on emotions in this paper is intended to strengthen the movement and increase the likelihood of such visions becoming reality.

2.2 Why emotions?

“Information is not changing our minds—most people make decisions on the basis of feelings” (Eno, 2022).

It would be surprising if our current planetary predicament did *not* generate emotional responses (Head and Harada, 2017), yet recognition of the emotional dimensions of these crises has only recently begun to gain traction and is still limited in environments heavily invested in scientific knowledge (such as universities). Anderson and Smith (2001, p. 7) argue that the neglect of emotions leaves a “void in how to both know, and intervene in, the world,” and that this gendered production of knowledge side-lines emotions, favouring a (masculinised) “detachment, objectivity, and rationality” over a feminised “subjectivity, passion and desire”.

Although “affect,” “emotion” and “feeling” can all be variously defined, for the purposes of this paper we approach these concepts interchangeably, to denote a cocktail of unconscious bodily feelings and conscious experiences of feelings (Hamilton, 2020; Pihkala, 2022). Indeed, the climatic and the affective are entangled; as Verlie attests, climate change—as a phenomenon that is *felt* through things like temperatures, hurricanes, disease, floods, and drought—“reconfigures, disrupts, shapes and directs humans, and everyday human affective practices contribute to changing or stabilising climate” (Verlie, 2019, unpaginated). Once we acknowledge the interplay of emotions in everything we think and do about the climate crisis, we can acknowledge the social, political and cultural context of the emotions we feel, how we manage them and how this influences the kinds of actions we do or don’t take (Ahmed, 2014).

A raft of past research demonstrates the importance of emotions both for understanding the climate crisis and for responding to it. Norgaard (2006) found that people manage their emotions in line with social norms (effectively suppressing distressing emotions), producing a kind of “everyday denial,” and subsequent research has investigated the emotions associated with the climate and nature crises (Cunsolo Willox et al., 2013; Duggan

et al., 2021; Wang et al., 2018; Hickman et al., 2021), created new vocabulary (Albrecht, 2019), and explored the relationship between emotions and environmental actions (Norgaard, 2011; Sangervo et al., 2022). Davidson and Kecinski (2022) suggest that understanding emotions is critical to the success of adaptation and mitigation strategies. Increasingly, research highlights that distress and anxiety are emotions particularly associated with the climate crisis, including studies with children and young people (Hickman et al., 2021), the general public (Sangervo et al., 2022; Whitmarsh and O’Neill, 2011), affected communities (Tschakert et al., 2013; Askland and Bunn, 2018), educators (Verlie et al., 2020), and climate scientists (Head and Harada, 2017; Duggan et al., 2021). Rather than unfairly shifting the burden of responsibility for climate action onto individuals (instead of the wider political and institutional drivers of the CEC), such research underpins the assertion made by Ahmed (2014) and Verlie (2019) (see above) that emotions cannot be considered separately from the social-political realm; the capacity for changes in one is dependent on the other, and *vice versa*.

The subject of this paper and the project—Climate Lab—is not so much concerned with *which* emotions are connected to climate action, but rather how creating a space to express and process *any* emotion about the crisis can itself open up new possibilities for personal and collective transformation. From a psychological perspective, it has long been observed that managing emotion involves “bodily preparation for a consciously or unconsciously anticipated deed” and that “this is why emotion work is *work*, and why estrangement from emotion is estrangement *from* something of importance and weight” (Hochschild, 1983, p. 230). This is also true of the CEC, where suppressing emotion is more likely to result in poor mental health, isolation, inaction and apathy (Norgaard, 2011; Lertzman, 2015; Gordon et al., 2019) than it is to result in meaningful progress. And so, while the pursuit of objective, rational science will remain an important part of university climate research, it can simultaneously estrange staff from their feelings about the climate and ecological crisis. Neglecting these feelings, we suggest, may prevent Higher Education Institutes from becoming the agents of social change that they could—and many would argue, *should*—be.

2.3 Emotions in a university setting

Studies have shown how scientists enlist particular behaviours, strategies and energies to keep their emotions hidden and maintain their image as objective and rational (Head and Harada, 2017; Gillespie, 2020). Such management can be thought of as a form of emotional labour (Hochschild, 1979, 1983), which as we discuss below, has inner (wellbeing and mental health) and outer (ability to effect or participate in change) implications.

A doctrine of impartiality and objectivity in academia—and especially in science disciplines—has created various social “defences” (Randall and Hoggett, 2019) to keep climate emotions at bay. Indeed, Brysse et al. (2013) found that “dispassionate norms” creates a bias towards toning-down statements that might be perceived as alarmist. Furthermore, where emotions about uncertain environmental futures are expressed, they tend to

emphasise resilience, adaptation, and risk management which are—arguably—more positive emotional outlooks (Rickards et al., 2014). Research by Head and Harada (2017) with climate scientists in Australia found several common triggers for downplaying emotions: (1) the social norms of science (rationality); (2) fear of attacks from climate denialists; (3) personal denial in order to protect self and family in everyday life; (4) maintaining an optimistic disposition in order to maintain personal and group resolve (to do science); and similarly (5) a focus on pleasurable emotions about their jobs (i.e. it being interesting and fun work) which galvanised a sense of scientific community and fellowship. Consequently, Thierry et al. (2023, p. 2) note how “...on a day-to-day basis, most academic staff seem to be maintaining the semblance of normalcy and unconcern. So great is our apparent collective indifference that an onlooker could be forgiven for thinking that we do not believe our own institutions’ official warnings that an emergency is unfolding around us.” They identify organisational structures of modern higher education institutes that uphold an extractivist growth economy and legitimate hegemonic cultural practices as a primary cause of inbuilt inertia. Such inertia, coupled with a psychological need to deny the consequences of our own inaction, makes it very difficult for individuals within the organisation to challenge the status quo (Thierry et al., 2023). Thus, climate silence is a blockage along the pathway(s) towards genuine transformation.

However, emotional restraint about the climate crisis amongst scientists may be reaching a breaking point, with many increasingly compelled to voice their feelings (e.g. Harrabin, 2022; Gardner and Wordley, 2019; Green, 2020). Academics are increasingly speaking out about the emotional toll of their climate knowledge: in a short letter to the journal, *Science*, titled “Grieving environmental scientists need support”, Gordon et al. (2019) note how the losses associated with the climate and ecological crises trigger strong grief responses amongst people with an emotional attachment to nature, but that “environmental scientists are presented with few opportunities to address this grief professionally” (Gordon et al., 2019, p. 193). Pihkala (2020) also suggests that provision and support for academic staff to process their eco-anxiety will be essential for personal growth and transformation, and therefore also for the work of putting higher education on a path towards climate justice. Again, such research demonstrates how individual and institutional changes are fundamentally intertwined and thus how genuine transformation needs to include both—rather than unfairly directing blame or responsibility on one or the other. Our approach, exemplified through Climate Lab, offers a way in which to do this by providing space and time to acknowledge, share, and process hitherto neglected emotions about the CEC.

3 Methods

3.1 Emotional methodologies

Despite mounting evidence (and indeed, ancient wisdom and common sense) that inner dimensions (such as emotions, affects, value systems, and mindsets) are fundamental to how people engage the world and respond to problems, climate and ecological crises are still primarily approached as external problems to be

addressed through “outer” changes in science, technology, and politics. Such neglect is likely hindering any efforts towards meaningful and deep transformations for more liveable futures (Ives et al., 2020). External factors may be the *least* likely place to produce sustained change if inner dimensions are not also addressed; many studies, from a host of disciplines, now show that emotions and mindsets can be “deep leverage points” for transformation at individual, cultural, and political scales (Hamilton, 2022; see also Meadows, 1999; O’Brien, 2018; Wamsler et al., 2020; Woiwode et al., 2021; McCaffrey and Boucher, 2022). Davidson and Kecinski (2022, p. 1) go as far as to say that “the first trigger to any personal and collective change begins with emotions... Emotions are thus at the centre of social responses to climate change.” Although a strict binary or boundary between internal and external is untenable (see Ahmed, 2014), it is helpful to think of the overlap of what O’Brien (2018) calls the “practical, political and personal spheres” of transformation, and how they influence one another. In neglecting the personal sphere, we neglect a significant—perhaps even dominant—sphere of influence (see also O’Brien, 2021).

“Emotional methodologies” (EM) are a way to acknowledge, explore, and encourage the processing of complex emotions in a safe and contained way. Key to EMs is the development of emotional reflexivity, defined as “an embodied and relational awareness of—and attention to—the ways that people engage with and feel about issues, how this influences their responses, the actions they take, the stories and worldviews they inhabit and their perceptions of individual and collective agency” (Hamilton, 2022, p. 4. See also Pain, 2009; Holmes, 2015). Developing emotional reflexivity is influenced by the “emotional habitus”; that is, the “safe spaces” in which to acknowledge and explore emotions, and the presence or absence of social norms that denote particular ways of emoting that either avoid or welcome uncomfortable emotions about climate (Gould, 2009; Norgaard, 2011; Owen et al., 2022; Hamilton, 2022). At their core, emotional methodologies challenge what we mean by “communication” in the context of CEC. Despite all our sophisticated options for communication, we might ask whether the deepest purpose of communication, to create understanding and foster connection and, ultimately, to ensure survival, is being served? As Moser (2015) suggests, given the dire straits we find ourselves in, perhaps not. She argues that what is needed most is not persuasion, education, and deliberation (the hallmarks of climate education and communication within HE and beyond), but rather kindness and compassion, respect, and dignity: “Not a battle of the minds, but a meeting of the hearts” (ibid.).

These can be tough words to absorb in a culture built on ways of knowing that prioritise rational thought, debate, and impartiality. The traditional university, and particularly the neoliberal one (Thierry et al., 2023) does not make a natural emotional habitus because it side-lines, even suppresses, many other ways of knowing—bodily, emotional, spiritual, intuitive—that we know are central to how people come to understand and respond to environmental change. And while a range of approaches do increasingly see researchers as subjective, active participants in knowledge creation, and there is a rich tradition of centering emotion and affect in some disciplines, these endeavours do not currently hold authority on climate change, both in terms of who convenes research initiatives in universities, and who

communicates about the crisis to the public (Gardner et al., 2021). Making room for embodied and emotional knowledge is also an important part of decentering and disrupting the imperial, Western knowledge systems that are intimately bound up with colonialism and climate (Smith, 2021; Sultana, 2022). Other research shows how emotions and emotional methodologies are implicated in long term individual and collective resistance in autonomous forms of activism (Brown and Pickerill, 2009; Jasper, 2011). However, only a small body of work has investigated the emotional landscapes of universities and education settings in relation to the climate crisis (e.g. Willis, 2012; Head and Harada, 2017; Jovarauskaite and Böhm, 2020; Jones and Davison, 2021; Verlie et al., 2020), and still fewer² propose methods for overcoming the anxiety, avoidance, and inertia (amongst staff and students) that many of these studies observe.

3.2 Climate Lab

As noted in the introduction, the catalyst for Climate Lab was a child's question to glaciologist Murray regarding her feelings about the climate crisis. Murray subsequently brought together an interdisciplinary team of academics at Swansea University to explore what would happen if other scientists were asked the same question. It became evident that we would need skilled facilitators to create the kind of space where academics would feel comfortable to discuss their feelings. For this, we turned to an organisation called Emergence (<https://emergence-uk.org/about/>), based in mid-Wales, with whom one member of the team had interacted before (Pigott, 2020). Some university seed corn funding enabled us to commission Emergence, and the Climate Lab pilot project was born.

The Climate Lab pilot consisted of two, day-long, in-person workshops in March 2022, at two locations at Swansea University's campuses, both facilitated by artist and founder of Emergence, Fern Smith,³ and Newport-based performance artist, Marega Palser.⁴ Two other artists from south Wales, Emily Hinshewood and Tanya Syed, were commissioned to join the workshops and produce creative responses. Invites were circulated within the Faculty of Science and Engineering at Swansea University and aimed at "climate scientists and engineers." We focused on STEM disciplines because these disciplines embody a culture of science that most strongly denies or hides the emotional dimensions of doing science (Willis, 2012; Brysse et al., 2013), and such suppression is increasingly understood to be a barrier to effective action (Brown and Pickerill, 2009; Head and Harada, 2017; Randall and Hoggett, 2019).

The invite called people "to participate in a unique, immersive, experiential research lab focusing on climate change, sea level rise, and the future coastline of Wales." It asked questions such as "Can we take the expert viewpoint of climate scientists 'outside of the box' of the scientific method?" and explained that the intention

would be to "step into a new space for enquiry," "share and listen to stories from others involved in climate research," "see your work from a fresh perspective," "examine and witness the impact of climate research on those who undertake it," and "engage in mutual inspiration and co-learning" with an "emphasis on creating an atmosphere of trust and reflection—providing space and time for emotions to be shared." The pilots involved 16 participants (including the organising team and facilitators) from Engineering, Geography, Biosciences, and Health and Human Sciences, ranging from postdoctoral researchers to professors. Most, but not all, were white, and only three participants were men. Although no respondents to the invitation were turned away, the number of participants was around the upper limit that the facilitators had deemed optimal for an in-person workshop.

To create an atmosphere of trust and reflection during the first workshop, the facilitators steered our energies into activities that would help us get to know one another and to feel at home in the space. Some were "fun" activities such as simple body and breath work and drawing pictures of one another with our non-dominant hand without looking at the page (see Figure 1). In another activity we were asked to choose an object from an array of trinkets, found objects, flotsam and jetsam laid out on a table, and to share with another person how our chosen object resonated with us. We were asked to reflect on our personalities, values, and deepest questions. These activities were surprising and perhaps uncomfortable for some, particularly as there was little in these first activities that had anything obviously to do with the climate crisis. A couple of participants dropped out between the first and second workshops.

The first part of the pilot Climate Lab, held in a building a stone's throw from the beach, incorporated ceremonial aspects such as walking out in silence at low tide to meet the sea (a long walk at Swansea Bay, where the tidal range is 8 m), and the use of a talking circle known as "council." Council circles use a very specific way of speaking in turn, from the heart, with specific guidelines for sharing (Zimmerman and Coyle, 1996). This means talking only about personal feelings rather than jumping to solutions and offering what one thinks ought to be done about a particular situation; this is a subtle but important distinction in the climate context where discussions often revolve around solutions and blame (Pigott, 2020). The invitation to speak in circle was in response to the phrase "knowing what I know and doing what I do, my greatest fear for the future is..." Other participants were encouraged to actively and deeply listen (rather than respond, debate or plan what they wanted to say next). This enabled a form of witnessing (Macy and Brown, 2015) that not only helps people to feel more in touch with what they feel themselves, but also helps them understand that others may feel the same; this can be a galvanising experience (Johnstone, 2002; Pigott, 2020).

During part two of the pilot three weeks later, the same participants came together to experience the artists' creative responses⁵ (Figure 2), and to hear about their creative processes in response to what they had experienced during the first workshop. Further creative, ritualistic and ceremonial practices

² One example is the Daring Classrooms initiative (see <https://brenebrown.com/hubs/daring-classrooms-hub/> Last accessed 14 June 2024).

³ See <https://fernsmith.uk/> (last accessed 20 June 2024).

⁴ See <https://www.instagram.com/maregap/> (last accessed 20 June 2024).

⁵ See <https://climatelab.swansea.ac.uk/climate-lab-swansea/> Last accessed 14 June 2024.



FIGURE 2

Snapshots of the artists' creative responses/works in progress during the pilot Climate Lab: (A) "Blueprints" by Emily Hinshelwood, a series of cyanotype postcards featuring participant's words in response to the prompt "knowing what I know and doing what I do, my greatest fear for the future is..."; (B) A still from "Islands of Possibility", a film by Tanya Syed, that explores the role of time in emotions about the CEC (see <https://vimeo.com/737337900>); (C) Participants' words scribed and arranged around a map of Swansea Bay, which were spoken and laid out in a ceremonial fashion during a performance piece by Marega Palser; (D) One of the postcards by Emily Hinshelwood.

were employed, including short walks, talking circles, a tea ceremony, and drawing/writing.

The workshop methodology, although somewhat alien in a university setting, was inspired by a framework for transformation—Joanna Macy's Work that Reconnects (WTR)—that is widely used elsewhere, particularly in activist and community spaces. The WTR is a loose framework that was developed by Macy and colleagues in the 1970s (Macy and Johnstone, 2012; Macy and Brown, 2015) and continues to evolve. It draws on a combination of systems theory, Buddhist philosophy and deep ecology and has at its core the aim to connect people to their emotions, to others and to the more-than-human world. Research into the impacts of WTR by practitioners has found that it can strengthen connections to self, others, and

the more-than-human world, and that workshops can renew commitment to action (Johnstone, 2002; Hollis-Walker, 2012; Hathaway, 2017). Climate Lab followed the four-part structure of the WTR. On the first day the participants were led through the "coming from gratitude" and "honouring our pain for the world" stages, and on day two the focus changed to the "seeing with new eyes" and "going forth" stages.

After the pilot in 2022, Climate Lab secured further internal funding to run two online iterations of the workshops in 2023; both were two-part processes, Global Climate Lab 1 in May and June, and Global Climate Lab 2 in September and October. This time, invites were sent out internationally via email, twitter, LinkedIn, fliers at conferences, and departmental newsletters, aimed at "climate researchers" (after receiving interest from social scientists,

we decided to broaden the focus from STEM-only disciplines). The first workshop received 11 participants from the USA, Canada, Denmark, Germany, Pakistan, and the UK. The second workshop had 15 participants from Australia, France, Pakistan, Bangladesh, Germany and the UK. Most participants were female (four participants were male; of these, only one attended both parts of their Lab). Again, no respondents to the invite were turned away unless they knew in advance that they would not be able to attend both parts of the workshop. Facilitators planned activities for up to 15 online participants, although larger groups could potentially be accommodated by adjusting the methods.

A call was put out via Emergence's networks for an artist to participate in each workshop. From a number of applicants, two were commissioned—multidisciplinary artist Carolina Caycedo (based in the USA), for the first workshop, and Christine Kettaneh, a sculptural and performance artist (based in Lebanon), who joined the second workshop.

These online workshops followed the WTR framework in a similar way to the pilot project, with activities adapted by our facilitators to work in an online environment (Zoom). A third and final online “celebratory gathering” was offered for each cohort to showcase the outcomes of the artists' endeavours (these were shown as “works in progress” during the second workshops but finalised by the third gathering). The Council method was, again, a critically important component of the online Climate Labs, and the “hide/show/pin” video functions in Zoom helped to create a virtual space that facilitated focus and deep listening to whoever was speaking.

The ethics process was made more robust for the Global Climate Labs after it was flagged to us during the pilot that the invitation to bring emotions to the fore could be triggering for some. In addition to seeking the usual university ethics clearance, we also asked participants to read detailed information about the workshops and sign a consent form, and we built in more “support” spaces, including a breakout room option for anyone needing someone (a nominated team member) to talk to, and by signposting various support services related to climate distress.⁶ Each workshop began by stressing to participants that the nature of the climate and ecological crises meant that there could be no guarantee of an entirely “safe space”; indeed, the aim was to create “safe enough” or “brave” (Arao and Clemens, 2023) spaces in which participants felt able to encounter their (and others') most uncomfortable and upsetting feelings about the crises.

3.3 Creative participation

The invitation to engage in mutual creativity alongside professional artists was at the heart of Climate Lab and enabled it to create space for emotions and connections that are otherwise difficult to access. From the start of the planning process, our facilitators were clear that they would not simply be facilitating discussions *between* climate scientists and engineers whilst artists

merely observed and “reported back” on the process. Similarly, we (the organising team) were strongly encouraged to participate rather than observe as “researchers.” This approach resonates with participatory action research (PAR) as well as decolonial and feminist approaches to knowledge co-creation, whereby all participants' various knowledge(s) and expertise are valued equally (see, for example, Omodan and Dastile, 2023; Country et al., 2016; Smith, 2021; Haraway, 2016). Importantly, such approaches reject a notion that researchers are objective bystanders to the worlds they research, because we are all always and unavoidably part of the world, influencing how events unfold and how knowledge is created (Barad, 2007; Ingold, 2016). PAR is also primarily focused on creating societal *change*, rather than simply “data” (Kemmis, 2010). As co-author and facilitator Smith elaborates in a series of blog posts⁷ about Climate Lab,

“...although easier to distinguish and separate roles from a research point of view, this would set up a false division between ‘us’ and ‘them’ - one often replicated in projects which invite artists into scientific forums. This risks the artists becoming instrumental and secondary to the scientists, rather than both learning from each other, shaping the narrative, and creating change together.”

Creative methods and the involvement of artists were central to Climate Lab's transformative potential because they created a conducive “emotional habitus” (Hamilton, 2022) for the sharing and processing of emotions, giving participants opportunities and permission to access different (often more playful, imaginative, or deeper) parts of themselves and different ways of interacting with one another than they are usually accustomed to in an institutional setting (these themes are explored more fully in Pigott et al., in preparation).

In what follows we describe and discuss the various effects of, and themes arising from, the pilot and Global Climate Labs (conceptualised in Figure 3) in relation to their potential to catalyse transformation in HE.

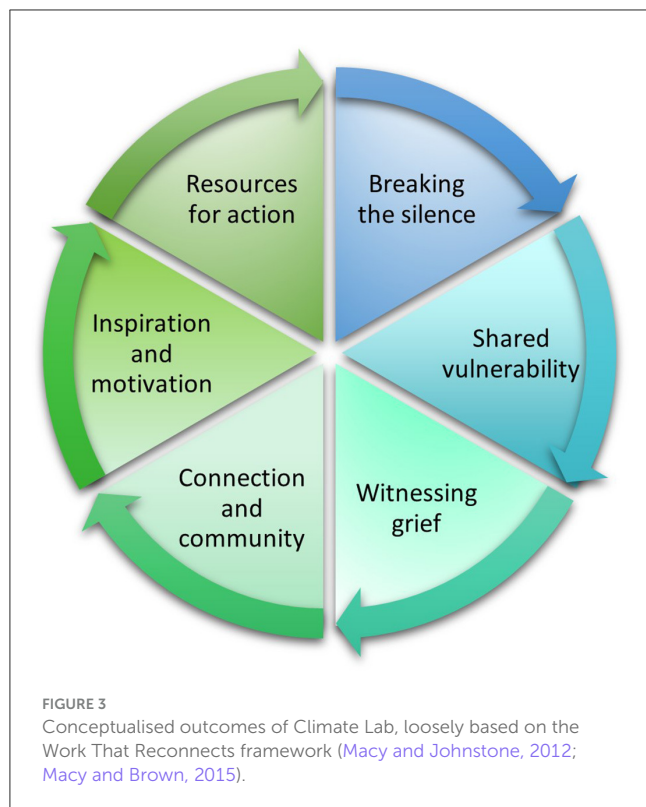
4 Findings and discussion

4.1 Breaking the silence

“The power of grieving connects us... we discover that others feel the same way as we do—even in a university divided by campuses, disciplines, and departments. We find that we are not alone. Grief makes us reach out for support. It creates a community; it has the potential to create a village within an institution. This galvanises us and makes us more resilient. It

6 See <https://climatelab.swansea.ac.uk/resources/> (Last accessed 14.06.2024).

7 Available at https://emergenceuk.blogspot.com/2022/04/taking-climate-experts-out-of-thebox_19.html Last accessed 18 March 2024.



makes us attend to what is important and helps us keep on keeping on.” Fern Smith, Climate Lab creator and facilitator (see text footnote⁷).

In a very direct sense, Climate Lab provided spaces of connection that helped break a generalised climate silence in HE and “burst the bubble” of pluralistic ignorance whereby individuals hold a false assumption that no one else cares (Geiger and Swim, 2016; Thierry et al., 2023). Participant comments indicated that hearing how their colleagues also cared about the climate was a welcome revelation (Figure 4). These moments of interpersonal connection can spark processes of social contagion within and beyond institutions (Thierry et al., 2023; Moser and Dilling, 2007; Winkelmann et al., 2022), as people gather confidence that their views and values are shared by others. From a systems change perspective, when a system (i.e. the individuals comprising that system) has the opportunity to “see itself,” then it gains power to imaginatively transcend that system/paradigm and—in the language of the Work That Reconnects—to “see the world with new eyes” (Macy and Brown, 2015). The value of such a rupture in the daily fabric of how life is imagined, of the daily illusion that no one else cares and that norms and cultures are unquestionable, cannot be underestimated because it represents a significant leverage point for exerting change in social systems more widely (Meadows, 1999).

Spaces of connection and community-formation (whether brief or ongoing) can give people the courage, camaraderie and “deep determination” to take climate action (Hamilton, 2022). Speaking about the CEC can be difficult, especially in work settings, but is vital. Although the Climate Lab organising team already knew each other in some capacity, the bonds we forged with one another and with other participants during the in-person pilot

Climate Lab (and the more ephemeral but nonetheless powerful connections made with international researchers during the Global Climate Labs) have been of a different quality to that of day-to-day collegiality. Having seen one another express deep concern and vulnerability about the CEC (including, at times, tears), we have subsequently found ourselves encouraged and emboldened to bring up the CEC as often as possible in our workplace and lives (see section “Pathways towards personal and collective agency,” below), from university committees to grant review panels, and through public outreach and engagement activities. Without adequate emotional support networks, doing so is an immense pressure and responsibility—that requires considerable bravery—for climate-concerned HE staff who are already likely to be overworked, precariously employed, and feeling isolated by the culture(s) they operate within (Owens et al., 2023).

Sharing distressing emotions makes us vulnerable, and although uncomfortable, such vulnerability presents a way of (re)connecting with one another, bringing to the fore a subjectivity that is—crucially—*receptive*; we become better able to think and feel our interdependence with one another, and also our corporeal vulnerability to and dependence on the more-than-human world (Butler et al., 2016; Verlie, 2021). Rather than understanding vulnerability only in material and political terms (i.e., “climate vulnerability”—an approach which tends to imaginatively set people apart at global and local scales), Eriksen helpfully suggests that “vulnerability is fundamental to the connectedness in social relations critical to understanding and acting on climate change” (Eriksen, 2022, p. 1279), and urges us to investigate the deeply personal realms of vulnerability that relate to linking lived experiences and a shared humanity (Eriksen, 2022).

Leaning into vulnerability also means refusing to turn away from the intractable contradictions and difficulties of these times, which can otherwise side-line the kinds of knowledges, subjectivities, and practices that are better able to cope and thrive with complexity and difference (Pigott, 2020); As Solnit proffers, within the spaciousness of uncertainty there is room to act (Solnit, 2016; see also Mouffe, 2000). Making space for vulnerability and related emotions such as shame, guilt, and uncertainty is also part of the work of decolonising the (predominantly white, masculine, linear, progress-oriented) knowledge structures that contribute to individualism and environmental destruction (Singh, 2018; Chakrabarty, 2000). In this sense, vulnerability is not an obstacle to climate action, but rather can be a means for generating different kinds of (much-needed) ethico-political awareness, and more communal ways of perceiving and being together (Eriksen, 2022; Ramsden, 2016).

4.2 Forming community

Through Climate Lab we experienced ourselves and observed in others how turning towards and expressing difficult emotions enabled a changed relationship with other participants in the group. Participants commented (Figure 4) on having found a community of others in their institution who felt the same as them, and how this gave them inspiration and courage to continue their work and/or take bolder steps. Their comments align with wider research on emotional methodologies, where the “disenfranchised grief” that



FIGURE 4
Climate Lab participant feedback, collected via a post-workshop online survey.

participants express and share with others can become a resource for initiating and sustaining action (Hamilton, 2020; Verlie, 2019; Randall, 2009; Lertzman, 2015; Head, 2016; Cunsolo and Ellis, 2018; Osborne, 2018).

Recent research indicates that one of the biggest barriers to HE educators taking action is not a lack of access to information, materials or resources but rather the social, cultural and institutional factors which shape educator's agency and opportunities to enact change (Owens et al., 2023). These include organisational culture and epistemic norms, the "tone" set by senior management regarding whether the CEC are taken seriously, academics perceiving risks to career and credibility for appearing "radical" or "political," an intense institutional focus on efficiency and productivity at the cost of time and space to develop novel approaches to the CEC in universities, and the vested interests of fossil fuel companies in universities which create a conflict of interest for senior management and some staff. The research found that one of the key challenges that educators face is dealing with their own distressing emotions about the CEC (echoing commentaries by Gordon et al., 2019 and Pihkala, 2020) and that day-to-day routine interactions and connections between colleagues in HE are important in capacity-building to enable people to transform their good will and concern into action (Owens et al., 2023).

What the Climate Lab showed us, however, is that processing distressing emotions is difficult and skilled work, and unlikely to be facilitated through "routine interactions" alone; indeed, we know that overall, cultural norms dictate what is kept in and out of discussion in routine institutional interactions—hence

the significantly different approach and creative methods used in Climate Lab to enable participants to step out of what was usually expected of them in their roles. Drawing on and extending Owens et al. (2023) work, we therefore suggest that making space for emotions is itself a key conversion factor in determining the capabilities of HE staff to enact change, because—in our experience—bearing witness to one another's emotions established bonds between participants that would not have otherwise existed.⁸ The artists' creative responses were a key part of this witnessing process, reflecting back to the participants the emotions that had been shared, and reinforcing the fact that they existed and had been heard. For example, participants commented that "...it's always enlightening to work with more voices with different lived experiences. I enjoyed seeing and hearing my and others' words/images reflected back and interpreted through the artists' works" and "It was a very good process. I felt so much more of everything."

The climate crisis is often conceptualised as a crisis of imagination (e.g. Wapner and Elver, 2016), but it is also a crisis of connection (Hodgetts, 2023). Our warming climate is both a symptom and a cause of a centuries-long decline in social connection and community cohesion (Card and Closson, 2023);

⁸ It is important to note that, beyond a Padlet set up for participants to share their projects and resources, the Climate Lab did not aim to forge an enduring, active community of connected researchers. Nonetheless, a *sense of community* was created simply by breaking the silence.

our increasingly individualised lifestyles, particularly in high-income countries, take a huge toll on the planet (Moon et al., 2023), while increasing temperatures are also likely to further fracture and stress our relationships with one another and increase feelings of anxiety and distress (Card et al., 2023). What is more, research shows that attempting to reverse this decline and to foster social cohesiveness is more likely to be achieved through intimacy rather than information. An experiment by van Swol et al. (2021) showed that when discussion groups were encouraged to engage in self-disclosure and focus on shared values, they had higher ratings of social cohesion, group attraction, and collective engagement (and lower ratings of ostracism) than those groups encouraged to solely discuss information from an article about climate change.

This observation gives us clues as to why Climate Lab felt like such a radical space within the university and even as an online space. It affirms something that is well known in feminist and post-colonial research, but less examined in discussions about the CEC, or indeed HE, which is that emotions are political, they enact change in the world, and facilitate the formation of communities and movements (Ahmed, 2014). As Verlie insists, the work of caring and of building caring communities is a form of climate action; “emotional work is political work” (Verlie interviewed by O’Neill, 2022). In fact, this work of building caring communities might be one of the most promising edges of climate action: leading Intergovernmental Panel on Climate Change scientists such as Christina Figures and Karen O’Brien are increasingly turning to examine the inner and collective dimensions of experience that underpin climate action inertia—and might be key to overcoming it (Green, 2022; Bristow et al., 2022; O’Brien, 2021). This includes approaching the CEC itself as a “collective trauma” of mass numbing, denial, and avoidance of responsibility by leaders and wealthy nations for the traumas of colonialism and climate change for which they are primarily responsible (Green, 2022).

Approaching the CEC as a trauma legitimises using collective healing practices and “radical tenderness” (Machado de Oliveira, 2021, p. xxi) to recognise feelings of individual and collective helplessness, shame, fear, and grief and to tap into the wisdom this may reveal (Green, 2022). Such feelings were welcomed in Climate Lab; one participant commented that they appreciated having the opportunity to sense “the urgency of what is causing these feelings of doom in scientists. It was raw... a more contained emotion, one almost laced with guilt.” Although Climate Lab never explicitly used the terms “trauma” or “healing” both facilitators having training and experience in working with distress and trauma. The design, activities, and presentation of Climate Lab was thus informed by trauma healing approaches, such as multi-day processes of trust-building, slowing down, communicating precisely, attuning to others, and recognising unacknowledged emotions—and in doing so aiming to build more collaborative (and capable) communities (Green, 2022).

4.3 Pathways towards personal and collective agency

Perhaps the most telling observation is that of our own (the organising team’s) experiences of how Climate Lab changed our

relationships with one another and our capacities to make change in our institution. Although we all knew each other professionally prior to Climate Lab, it is not an exaggeration to say that these relationships have been considerably deepened through the experience of hearing one another speak so openly, emotionally, and vulnerably about the CEC. These connections have paved the way for actions that we have subsequently each gone out into the university to initiate or participate in (both individually and in collaboration with one another). For example, Murray and Bohata played key roles in establishing the university’s first dedicated Climate Action Research Institute and Climate Action Research Network (for the Faculties of Science and Engineering and Humanities and Social Science, respectively). Thomas led a Climate Comic project to explore and facilitate intergenerational learning about the CEC (Thomas et al., 2023), and Pigott ran a successful Fossil Free Career campaign with students to persuade the university’s career service to cut its ties with fossil fuel employers (Pigott, 2024). It is important to note that these activities were not direct “outputs” of the Climate Lab; the Labs were not intended as spaces to workshop ideas or create action plans. However, they did create the necessary psychological support and community for us, as participants, to feel emboldened to act on our convictions.

The “ripple effects” of Climate Lab resonate with a comment from the influential academic and activist, Charlie Gardner,⁹ that the primary concern of climate-concerned academics should not be to “get people to care about climate change, because they probably already do. Rather, the task is to help them realise their agency, empower them to take action, and facilitate that.” Climate Lab empowered us to first realise *ourselves* as agents of change, making the task of empowering others to do the same feel much more achievable.

Noting these ripple effects (and knowing that many more may have been set in motion by other Climate Lab participants¹⁰) is important in the context of valid concerns about whether supposedly climate-oriented activities actually contribute to the urgent (and many would argue at this point, primary) task of dismantling fossil capitalism (e.g. Malm, 2018; Bluwstein, 2021), or whether they distract from it. It would be easy to level such claims at Climate Lab, as a space that resists an academic impulse to want to “do” and “solve” (e.g. Stengers, 2018), which takes up time with seemingly frivolous creative activities that may seem self-indulgent in the extent that it delves into the emotions and vulnerabilities of otherwise privileged academics in relative positions of power. As one Climate Lab participant put it, with a nod to the seeming futility of sitting around in a room, talking, “I feel I should be lying down in the road.” However, to write emotional methodologies off because of a lack of immediate or obvious “impact” on fossil fuel industries would be a mistake, and one that is rooted in the particularly linear, positivist, and productivist mindsets that are responsible for a “maladaptive cognitive-practice gap” (Thierry et al., 2023, p. 1) in HE and which are intimately linked to the

9 In a tweet <https://twitter.com/CharlieJGardner/status/1593197570712825857>.

10 Tracking longitudinal “impact” has not been a primary or funded component of Climate Lab, although it would be an interesting next step.

CEC. As already mentioned, emotional methodologies can help build the deep determination, networks and community cohesion needed to persist in climate actions and can spark inspiration for more visible actions. As participants attest, these spaces and processes are needed (Figure 5). But more than this, engaging in EMs is part of a prefigurative politics (Monticelli, 2022) for post-fossil capitalism worlds, within HE and beyond, in which different kinds of knowledge and embodiment practices (that resist capital-colonialist logics) are prioritised in order to usher in more compassionate, caring, and care-full worlds. As one participant reflected, “working with the artists gave me permission to be playful, to think about and care about my body and emotions, rather than sidelining these. It reminded me of the importance of making contact with some of the ‘softer’ or more spiritual aspects of life, even in the face of crises which seem to scream for ‘hard’ action.” Prefigurative practices are important not only because they are part of the imaginative work of dismantling fossil capitalism and its logics (imagining that there is, after all, an alternative), but also because they will be part of creating the fairer, more inclusive and more ecologically-sensitive institutions and societies that we desperately need when it is gone.

4.4 Emotion, decolonisation, and gender

Transformations towards more sustainable and just futures require a radical dismantling and reconfiguration of long-run sociocultural and political-economic norms currently reproducing the very problems driving climate change, including colonialism, extractivism, neo-liberal capitalism, and an ideology of individualism (Stoddard et al., 2021; Machado de Oliveira, 2021). Western universities are systematically founded on a colonial legacy of knowledge production methods and face an on-going intellectual battle to accept this and to transform their theories, methods, and practices (Ferreira da Silva, 2007; Shilliam, 2014; Todd, 2016). Calls for alternative knowledge creation and meaningful decolonising practices include experiments in trust, communication, deep listening, praxis and reflexivity (Bhambra et al., 2020; Radcliffe, 2017; Smith, 2021; Machado de Oliveira, 2021), which are all facets of emotional methodologies.

One example of the effects of on-going colonial structures during Climate Lab was the use of the English language. We, as organisers, did not even question this choice for the in-person Labs, as English is the dominant working language on campus (although Welsh is also used, and some Welsh was incorporated into the workshops). The use of English also felt unavoidable for the online Global Climate Labs, partly due to the constraints of the language of the organisers and facilitators (predominantly English), but mainly because English remains the international language most likely to enable participants with various first languages to communicate with one another. However, feedback from colleagues when we were promoting Climate Lab indicated that language was a very real barrier to many scientists, especially those who either don't speak English or wouldn't feel confident enough to actively participate and discuss emotions in a room (virtual or otherwise) in which English is the main communication language. To make things worse, in many regions, English is

negatively perceived as an imperialist language. These difficulties around language are connected to the ways in which expressions of climate emotions risk perpetuating white, colonial fragility, guilt and inertia (Kanngieser, 2016). As Ray (2021) warns, “Intense emotions mobilise people, but not always for the good of all life on this planet.”

Despite these challenges and potential pitfalls, we argue that utilising emotional methodologies in universities that are structurally and systematically colonial is still a worthwhile endeavour if (a) these methods are facilitated with an awareness of and sensitivity to the colonial nature of universities and to the critical question of *whose* emotions get to count (Ahmed, 2014) and (b) help to build concrete, day-to-day practices and norms that are explicitly decolonial (Kanngieser, 2016)—such as cultures of deep listening, interdisciplinarity, vulnerability, reciprocity, and approaches to knowledge creation that decentre white, masculinised scholarship.

Intersecting with the challenges of coloniality, is the issue of gender. As already noted, the vast majority of Climate Lab participants, as well as its organisers, facilitators, and artists, were female. This initially surprised us (after all, climate science is still dominated by men (Liverman et al., 2022)), but on further consideration is perhaps not surprising at all—and gives cause for concern. Part of the reason that emotional methodologies can bolster decolonial agendas in universities is precisely because they centre qualities such as relationality, care, solidarity, co-operation and attentiveness that do not serve the capitalist, neoliberal values that are increasingly structuring university operations (McGeown and Barry, 2023). Given that women and femme-identifying people are strongly socialised and morally impelled to engage with care-related work (that emotional methodologies might reasonably be classed as) in ways that men are not (see Lynch, 2021, p. 11; also Tronto, 1993 for the nuances around this framing), it was perhaps inevitable that women were more attracted to the premise of Climate Lab, whereas their male counterparts may have seen the invites but prioritised more “valuable” academic activities instead. Equally, the mention of emotions and feelings in the invites may have unintentionally signalled a “female” space and made male-identifying people feel excluded or uncomfortable with participating due to the gender norms that they, too, are constrained by.

The reasons for a lack of male engagement are likely multiple and intertwined, but they are worrisome because it indicates that emotional methodologies, though important for the transformation of HE, risk becoming an additional labour that is predominantly shouldered by women. Women—in HE and elsewhere—are already disproportionately engaged in tending affective relations that require time and proximity (Lynch, 2021) but which are not rewarded within current models of scholarship. What is more, this gender bias is exacerbated by issues of academic rank, race and ethnicity, disability, and employment status (see Owens et al., 2023).

The gender imbalance we observed in Climate Lab is as deeply-rooted in the structures of HE as colonialism is. It may be that a careful rewording of invites to make them less gendered would help, but it is likely that more structural changes in universities that would persuade or enable male-identifying colleagues to take emotional methods more seriously as part of

"Yes, it's needed. I see the point of Climate Lab being to facilitate and care for heartfelt extra-disciplinary "mutual accompaniment" in these very difficult and demanding times. Something I feel is particularly important for those of us whose education and field of practice have inevitably made us - artists and academics alike - particularly susceptible to being subjected to the psycho-social pressures of possessive individualism."

"Providing a safe, slow space and helping scientists focus on their humanity for a spell - desperately needed for personal wellbeing and the future of our planet. It is so needed and appreciated (everyone I told about Climate Lab really wanted to participate!) and the more people who participate the more power it will have to shift academic culture."

"SO needed! In so many places where I'm interacting with people we don't talk about climate emotions. My partner and I do, but not at work, with most friends, or in activist groups. Climate lab really offers connection and there is something fundamental about that."

"We're all doing climate stuff without talking about the climate crisis and our emotions, and doing that in Climate Lab made everything feel real again. But while scary that is also good."

FIGURE 5

Climate Lab participants, in response to the feedback question(s) "What is the point of Climate Lab? Is it needed? If so, why should we keep offering it?"

their research and personal development will be necessary. If emotional methodologies are used more widely in HE settings—as we advocate—then it is essential that these problems are addressed so that EMs do not simply further entrench existing gender (and other) inequalities and burden women disproportionately with responding to the CEC—both within HE and more broadly (e.g. [United Nations, 2022](#)). With that said, in attempting to address gender inequality it is important not to eschew (in a “throwing the baby out with the bathwater” kind of way) the opportunities and possibilities afforded by feminine knowledge practices (e.g. relationality and emotional reflexivity) and feminist critiques of the status quo ([Jaggar, 2014](#)).

5 Concluding thoughts

The climate and ecological crises are accelerating, and the need for significant societal change and new ways of acting are critical. This is just as true for the HE sector—which carries a large responsibility to respond to the CEC—as anywhere else. HE is under pressure to act in new ways (e.g. [Bhambra et al., 2020](#); [Green, 2020](#); [Facer, 2021](#); [Gardner et al., 2021](#); [Capstick et al., 2022](#); [McGeown and Barry, 2023](#)), but the simplicity of the phrase “act in new ways” belies the deep, often challenging, personal (but socially-determined) changes that support genuinely different ways of working. Learning to act in new ways is unlikely to happen through bolt-on programmes or new toolkits; rather, genuine transformation is a praxis – iterative, difficult, and ongoing. Our central point in this article has been that in order for universities to become agents of change in society through initiating and sustaining “outward” actions (for example, outreach, activism, research initiatives, changing the curriculum, and green infrastructure), there is a need for them to overcome institutionally

organised climate silence which is rooted in a denial of climate emotions. Such denial is exemplified by many of the comments by Climate Lab participants in this article, and by the widespread failure of universities to rise to the challenges of the CEC so far.

Our experience in organising and participating in Climate Lab indicates that creating spaces for staff to take a “deep dive” into climate emotions can offer them relief from the cognitive dissonance of suppressing emotions and thus open up new possibilities for, and a determination to sustain, collaborative action with colleagues. Climate Lab also teaches us that artistic and creative methods are invaluable for curating and facilitating such spaces; not as public relations for “Science,” but because they present ways of doing and being that make possible different kinds of knowing and acting. Creative methods help to create the kind of “emotional habitus” needed for staff to feel safe enough and supported when expressing distressing emotions within university environments, helping lead participants away from relying solely on traditional models of climate communication (persuasion, education, and deliberation) and towards models of communication founded on imagination, compassion and respect ([Moser, 2015](#)). It follows that once staff feel comfortable with such methods, then they will be better equipped to share these with their students ([Owens et al., 2023](#)). In addition to the mental health and climate empowerment benefits of increasing emotional reflexivity amongst staff and students, bringing emotional methodologies “into the fold” as a valid form of knowledge production is also fundamental to the work of decolonisation and gender equality, which are both intrinsically connected to the CEC (e.g. [Plumwood, 2002](#); [Smith, 2021](#); [Sultana, 2022](#)).

We know that simply conveying more information, more facts, and more dire warnings about the CEC is not an effective pathway to action, and that engaging people’s emotions and imagination is vital for communicating crises and triggering a sense of agency and

responsibility (e.g. Guenther, 2020). However, within HE we have been reluctant to heed this advice. It is still—especially within the sciences—relatively “taboo” to acknowledge emotions in and about our research, stemming from deep-seated social norms of Western-Enlightenment science (Brysse et al., 2013). If the climate and ecological crises require those of us working in HE to “dismantle taken-for-granted ideas and inherited practices, and to experiment with what a new higher education might be” (Facer, 2021, p. 10) then Climate Lab indicates that engaging with, and making space for, emotions is an essential part of this endeavour.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Swansea University Ethics Committee. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

AP: Conceptualization, Funding acquisition, Investigation, Project administration, Writing – original draft, Writing – review & editing. HN: Conceptualization, Project administration, Visualization, Writing – review & editing. MT: Conceptualization, Project administration, Writing – review & editing. FS: Conceptualization, Investigation, Project administration, Writing – review & editing. KB: Conceptualization, Funding acquisition, Project administration, Writing – review & editing. TM: Conceptualization, Funding acquisition, Project administration, Writing – review & editing. MP: Conceptualization, Project administration, Writing – review & editing. EH: Writing – review

& editing. OE: Conceptualization, Funding acquisition, Writing – review & editing.

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The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The wins of the grassroots climate movement in the University of California

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As the climate and ecological predicament worsens, too many people seem to be waiting for policy to be implemented from “on high.” Yet the history of many social struggles shows us that achieving policy wins requires a strong push from below. Here we recount how members of the climate justice organization The UC San Diego Green New Deal were critical to reorienting the climate policy of a very large institution, the 10 campus University of California, as well as winning important climate actions at UC San Diego itself. We discuss three campaigns: Decarbonization and Electrification, Cutting Ties with Fossil Finance, and Climate Education for All. From shifting the focus to emission reductions rather than carbon offsets, to pushing Chase Bank out of the campus student center, to providing new undergraduate curricula, these wins are now reverberating throughout higher education in the United States and beyond. This movement has also provided an important pedagogical role by teaching organizing and activist skills to undergraduates so they can go forth and fight for their futures.

KEYWORDS

decarbonization, social movement, activism, fossil fuel, divestment, climate justice

Introduction

Global heating is accelerating (Cheng et al., 2024; Minière et al., 2023). If substantial cuts in emissions are not made soon, many indications are that by 2050 we will breach 2°C above pre-industrial levels (Hansen et al., 2023), experience tens of trillions of dollars of economic damages (Kotz et al., 2024), and, by some projections, see the migration of hundreds of millions of people (Xu et al., 2020), although there is disagreement on the numbers (Daoust and Selby, 2024). The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report spelled out in detail how to cut greenhouse gas emissions by leaving fossil fuels in the ground, sourcing electricity from renewable energy, electrifying buildings and transportation, reducing the carbon intensity of agriculture, and cutting consumption (Shukla et al., 2022). The technology is mostly there; what is lacking is the political will to effect the transition away from fossil fuels at the speed and scale that is needed (Stoddard et al., 2021).

In that same IPCC report, there is a detailed section on the kinds of social and political changes that would constitute an adequate response to the climate crisis (Creutzig et al., 2022). After acknowledging the importance of social movements and collective action such as the youth-led climate strikes that were so successful in drawing attention to the issue, the authors observe that “changes in social norms often start with pilot experiments led by dedicated individuals and niche groups.” These insights speak to the importance of local

action which not only produces results but can also reduce some of the psychological barriers to constructive work on climate change. This is important because the huge scale of the problem and the diffuse effects of greenhouse gases can engender feelings of helplessness. In general, too few people appear to believe the transition is possible, or, more importantly, that they have a role to play in pushing for it to happen (Funk, 2021; Latkin et al., 2023). They do not, to borrow a term from psychologists, feel personal or collective *efficacy* (Bandura, 2000; Van Zomeren et al., 2008). In other words, they do not believe that they can deploy their skills and abilities to make change where they are.

Yet if we look at many other historical struggles, we see that national level change often started with and was driven by local struggles. To focus on the United States, as we do for the remainder of this paper—the struggles for the 8 h work day, the 5 day work week, women's rights, civil rights, and same-sex marriage were initiated locally and spilled over in wider circles until they affected national policy (Sovacool, 2022; Young and Thomas-Walters, 2024). The canonical example for environmental policy is the far-reaching Nixon-era environmental legislation in the 1970s that was enacted at the national (federal) level after a concerted struggle at the local level in towns and cities across the country (Tokar, 1997). And even on the climate front, it seems likely that local struggles such as the Standing Rock protests, which led to the birth of youth climate movements such as the Sunrise Movement, helped create national-level policy (Lawrence, 2022). These climate movements, and the elected officials they supported, such as Alexandria Ocasio-Cortez, popularized the Green New Deal concept within Congress, which ultimately paved the way for the Inflation Reduction Act—a deeply compromised act, shorn of social provisions, but still the largest investment in climate action in US history (Sunrise Movement, 2022).

Accordingly, as students, staff and faculty, we focused our efforts specifically on our own institution—the 60,000 strong University of California, San Diego (UC San Diego). And UC San Diego is situated within the 10 campus University of California (UC), which has around 500,000 people all told, and is the third largest employer in California, the fifth largest economy in the world. In this article, we describe our social movement struggle—one that has had many successes even though the movement was powered by no more than a few dozen individuals at a time, fewer than 0.1% of our campus population. Our aims in this exposition are several: first, to suggest a template for activists in other academic institutions; second, to claim the specific wins for our movement since they are being appropriated by institutional actors (often the very people who opposed change); third, to demonstrate the spill-over effects of our wins and actions into the wider California and higher education communities; and fourth, to increase confidence that there is efficacy in grassroots climate action, especially in a university setting. We situate our case study within a growing literature that recognizes the essential role that institutions of higher education can and should play in supporting climate action across society (Dyke and Monbiot, 2024; Kinol et al., 2023; Lachapelle et al., 2024; Nussey et al., 2023; Stewart et al., 2022; Urai and Kelly, 2023).

To begin, we describe the formation and structure of our social movement—the UC San Diego Green New Deal (UCSD GND). We discuss how the grassroots-based UCSD GND worked in concert with faculty within the academic senate and with some administrators, using an Inside-Outside strategy. We illustrate the

effectiveness of our approach with three different campaigns: Decarbonization and Electrification, Cutting Ties with Fossil Finance, and Climate Education for All. We also provide some data in the form of anecdotal survey responses from several universities on the impact our efforts had on theirs. Finally, we draw several lessons from our efforts and make some suggestions for campus-based social movements.

The UCSD GND

In the summer of 2019, a small group of faculty and students got together to plan and stage a large rally, preparatory to forming an organization. The rally that September, which overlapped with many other climate events around the world that were partly inspired by Greta Thunberg, was at least 500 strong and was covered by local news (Fox 5 Digital Team, 2019). The messaging for the rally was oriented around three demands of our institution: Teach your students about climate change and climate justice; Meet your Carbon Neutral goal by 2025; and Build a UC-wide Green New Deal. The first and third goals were chosen to grow the climate movement through increased education and awareness, while the second goal called on the university to take action to reduce its own very substantial climate pollution. At the time we did not yet understand that “carbon neutrality” was not an emissions-reduction strategy (as explained below). Also, our third demand, to build a UC-wide 10-campus movement was not so much a demand to our institution as an aspiration for ourselves.

The September rally was successful at motivating dozens of faculty, students and staff, union members, environmentalists, already-experienced organizers, and others to join our first general meeting and, from that, we formed our organization, the UCSD GND. Within about a year, as we learned more, our platform of demands evolved to the four that can be seen in Figure 1, top; these will be expanded on in the sections below.

While the group is registered each year as a student organization, a key feature that sets the UCSD GND apart from most student organizations is that it includes faculty, staff, alumni, and retiree members in key roles. It is their involvement plus Ph.D. students (who are around for longer than undergraduates) that helped provide the critical continuity for multi-year campaigns, overcoming the problem that student-only organizations have with cohort turnover (for an Italian example of the strength of such alliances see Cini, 2017; and for a more general discussion see Hensby, 2017).

The group was organized with a Steering Committee and several teams, Figure 1, bottom. Additional members would join for specific events such as the once-per-month General Meeting, rallies, and protests. Funds were raised from supportive faculty and allies in the wider city and donated through the university foundation to the student organization. Funds were used for training events, food, art supplies, banners, and printing costs. Communication was done through in-person and Zoom team meetings, and co-ordinated through a Slack workspace. Outward-facing communication was done via physical fliers, X/Twitter, Instagram, a website, and a general mailing list of supporters. Everyone was on a first name basis and attempts were made to flatten hierarchy so that all members felt welcome to get involved and participate in decision-making, planning and execution. Teams and responsibilities were established to allow



FIGURE 1

Depiction of the UCSD GND climate action and justice movement. (Top) Photo from a rally in September 2021, 2 years after we formed, showing a banner with our four campaigns/demands at the time (note that while the main text mostly discusses the first three, we also undertook many actions to support student well-being and workers' rights). (Bottom) Diagram of the structure of the organization showing how members participate in different teams to contribute to the key campaigns.

some agility in decision-making and initiative and to avoid the “tyranny of structurelessness” (Freeman, 1970). Committed members were welcome to join the Steering committee, with most members serving for at least one academic year. Some students brought with them activist and organizing experiences from other groups, such as the Sunrise Movement and 350.org, sharing practices such as the Act, Recruit, Train Cycle, as well as strategies of campaign-planning and tactics of escalation (Ganz, 2024).

Part of our original motivation when forming the organization, as mentioned above, was to build a 10 campus UC climate movement. From early 2020 we began this process through outreach to individuals and groups throughout the system, leading to the formation of the UC Green New Deal Coalition, which is detailed in Box 1. From then until now, we have continued to organize primarily within the UCSD GND, with some of us also organizing with the UC GND Coalition. The 10 campus organizing basis would prove critical in bringing pressure to bear on the UC-wide President, Regents, and other decision-makers for policy decisions, especially on Decarbonization.

The Inside-Outside strategy—our allies in the faculty senate and administrations

Like many universities in the US, UC San Diego has a faculty senate, which aims to share governance with the Chancellor and the administration. The chairs of the main senate committees meet together with the Chancellor and the administration on a semi-regular

basis. These committees have their counterparts on each of the other 9 UC campuses; and the UC-wide senate is represented in meetings with the Regents and the UC President.

From its inception, the UCSD GND worked closely with allies in the faculty senate at UC San Diego, and throughout the 10 campus system, and also with some administrators. As we detail below, this Inside-Outside strategy was key to several of our wins. Here “Inside” refers to “within institutional structures,” while “Outside” refers to the agitprop, rabble-rousing and protest tactics of the UCSD GND, elevating a voice for students.

In late 2019, as the UCSD GND was getting started, faculty allies drafted a Task Force on the Climate Crisis Report (Aron et al., 2020). Two key statements in the report were:

The Academic Senate should form a new standing committee to advise the Academic Senate and administration on matters pertaining to climate change impacts and mitigation, and to study and make recommendations regarding campus actions. The Academic Senate should ensure that teaching related to the climate crisis is well-supported on campus.

The report came up with 34 concrete recommendations, some of which are shown in Table 1. Under the Decarbonization category, the biggest item by far was the campus power plant, known as a “cogeneration plant” because it co-generates both electricity and heat from burning fossil gas. It soon became clear to those writing the report that the glossy graphs in the campus sustainability materials

were concealing a completely inadequate climate action strategy, and that the campus should be aiming to retire that plant as soon as possible.

The Task Force Report was submitted in July 2020 and was voted on and accepted by the Faculty Senate. By early 2021, the Academic Senate honored one of the key statements in the report—creating a standing Committee on Campus Climate Change (hereafter, UCSD Academic Senate CCCC)—still the only one of its kind in the 10 campus system. As we explain below, the UCSD Academic Senate CCCC was critical to the Inside-Outside strategy that advanced and won some of the UCSD GND's campaigns.

Campaign #1: decarbonization and electrification

The energy systems campaign is at the heart of the organization's work. The UCSD GND and the UC GND Coalition have relentlessly exposed the inadequacy of the UC's climate policy and forced the system to adopt new goals. The first phase was information-gathering and analysis. When we understood UC's "carbon neutral" policy to be an obfuscation, we worked to bring the truth to light and to push for the university to make a plan for true decarbonization. It took five solid years of organizing, but in the end we steered a very large institution to take the first steps towards fossil-free operations.

Background

We begin with the institution's fossil fuel use. Academic science, with its need for ultra-controlled environments and huge data-crunching power, is an energy-intensive pursuit; likewise, offices and student housing require air-conditioning, lights, heating, and elevators. The 10 campuses that comprise the UC currently emit around 1.3 million tons of CO₂e every year—more than the emissions of 40 of each of the world's smaller countries (CO₂ Emissions by Country, 2024). Two thirds of the total—nearly 900,000 tons—is produced by co-generation plants on seven of the campuses (Supplementary 1). These onsite facilities burn fossil gas to make electricity and to provide heating and cooling. Fossil gas, which is usually called "natural gas", is primarily extracted in the US via fracking and is ~90% methane, a greenhouse gas which absorbs 80 times as much heat as CO₂ over a 20-year period. Further, fossil gas leaks during extraction and transportation, making it as bad for the climate as coal (Gordon et al., 2023).

UC's first policy for climate action was developed back in 2013, when UC President Janet Napolitano needed to respond to California's targeting of emissions. She therefore established the Carbon Neutrality Initiative (UC Office President, 2014), pledging that the entire university system would be 'carbon neutral' with regard to its direct emissions by 2025. At the time, the carbon neutrality target looked commensurate with the university's standing as a climate leader. Over the years, however, problems began to surface with both the conception and the execution of this plan, even as the university doubled down on it.

It took us many months, some detective work, and a lot of self-education to get to grips with the limitations of this Carbon Neutrality Initiative. Faced with bureaucratic defensiveness and obfuscation, we had to resort to Public Records Act requests. Over time, however,

BOX 1 The UC Green New Deal Coalition

We spearheaded the formation of the UC GND Coalition (Coalition from here on) in March 2020 to advance our decarbonization and other campaigns by targeting UC-wide decision-makers and to build capacity on different campuses. Forming the Coalition was a natural follow-on from a campaign led by UCSD GND calling for the search for the new UC President to include a climate crisis focus (UCSD GND, 2020a). Connections made during the petition drive with organizers at other campuses including UC Berkeley, UC Davis, UCLA, and UC Santa Cruz formed the basis of the Coalition. From there, we worked throughout 2020 to grow participation across all 10 UC campuses. The timing of COVID pandemic restrictions was opportune for this kind of remote organizing as people were at home and everything was happening online.

Once formed, the Coalition became a volunteer-run, democratically organized, grassroots grouping of UC organizations and individuals with established Working Groups. A key initial campaign and organizing tool was the drafting of a UC Green New Deal policy platform—a comprehensive list of actions the UC should take to decarbonize and support environmental justice (UC Green New Deal Coalition, 2021). The policy covers 11 sections (Energy, Transportation, Housing, Construction, Land Use, Food and Waste, Labor, Divestment, Accountability & Governance, Education, and Funding Possibilities) and was drafted and revised through community solicitation, and delivered to the UC Office of the President.

The Coalition's main campaign to date has focused on the Energy section of the policy platform, primarily calling for the UC to shift its focus from "carbon neutrality" to "emission reductions" (this issue is expanded on in the main text of the article below). The Coalition played many roles in this critical campaign. First, in 2020, the Coalition pushed a petition started by the UCSD GND to all 10 campuses. Second, in 2022, the Coalition worked to turn out a faculty vote on a Senate resolution calling for investments to reduce on-campus fossil fuel combustion 60% by 2030 and 95% by 2035. Third, the Coalition coordinated a steady stream of individuals giving public comment at bi-monthly Regents Meetings (meetings of the UC Board of Directors), asking for accelerated and ambitious emission reduction goals. For example, 2023, when the UC was revising its Climate Protection Policy (McMillan, 2023), the Coalition encouraged members to submit feedback calling for accelerated and more ambitious goals. Finally, in 2024, a Coalition representative was invited to give a presentation to the UC Regents calling for rapid implementation of decarbonization plans.

In addition to the specific energy decarbonization campaign, the Coalition worked to raise awareness of the shortcomings in the UC's climate policy more generally. After finalizing the above-mentioned policy platform, a petition was launched to gather support for the UC to enact a Green New Deal. Coordinated rallies for a UC Green New Deal were held at all 10 UC campuses on Earth Day in 2022, and Coalition members were invited to speak at a meeting of the Global Climate Leadership Council about the urgency of the moment and the need for a UC Green New Deal.

This coordinated cross-campus effort amplified and legitimized the voices of the grassroots movement. As a result, the UC has begun to make concrete changes to its climate policy that are focused on emissions reduction. Throughout its existence, the Coalition has acted as a forum to share skills, knowledge, and lessons learned between organizers on different campuses—improving the efficacy of our work.

with input and advice from activists and energy experts in our networks, we were able to piece together an analysis of UC greenwashing that was comprehensive, quantitative, and historically informed. As we lay out below, we did not, of course, convince the university administration to change its ways immediately—it took about 3 years—but it was crucial that we had the facts and figures at our disposal. By always showing up well-briefed, we chipped away at institutional resistance. Eventually we broke through completely, to the extent that our erstwhile opponents are now taking credit for the transformations we urged upon them (Temple, 2023).

In our investigations, we learned that after Napolitano set the carbon neutrality target, a task force was convened to plan how to get

TABLE 1 A subset of the 34 recommendations in the UC San Diego Academic Senate Task Force on the Climate Crisis report (July 2020).

Decarbonization	Transparency	Teaching and research	Health and preparedness
Cogeneration plant Replace campus fossil-gas burning plant with a mostly-electric system	Corporate influence Create transparency rules for corporate influence over energy and climate scholarship	New courses**: - Add Interdisciplinary courses - Add climate content - Infuse climate content into existing courses	Measure Measure emissions in healthcare facilities
Transportation - Create scope 3* goals for now, not 2050 - Replace campus fleet by electric vehicles by 2025 - Measure campus-related aviation and make a plan - Make public transport free for campus	Banking Shift campus banking away from large fossil fuel financing banks	Research Funds Steer research funds to encouraging new investigators	Medical Education Prioritize climate crisis
Waste Build on-campus composting system to reduce 16,000 CO₂e /yr		New Teaching Lines Direct new faculty teaching lines to a climate focus within social science and humanities	Recognition Recognize climate crisis work in career advancement of clinical faculty
Other - Measure emissions of campus procurement - Make vegetarian meals default - Replace campus landscaping equipment with electric			Counseling Increase mental health counsellors who can help with climate anxiety

The text shown in bold corresponds to the key campaigns taken-on by the UCSD GND climate movement under its three campaigns of Climate Education for All, Decarbonization and Cutting Ties with Fossil Finance. Some of the other recommendations have been worked on by the UCSD Academic Senate Committee on Campus Climate Change that arose from this Task Force report, and yet others have been taken up by Dean's, Provosts and Administrators, such as creating new faculty lines focuses on the climate crisis.

*Scope 3 refers to greenhouse gas emissions from "non direct" forms of campus operations such as aviation and ground transportation for students, faculty and staff.

**Eventually we won something much more ambitious than new courses, we got a General Education requirement for all undergraduates on climate.

there. Titled *UC Strategies for Decarbonization: Replacing Natural Gas*, this 2018 report rested on four pillars: energy efficiency, new-building electrification, wholesale purchasing of renewable electricity, and biogas (Meier et al., 2018). At this point, greenwashing tactics swung into action. The UC began to claim that the first three of these pillars allowed the university to grow without increasing its greenhouse gas emissions—a notable achievement as long as you ignore the massive 'embodied emissions' in the construction of many new buildings (about 1 ton of CO₂e for every ton of concrete poured), and the flaws inherent in the "clean-electricity" purchasing scheme (Supplementary 2).

Yet these efforts left untouched the approximately 900,000 tons of CO₂ emitted by the gas-fueled campus co-generation plants, which still provide the bulk of the UC's electricity. Instead of phasing out campus fossil fuel combustion—on the grounds that it would be too expensive—the taskforce report recommended that the university 'replace' the fossil gas with biogas. 'Replacing' was a euphemism. The biogas program was a carbon credit scheme, in which the university would pay landfills elsewhere to capture their biogas and turn it into energy, while the UC would continue to burn fossil gas on site. Unfortunately for the carbon neutrality concept, biogas turned out to be scarce and costly. So, after investing in a biogas plant in Louisiana and another in Wisconsin, the sustainability officers turned to a cheaper carbon-trading option—carbon offsets (also see Dyke et al., 2024).

Bringing to light the truth about UC carbon offsets

Offsets are certification schemes by which polluters pay other people to sequester carbon on their behalf. A familiar example might be the addition of a few dollars on an airplane ticket to pay for a tree

to be planted. As the biogas program ran into problems of cost and supply, these kinds of certificates began to play a larger and larger role in the university's plans for carbon neutrality. The 2019 UC San Diego Climate Action Plan, for example, projected that 'unspecified offsets' would do the work of neutralizing nearly half of campus emissions (UC San Diego Climate Action Plan, 2019). It was challenging to get any concrete information about these 'unspecified offsets'. In October 2020, after we had begun to ask questions, sustainability officers at every campus engaged in a formal consultation process with the 10 campus communities. Every campus was sent materials about the program's aims and plans, yet these contained not a single word about the actual offset schemes that were being considered (Perez, 2021). Our further enquiries went unanswered.

The UCSD GND got to work. Buried in the Carbon Neutrality Initiative website, we unearthed a spreadsheet listing offset schemes that had received seed money (Supplementary 4). On the assumption that these were likely to be the ones rolled out in 2025, we contacted the lead scientists, and asked for further information. We spoke to three investigators; two for reforestation projects and one for cookstoves. The first investigator frankly admitted that the project was unlikely to come to completion for political reasons. The second asked us not to share the information as it was all too provisional. The third offset scheme involved subsidizing efficient cookstoves in Rwanda. Impressively, that lead scientist had analyzed a mass of technical details to come up with a system taking into account every phase of production and use. Wood pellet cookstoves, he informed us, constitute some of the highest quality offsets on the market. The thinking was that providing people with more efficient cookstoves leads them to burn less wood, and less wood burned means less CO₂

released to the atmosphere, and that reduction in emitted carbon compensates for, or “offsets,” an equivalent amount of carbon emitted by the UC. Although this project was more thoughtful and detailed than the others we investigated, there are still many serious problems with the assumptions.

First, these (and most) offsets are *impossibly cheap*—averaging about \$8 per ton (Supplementary 4). This meant the UC would theoretically be able to “offset” the nearly 1 million tons of CO₂ it emits per year from burning fossil gas on-campus with only \$8 million.

Second, offsets involving trees are *highly uncertain*. This is because trees represent a temporary movement of carbon within the ocean-atmosphere-biosphere system while when the UC burns fossil gas, it injects new carbon into that system, keeping CO₂ elevated in our atmosphere for thousands of years. The problems of relying on trees as offsets are legion. Trees are now burning at increasing rates, including those that were planted or preserved as offsets (Badgley, 2024), and, overall, the number of trees that burned worldwide between 2000 and 2021 was 11 times the number planted, releasing about 2 billion tons of CO₂ per year (You, 2023).

Third, there is the problem of *additionality*. For an action to count as a carbon offset—for it to function as a license to pollute elsewhere—it has to be something that would not have happened in the absence of the offset scheme. Because the few carbon offset projects the UC was planning to use were already underway before offsetting was included as part of their funding, these projects uniformly failed the additionality criterion.

These offset proposals were boutique schemes within the UC. Beyond the walls of the institution flourishes the established carbon offsetting market, which is increasingly being exposed for its even greater flimsiness (CarbonBrief, 2023; Romm, 2023). While the Office of the President was considering cookstove schemes, the sustainability officers on the individual campuses were scouring that market for the cheapest options. In 2020, UC Merced proudly announced it had achieved “carbon neutrality.” Our UCSD GND team wrote to ask how, but they would not tell us, so we did a public records request. It turned out that for a paltry \$1.35 a ton they had bought carbon offsets from landfills that were simply flaring their biomethane into the sky (UCSD GND, 2021). Because methane is a *really* potent greenhouse gas, burning it and turning it into CO₂ counts as a mitigation measure. While in California, capturing landfill methane is required by law, in low-regulation states landfill operators can claim that flaring methane is ‘additional,’ and can therefore sell carbon credits.

With no incentive on the part of consumers to demand quality, the carbon offset market is a race to the bottom. Ultimately, carbon neutrality and the related concept of net zero are more of a framework for slippery accounting than for real emissions reductions (Dyke et al., 2021). The complacency fostered by these schemes is one of the reasons it is so hard to tackle climate change. Much like scientists at the University of Exeter (Dyke et al., 2024) the UCSD GND therefore concluded that the only substantive way to address the UC’s greenhouse gas emissions was to do the very thing that the 2018 report rejected, which was to actually retire the fossil-fuel infrastructure, eliminating emissions at the source.

The campaign for a fossil-free UC

Accordingly, and as laid out in Box 1, the UCSD GND and the 10 campus UC GND Coalition circulated a petition in 2020 demanding

that the “UC develop a detailed plan for true decarbonization of its energy regime for all 10 campuses.” The demand was deliberately modest. All we were asking for were ‘shovel-ready’ plans. As we wrote in this energy-systems petition text: “Even if the funds are not currently available, they can be requested from a future Federal green infrastructure initiative, for which the University must lay the groundwork now” (UCSD GND, 2020b). By October of 2020, the petition had garnered over 3,500 signatures, plus endorsements from unions representing tens of thousands of UC workers. This got us into meetings with the Executive Vice Chancellor of the UC system, as well as with the Chancellors of some of the individual campuses. Their response was polite but dismissive. In April 2021, we received the message that UC President Michael Drake was not ready to abandon carbon neutrality as the 2025 goal.

The campaign that followed the denial of our petition is a good example of the Inside-Outside strategy in action. As recounted below, the UCSD GND produced hard-hitting agitprop and mounted demonstrations, while the UCSD Academic Senate CCCC pulled the levers of faculty governance. The two tracks were united in an initiative called Electrify UC, whose website collated public records request data, published analyses, and documented the progress of our campaign (UCSD GND, 2021).

Most notable on the agitprop front was a student-directed documentary, ‘Coming Clean: A Demand for a Fossil Free UC’ (Montejo et al., 2022). One of the film’s highlights is a scathing parody of carbon trading by UC Berkeley climate scientist David Romps: “I could buy a gigantic tank and fill it with oil. Then I could sit next to the tank with a match, and I could, every day, write on a piece of paper, that if no-one buys this piece of paper, I’ll light the tank of oil on fire, releasing carbon dioxide to the atmosphere. And I call those pieces of paper carbon offsets.” UCSD GND members also published an op-ed in the *Sacramento Bee* about the specifics of the UC’s offsets, describing the secrecy surrounding UC Merced’s claim to be carbon neutral in these terms: “The UC claims to “neutralize” the atmospheric damage it causes when it burns fracked methane and emits carbon dioxide by paying landfills in low-regulation states to burn biomethane and emit carbon dioxide. No wonder UC Merced and UCLA want to keep the details hidden” (Gere and Aron, 2021).

The UCSD GND applied social pressure using tried and true campus protest tactics. We followed the “Act, Recruit, Train” model by kicking off each academic year with a large rally which led to an influx in new member interest. In monthly all-hands meetings and weekly campaign-specific meetings, we trained new members to participate in and lead smaller actions throughout the year. Our tactics included conducting attention-seeking skits and impromptu speeches in campus common spaces, dropping a banner saying “UCSD Burns Fracked Methane” (see Figure 2) and drawing similar large messages in the sand on our campus beach—filmed by drone (La Jolla Light, 2022). Our academic years often culminated in an Earth Day rally, first only in San Diego and later expanding through the UC GND Coalition to cover all 10 campuses. We would then repeat the training and planning cycle for the remainder of the year with a hiatus in the summer.

At the same time, the UCSD Academic Senate CCCC developed a Senate resolution about decarbonization, carefully worded to address direct smokestack emissions. It took many months to pass the resolution through all relevant committees and councils—time we used to rally support on all 10 campuses—but finally every eligible



FIGURE 2

Fossil gas in the University of California. Upper left, all 10 campuses burn fossil gas (fracked methane), with 7 of them doing so to generate both electricity and heating in co-generation plants. Upper right, the co-generation plant at UCLA, which emits over 200,000 tons of CO₂ per year. Bottom, a major rally outside the UC San Diego library, as part of our Khosla Must Commit campaign, which exhorted the Chancellor to commit to retiring the co-generation plant by 2030. In mid 2023 he did verbally commit in a public setting, but ongoing pressure is required for implementation.

faculty member across the whole 10-campus system received a link to vote on the following demand:

“The University of California Academic Senate petitions the Regents for investments in UC’s infrastructure that will reduce on-campus fossil fuel combustion by at least 60% of current levels by 2030 and by 95% of current levels by 2035.”

The resolution passed with a resounding 85% majority (Horwitz, 2022). Such resolutions are not in themselves binding, but they serve as consciousness-raising instruments, expressions of faculty will, and benchmarks for further advocacy. Picking up the struggle, allies at the systemwide level with direct access to the Office of the President urged the administration to respond, and in September 2022, President Michael Drake convened a new task force called ‘Pathways to a Fossil Free UC,’ marking the first decisive shift in UC policy from carbon neutrality to real decarbonization. Responding to the change in mandate, the sustainability office earmarked \$13 million of UC state funds for decarbonization planning on all 10 campuses, associated health systems and Lawrence Berkeley National Lab. It was about 2 years since we had first made that exact demand through the energy-systems petition.

Reframing UC climate policy

In March 2023, a new UC ‘climate protection policy’ was circulated for comment. By this time, the UCSD GND and UC GND

Coalition were acknowledged voices in the discussion about the university’s climate goals, and we produced a redlined version of the policy, furthering almost every provision (Supplementary 5). Some of our suggestions were adopted; others were not. The greatest victory concerned the offsets program. In the first draft, one and a half of the five pages were devoted to outlining the rules for UC biogas and offsets. The UCSD GND’s redline version struck out much of that language, pointing out that biogas is a carbon offset scheme, and stipulating that only “emissions from hard-to-decarbonize operations such as air travel and back-up energy generation” could be neutralized in this fashion. Just 3 months later, the offset program was canceled. On a dedicated website, the same administrators who had aggressively defended the program against our critiques portrayed the shift as emerging from their own process of reasoned deliberation: “It proved too difficult to identify quality projects on the market, and the process of developing our own offset projects also was more difficult and risky than we anticipated” (University of California, 2024). The website succinctly described the new official climate protection policy for the UC: “As of July 2023, the University system replaced its 2025 carbon neutrality goal with goals for direct decarbonization of campus greenhouse gas emissions.” Importantly, the story was also covered in the *MIT Technology Review* with the title “The UC has all but dropped Carbon Offsets—and Thinks You Should Too” (Temple, 2023), a major win for us.

Where the UCSD GND failed to have an impact (so far) was on the all-important question of the timeline for decarbonization. The

Academic Senate resolution set a deadline of 2035 for 95% reduction of direct emissions. The new official policy punted that date to 2045. We strenuously objected to the delay, to no avail. This is where the individual campus plans come in. Every campus has completed its own decarbonization study, with three of them referenced here (UC Berkeley, 2024; UC Davis, 2024; UC Santa Cruz, 2024). Each study is unique in responding to different physical conditions on each campus as well as to the presence and input of different personnel, from campus operations staff to student activists to administration. Where the top leadership is supportive, most notably at Berkeley, implementation could conform to the Senate resolution timeline; elsewhere, it is wholly uncertain.

At UC San Diego, the struggle continues. After the new Climate Protection Policy was made official, the UCSD GND mounted a campaign to get Chancellor Pradeep Khosla to commit to a 2030 decarbonization deadline. The Inside-Outside strategy swung into action, with noisy demonstrations demanding ‘Khosla Must Commit’ culminating in a high-profile event featuring UC San Diego alumnus Kim Stanley Robinson, author of the 2020 cli-fi novel *Ministry for the Future*. At that event, UCSD GND student-activists and other climate science students played the roles of Ministers for the Future of the University, arguing for decarbonization of campus operations on environmental justice grounds. In his speech that evening, Chancellor Khosla claimed that it was his “hope, dream and desire to electrify the campus by 2030” (UCSD GND, 2023). It is always helpful to have such a statement on hand, and we repeated it loudly and often, but implementation of UC San Diego decarbonization on the timeline demanded by science—i.e., a 45% reduction by 2030 from 2010 levels (IPCC, 2018)—will certainly require continued activist pressure.

The story of the UCSD GND energy systems campaign is a microcosm of the challenges of the energy transition as a whole. The scale of UC emissions is large enough to be consequential, yet its energy system is small enough to be understood in some detail. The energy demand of scientific research is commensurate with other industrial sectors. Public universities are uniquely well-positioned to spearhead the societal shift to cleaner energy: they have to adhere to transparency standards more stringent than those of private industry; they claim to respect traditions of student protest; they are answerable to ideals of the public good, and the employment protections afforded by academic tenure provide cover for fierce internal critique. Our efforts to steer the enormous ship of the UC towards true decarbonization can be understood as an exercise in prefigurative politics, a proof-of-concept process to try out different strategies, learn from successes and failures, and show the way forward for others (Yates, 2015).

Campaign #2: cutting ties with fossil finance

The UCSD GND’s finance campaign was preceded by an international student-led movement for Fossil Fuel Divestment which began in the early 2010s, calling on universities to sell their endowment and pension investments in oil and gas companies. These campaigns helped shape the sustainability discourse within higher education institutions and more broadly shifted social norms (Bergman, 2018; Grady-Benson and Sarathy, 2016; Green, 2018; Healy

and Debski, 2017). Student and staff collaborations were shown to drive success in this work (Stephens et al., 2018), which has in turn created collective efficacy among student organizers (Grady-Benson and Sarathy, 2016).

Within the UC, the push for fossil fuel divestment started in 2012 and was later followed by a systemwide faculty vote in favor of divestment. This campaign was partly won when, bowing to the sustained pressure, the Chief Investment Officer in the UC declared in 2020 before the UC Regents that he was “derisking” by selling most investments in fossil extraction companies (Supplementary 6). For the UCSD GND, the demand to Cut Ties with Fossil Finance now meant ridding the campus of banks with fossil fuel connections, dissociating the ties between the fossil fuel industry and academia, and implementing transparency policies about those relationships. We now discuss these in turn.

Retail and commercial banking

Following the divestment campaigns focused on university endowments and pensions, activists nationwide turned their attention to the financial ties that institutions have to the fossil fuel industry through the banks they use (Stop The Money Pipeline, 2024). The rationale is that banks enable the climate crisis by provide enormous financing to corporations to expand their coal, oil, and gas operations, which is incompatible with the curtailing of greenhouse gas emissions. Institutions could respond by cutting their ties with the worst-offending banks.

Inspired by this, the UCSD GND investigated which banks have a presence on its local campus and who the wider 10 campus UC banks with. We found that, in most instances, the UC has ties to banks that are heavily implicated in financing fossil fuel extraction, as documented in the yearly report *Banking on Climate Chaos* (Rainforest Action Network, 2023). These banking relationships can be divided into two categories: retail and commercial banking. Retail banking refers to the on-campus branches and local ATMs of specific banks, while commercial banking refers to the large banks used by institutions such as the UC. These two categories will be discussed separately below.

In late 2020, the UCSD GND developed a “Chase It Out” campaign that focused on the retail presence of Chase Bank in the student center on campus. Specifically, JP Morgan Chase has financed fossil fuel extraction—including tar sands oil, off-shore drilling, and fossil gas shipping terminals—by \$430 billion from 2016 to 2023 (Rainforest Action Network, 2023). By allowing Chase Bank to rent space on campus, UC San Diego was indirectly approving of the bank and its business practices and supplying a customer base. With between 10 and 20 people, we held small weekly protests for 7 weeks straight, in front of the branch to educate the campus community through flyers, speeches and chants, and to encourage passersby to shift their banking from Chase to a credit union (which typically has much less exposure to the fossil fuel industry). The recurring nature of these events enabled interested passersby to join the protests in subsequent weeks. As with the energy systems campaign, these protests (the Outside strategy) were coupled with an Inside strategy. In this case, we raised our concerns with a member of the administration, who, it turned out, was already interested in local credit unions, on the grounds that they invest more in local institutions than Chase does. That existing motivation, combined with our disruptive pressure (which was covered by the Washington Post,

Mufson and Grandoni, 2020), led to the termination of the Chase lease. In August 2022, a campus-wide email announced the new partnership with the University Credit Union, and the branch opened in September (UC San Diego, 2023).

The commercial banking issue, by contrast, must be directed at the 10 campus system where the banking relationships are set. In 2020 our faculty allies in the 10 campus academic senate—with a push from activists—succeeded in encouraging the head of the faculty senate to pass the following memo to the Chief Financial Officer of the UC system, who oversees a vast approximately \$50 billion yearly budget:

“The three major commercial banks that UC uses are Bank of America, Wells Fargo and Union ... These three banks have in the three years since the Paris accords, lent about half a trillion dollars to fossil fuel companies, enabling them to keep us on a path that is destroying the biosphere ... They have also failed to adopt responsible criteria for financing (or not) the extraction of coal, tar sands, arctic oil, and other carbon deposits which must remain in the ground if the goals of the Paris accords are to be met ... We respectfully request that UC’s Chief Financial Officer issues a Request for Proposals for commercial banking services that includes a meaningful criterion of adherence to ESG.” (Bhavnani, 2020)

The CFO and his key staff in the Finance Department at the UC Office of the President eventually responded to the memo and were willing to meet with activists. However, changing UC’s banks is difficult when the institution’s banking interests are so vast. For example, some hospital acquisitions and construction projects require financing in excess of a billion dollars; which few banking entities other than the big banks (with their fossil fuel entanglements) have the capacity to do. We responded by pointing out the strategy of advisors within the Finance group at the University of Cambridge who are finding ways to split off some financial relationships (cash and money market funds), something that has been endorsed by dozens of other UK universities and colleges (Banking Engagement Forum, 2024). With this information, we are now facilitating meetings between the CFO’s of the UC and Cambridge.

Fossil fuel industry (and investor-owned utility) funded research

There is growing concern in the climate movement about how fossil fuel companies build relationships with universities through donations and research partnerships. This allows the industry to use campus resources to conduct research and development (with engineers, scientists and economists), recruit a talented workforce from alumni, influence policymakers and the public, and greenwash their reputation through association with prestigious universities (Franta, 2021; Hiltner et al., 2024; Sneath, 2024; Westervelt, 2023). A recent high profile publication clearly showed how the research produced by such academic/fossil-fuel partnerships serves the interests of the funder: it distorts what questions are asked, what answers are found, and which policies are adopted (Almond et al., 2022).

One of the most telling examples of industry-sponsored research is MIT’s 2011 “The Future of Natural Gas” report (MIT Energy Initiative, 2011) developed by MIT’s Energy Initiative which has received \$450 million in funding from fossil fuel companies. The report’s favorable portrayal of natural gas (methane), with no conflict of interest disclaimer, led the Obama Administration to adopt a

pro-fracking energy policy (Obama Whitehouse, 2012) and to appoint the Chair of the research study, Ernest Moniz, as US Secretary of Energy in 2013. This surely contributed, along with other factors, to the subsequent boom in fracking which made the US the world’s leading producer and near-leading exporter of fossil gas by 2024 (US Energy Information Administration, 2024).

In response to these profound concerns about the academic/fossil-fuel partnership, an international movement has emerged—which the UCSD GND joined in 2023—calling on universities to dissociate. In our organization, we tackled this issue through research, op-ed writing, protest, and social media campaigns. We submitted public records requests, produced a database of grant funding, and built a network-map of fossil fuel influence on campus. Over about 10 years, UC San Diego has received \$103 million from the fossil fuel industry for research, of which \$95 million funded environmental research (Figure 3). The two largest contributors were for-profit, investor-owned utility companies: Southern California Edison and Pacific Gas and Electric.

The UCSD GND also went further by investigating two specific research relationships that seemed to be a conflict of interest: one at the Scripps Institution of Oceanography (UC San Diego’s marine, earth, and climate sciences department) and another at the Global Policy and Strategy School. Our work resulted in an op-ed that was published by local press (Cooper et al., 2021), and inspired environmental justice advocates in the city of San Diego to file a lawsuit alleging that investigators at UC San Diego’s Global Policy and Strategy School were engaged in a conflict of interest (McDonald, 2023). Our scope has since expanded to reveal fossil fuel industry influences on the wider 10 campus UC system (Cooper, 2023; UCSD GND, 2024).

We also built awareness through tried and true methods of direct action using the strategy of narrative intervention, i.e., to disrupt the status quo narrative that is at odds with our vision of ethical research. This included handing out fliers at a career fair (where fossil fuel industry recruiters were present) about only taking internships at ethical companies. We also passed out “Climate Bingo” sheets which featured real vs. fake climate solutions at a talk featuring a fossil-fuel-funded climate policy professor. And we engaged in traditional street protest, for example holding a rally during the “Triton Leadership Conference” hosted at Birch Aquarium on the Scripps Institution of Oceanography campus—calling out their hypocrisy for presenting an environmentally friendly image while taking money from the fossil fuel industry. We also responded to an appearance of an ExxonMobil recruiter on campus with a protest rally co-hosted with other student groups focused on broader corporate ties and militarism.

To date, a handful of universities such as VU Amsterdam and University of Toronto’s Environment School have committed, to varying degrees, to dissociating (i.e., ending financial and research relationships) with fossil fuel companies (Bonette, 2022; HOP, 2023) but UC San Diego and the wider UC are still resistant to the idea. Our campaign continues through an intersectional coalition pushing for ethical research of all kinds—calling into question the role of fossil fuels, weapons manufacturers, military and surveillance companies on campus.

The Inside Strategy establishes a transparency policy

A different aspect of cutting ties between fossil fuel interests and the university is to focus on making the industry-academic

partnerships institutionally transparent. Using the Inside strategy, we took this up in 2021 via the UCSD Academic Senate CCCC.

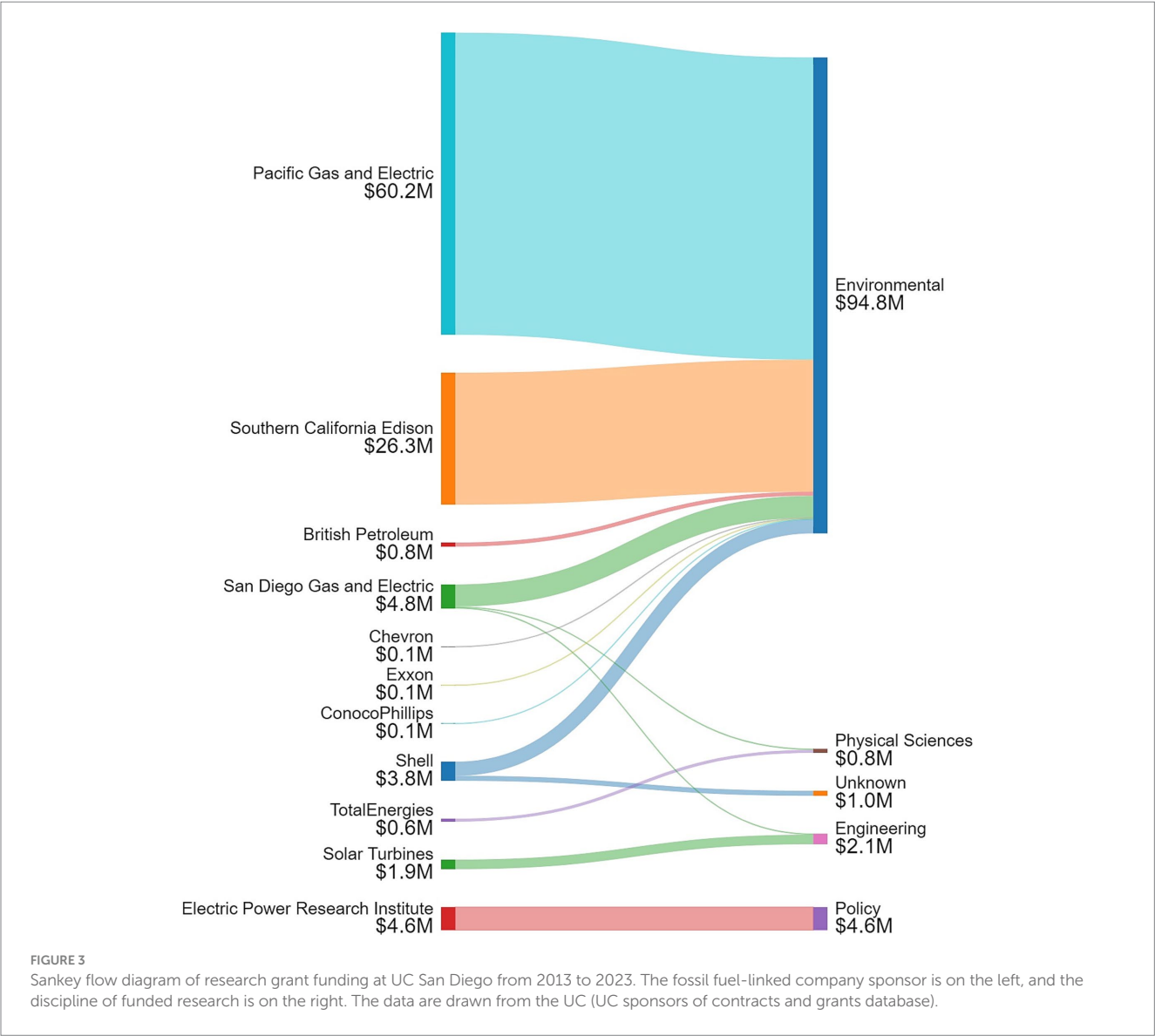
Given the similarities between the tobacco industry’s misinformation campaigns and the strategy of fossil fuel companies, the committee members initially thought to propose a fossil-fuel version of UC Regents Policy 2,309, which demands *special review* of tobacco funding proposals (Board of Regents, 2007). Yet as this idea was socialized with various UCSD academic senate committees, a less stringent policy was suggested—one that requires publicly disclosing fossil-fuel funding in all climate-related research products. But even this weaker disclosure policy ran into fierce opposition from industry-funded climate researchers. Then, in the hope of garnering more widespread support, the UCSD Academic Senate CCCC rewrote it to include all funding sources, rather than restricting it to fossil fuel industry money. Some thought that this weakened the proposal, but others judged it to be a strength, allowing the fossil fuel funding issue to find common cause with other conflict-of-interest concerns, such as the role of big-tech companies in funding academic research (Jamali and Hughes, 2024).

After 3 years of work with all the relevant committees, the final version was put to a vote of the Academic Senate in April 2024, where it passed by a large majority (UCSD Academic Senate, 2024):

All externally-sponsored research projects shall be disclosed yearly in a publicly accessible database. The project sponsor, project title, amount of funding, and the name of the principal investigators will all be disclosed and the registry maintained by the campus.

All academic units of the university (e.g., schools, departments, centers, institutes) shall publicly disclose all gifts of \$10,000 or more and restrictions on those gifts. These donations should be listed at least yearly.

And we exhort university researchers to adopt the norm of explicitly disclosing the financial and non-financial relationships that obtain between the funder and researcher in all public communications regarding their research (e.g., articles, websites,



presentations) in contexts where they reasonably can be taken to be speaking as a university expert.

As this was focused on simple transparency, this version of the policy was intuitive to biomedical researchers, who already have to disclose funding sources because of the obvious potential for conflict of interest issues with the pharmaceutical industry (Schwartz et al., 2008). While this effort is an important win for transparency, which could spread to other schools, it does not, in itself, obligate the university administration to implement a disclosure policy for fossil-fuel funding. Getting it implemented will require further pushing by the UCSD Academic Senate CCCC and activists. Moreover, our greater ambition is not merely disclosure but instead dissociation between research and fossil fuel interests, which will require further action.

Campaign #3: education for all

One of the original demands of the UCSD GND from September 2019 was “Teach the climate crisis and climate justice.” We saw that current offerings in the curriculum were inadequate and that a dramatic up-scaling of climate-related education was needed to reach around 35,000 undergraduates (for similar campaigns at other schools see Huq et al., 2023; Kinol et al., 2023; Stephens, 2024). The Task Force On Climate Crisis Report argued that climate crisis teaching must go beyond simply teaching about the physical science basis of global heating by also covering both “... psycho-socio-political topics, for example the more than 40 year history of how the fossil fuel industry has systematically distorted the science, misled the public and influenced the political system; and ... the topic of climate justice” (Aron et al., 2020).

For us, climate justice has several different meanings, referring for example to the fact that those who have done the least to generate emissions (the poor, the vulnerable, many of those in the global south) will suffer the greatest impacts and have the least means to adapt. It also refers to the ability to identify problematic technical and market fixes, such as carbon offsets, carbon capture, and hydrogen blending. Above all it stands for the recognition, as one prominent climate justice advocate put it: “[that] the continuing disruption of the earth’s climate system is not a technical problem to be ‘solved,’ but rather a systemic problem, rooted deeply in social and economic structures” (Tokar, 2010).

The Task Force on Climate Crisis Report envisioned three ways that climate education could be broadened, in decreasing order of commitment/difficulty. First, a *multidisciplinary approach* in which new courses were developed to cover the climate crisis (from physical science to renewable energy, from ethics to society). Second, a *within-discipline approach*, for example, where a biology professor creates a new course in biology to cover several or many aspects of the topic. Third, a *teaching-through-the-curriculum approach* where climate topics are sprinkled through an existing class (Aron, 2023).

As was explained above in the Inside-Outside Strategy section, the UCSD GND were able to have these concerns addressed in the Task Force Report which was approved by the Academic Senate. In early 2021, the UCSD Academic Senate CCCC took up the education requirement issue by convening a brainstorming session with major stakeholders including UC San Diego Provosts, Deans and activists

(Committee on Campus Climate Change, 2021). With buy-in from all, the Academic Senate then formed a workgroup to figure out how to implement a General Education requirement. The workgroup completed its report in 2023 (Teranes et al., 2023), and the General Education requirement was announced by the administration, to begin Fall 2024 (Campus Notice, 2023). As established in Senate Regulation 600.H:

“A knowledge of climate change is required of all candidates for a Bachelor’s degree who begin their studies at UC San Diego in lower-division standing in Fall 2024 or thereafter.”

This regulation makes UC San Diego one of the first major universities in the world to ensure that every student will take at least one class on climate. In selecting criteria for the classes, the workgroup identified four features: Scientific Underpinnings, Humanistic and Social Dimensions, Climate Solutions, and Project-Based Learning. Each class has to devote at least 30% of its syllabus to climate change, and to substantively cover at least two of the four areas, allowing for a range of approaches. There is now a standing committee of the Academic Senate whose task it is to review syllabi, which are required to be annotated by the instructor to explain how the criteria are met. Some of the submitted syllabi were developed explicitly in response to the new requirement; in other cases, the effect is to drive enrollment in classes already being taught. The first round of applications attracted 40 submissions, fairly evenly distributed among social and natural sciences and arts and humanities. A handful of the applications were sent back for further refinement and clarification.

The Academic Senate committee engaged in debate as to whether the requirement should insist on climate justice as the focus, in order that students did not come away with the impression that climate change can be solved by purely technical or scientific means. In the end, the taskforce decided to cast a wide net to encourage pedagogical autonomy since there are many kinds of climate expertise at UCSD and no strong justification for narrowing the focus. It remains to be seen if the political dimensions are adequately addressed through the requirement. If not, its terms can be revisited after the first five-year trial period.

Our hope, in our capacity as the activists who originated the requirement, is that a community of practice grows around the requirement, with faculty learning from one another, leading to integration of the social aspects in even the most STEM-focused courses. This community could address the need to provide emotional support and collective-action -opportunities for students to cope with their distress about climate breakdown (Schwartz et al., 2022; Stein et al., 2023). We also would like the requirement to engage students in a critical assessment of the relationship between economic growth and ecological destruction. Under current growth forecasts, renewable power will be an addition to the fossil fuel economy instead of a replacement for it (Hickel, 2020). Overall, our goal is to make sure that students grasp the scientific underpinnings as well as the big economic, social, and political picture, and our hope is that they leave UCSD feeling empowered to take action.

Of all the campaigns, this one was a relatively straightforward undertaking. Unlike infrastructure, financial and transparency matters, teaching at the UC is largely under faculty control, and so the Academic Senate was able to get this implemented at our campus without too much difficulty (and also because it was able to follow the

model of an existing General Education requirement for Diversity, Equity and Inclusion on our campus). Our allies at other campuses are now hoping to make it a requirement of the whole UC system.

Discussion

Over a 5 year period, the work of the UCSD GND resulted in many changes to university policy and practices. At the 10-campus level, it ended the reliance on carbon offsets and created the pressure for \$13 million to be spent on electrification planning. At UC San Diego, it helped to rid the campus of Chase retail banking, secure a Climate Change General Education requirement for all undergraduates, elevate concern about fossil fuel industry-academic partnerships, and secure a funding-disclosure resolution. In doing these things, this social movement also built the 10-campus UC GND Coalition. We now discuss several implications, including how this work might alter people's efficacy beliefs, the pedagogical value of training students in organizing tactics, and the impact of our efforts on activists at other universities. We conclude with a discussion of which aspects of our strategy were effective, and also some shortcomings and corrections, before looking briefly to the future.

Our impact on people's efficacy beliefs, other campuses, and wider student organizing

As we noted in the Introduction, there are many reasons why the energy and societal transition is mostly occurring at too small a scale and at too slow a pace. One of these reasons is that too few people join social mobilizations of activism/advocacy, even as those mobilizations remain absolutely critical with the inadequacies of international negotiations and the frequent stalling at national, regional and institutional levels (Stechemesser et al., 2024; Stoddard et al., 2021). In a recent survey of over 9,000 academics, a commonly reported intellectual barrier to considering whether to engage in activism/advocacy was "lack of efficacy beliefs" while two common practical barriers to actually getting engaged were "Lack of skills" and "No advocate in inner circle" (Dablander et al., 2024). The UCSD GND is a highly relevant example of how to overcome these barriers to collective action by starting an on-campus movement. Our wins show how a small group can change the trajectory of a very large institution to act on the climate crisis.

While starting a local campus group can help boost people's efficacy beliefs and also their practical skills, there is another important barrier to acting on the climate crisis, which is that it represents a *global* heating problem. Unlike many struggles for rights and against repression, which are often waged locally for local changes, those who enter this struggle need to believe it is worth their time and effort to engage in something which requires a global response (McAdam, 2017). While some may engage out of a profound commitment to climate justice, or to be on the right side of history regardless of success, or will act out of intergenerational self-preservation, others need evidence that local change is *worth* doing for bigger reasons. One such bigger reason is that struggling and winning locally helps create a *dynamic social norm*, i.e., it normalizes the struggle that needs to happen in many institutions and places and makes it grow (Constantino et al., 2022). Indeed, higher education in the US is a great target for local efforts to cascade much

more broadly since most of the large campuses still burn fossil gas, such as Harvard, Yale and Princeton (Huising and Aron, 2023; Lewis, 2021; Sustainability at Princeton, 2024) and some, like UNC Chapel Hill, still burn coal (No Coal UNC, 2020).

In order to assess the wider impact of our struggle, we sent out a short survey to a dozen or more schools in the US and abroad at which we'd had prior contact. For each of (a) carbon offsets, (b) campus decarbonization, (c) cutting ties with fossil finance, and (d) climate education for all, we asked how much impact our struggle in the UC had on their university. The results are shown in Table 2. Several universities such as Cornell and Northwestern credited us substantially in their struggle for campus decarbonization, while others such as Trinity College Dublin and Leiden University in the Netherlands credited us in their Climate Education for All Campaigns. Of particular note was a comment attesting to the importance of peer pressure: "Several ... deans have told us that the best evidence we can give them to persuade them to take climate action is peer pressure. They want to know if other universities are doing it. Your successes at UC have considerable impact by setting a public example of a much higher bar for university climate action, and ramping up the peer pressure."

In addition, our campus decarbonization campaign was used as a model campaign for the Sunrise Project's Climate Finance Fellowship's training retreat, and our messaging of "Decarbonize, Divest, Dissociate" was adopted by "Reclaim Earth Day" in 2024, in which 100 schools participated.

One of our potentially largest influences was to defeat the use of carbon offsets in the UC climate action policy—as exemplified by the above-mentioned article in the *MIT Technology Review* entitled "The University of California dropped carbon offsets—and thinks you should too" (Temple, 2023). While it is difficult for activists to measure the wider impact of something like this, it's possible, given the UC's role as a climate leader, that this news spread through wider academia and helped shift several large schools to drop their reliance on offsets. Every institution that abandons offsets hastens their inevitable and necessary delegitimization (Dyke et al., 2024).

Another important outcome of the UCSD GND's on-campus organizing was the training of dozens of students (and, in lesser numbers, staff and faculty) in activism, organizing and leadership. This included providing many opportunities for skills development in policy, writing, presenting, speaking, social-media, graphics, coalition-building, and with developing tactics, strategy and direct action such as protests. Those experiences have seen our students enter spaces where they represented the entire student body of the UC system, and also appeared in front of the Board of Regents, local legislators, and the U.S. Congress. Several have moved into careers within environmental policy, community organizing and journalism. As the climate crisis accelerates, as economic inequality and political polarization grow, our towns and cities will become increasingly brittle with impacts on housing (Trapasso, 2024), insurance (Aronoff, 2023), and migration (Lustgarten, 2024). Experienced activists will be critical for defending and transitioning our societies with responses that center local community empowerment.

Effective strategy, shortcomings, and corrections

One of the most effective features of our approach was a two-track Inside-Outside strategy. Other social movements have found this

TABLE 2 The wider impact of our struggle in higher education.

University	How much impact did our wins in the UC have on your struggle for:			
	Ending Carbon Offsets	Winning Decarbonization Plans	Cutting Ties With Fossil Finance	Climate Education for All
Trinity College, Dublin	None. We were not aware of the GND at UC's efforts on this—there is a growing general awareness that offsets are [woeful] and thankfully our Sustainability Strategy only mentions these as a “last resort” so we will refer to your actions in future discussions.	A little. Irish universities do not have their own power plants—but we have referred to the decarbonization actions of GND at UC as exemplary in the kinds of successful actions happening at a grassroots level. A promising development is that new and recently renovated buildings in Trinity have been fitted with a geothermal energy source.	A little. Trinity committed to divesting from fossil finance some years ago. It is unclear if this has been fully achieved. Trinity banks with Barclay's (among others), one of the largest financiers of the Fossil Fuels industry. Will pick this back up this year and will draw inspiration from GND at UC.	Substantial. Our biggest advocacy focus has been on introducing mandatory education on the climate and biodiversity crisis across all undergraduate programs. A course was established covering planetary boundaries, a sustainable existence, climate justice, systems thinking, and transformative action for change has been developed. It will be mandatory for all students taking degrees in the Business School in 24/25. We hope such requirements will expand to more programs in 25/26.
Stanford	None. Stanford claims to run its campus mainly on renewable electricity. Our struggle is primarily focused on dissociating from fossil fuel companies.	None.	A little. Wins at Princeton and several Dutch universities have been most useful, because they relate directly to our struggle	None.
Cornell	Substantial. Your success in exposing carbon offsets as an unacceptable false solution came just as Cornell on Fire's work was getting launched. Your talk was heard by multiple Cornell engineers and Sustainability staff involved in the energy transition. It was also an important source cited in our movement demands and investigative research, lending credibility and peer pressure to our calls on Cornell to reject carbon offsets and the broader notion of “carbon neutrality.”	Substantial. Your success in this campaign has national-headline-level impact, and puts a stake in the ground for other universities to follow suit. We would like to cite your work more directly in our ongoing campaign related to Cornell's power plant,	A little. Your success on this campaign has not influenced our work as directly as the first two campaigns as Cornell on Fire has so far devoted more time to campaigns and research focused on decarbonization and climate action plans. But fossil free research and dissociation are integral to our Demands platform and we need to educate ourselves on what you accomplished.	Substantial. We were inspired your communication announcing this win and the steps you took to get there. We are working on mobilizing Cornell's climate curriculum and hope to continue drawing on your success and insights. We note that several Cornell deans have told us that the best evidence we can give them to persuade them to take climate action is peer pressure. They want to know if other universities are doing it. Your successes at UC have considerable impact by setting a public example of a much higher bar for university climate action, and ramping up the peer pressure.
Leiden University	Substantial. We were inspired to launch a university-wide petition, with >1,200 signatures, calling for more ambitious climate action. Reduction rather than offsets was a key part of our demand.	None. Dutch universities are mostly already working on buildings and energy, so we felt our focus should lie in areas with greater room for improvement (flying, fossil ties, education). We also mostly do not generate our own energy, except with solar panels.	A little. With Scientists4Future NL, we sent a letter to all Dutch universities to start banking sustainably. Currently, we are discussing with the two green banks in NL and several university managements whether the financial products needed can be offered by green banks.	A little. This has been taken up by Scientist Rebellion, under the campaign name ‘Elephant in the Lecture Hall’.

(Continued)

TABLE 2 (Continued)

University	How much impact did our wins in the UC have on your struggle for:			
	Ending Carbon Offsets	Winning Decarbonization Plans	Cutting Ties With Fossil Finance	Climate Education for All
Northwestern	Substantial. Inspired by your example we organized to gain knowledge of fossil-fuel use on campus and future planning to decrease it. A subcommittee prepared formal requests for transparency on these and related sustainability issues from the university, and that request was then taken up and passed by the faculty senate.	Substantial. We also held group meetings to develop an understanding of what changes are possible, learning from faculty who already had expertise in these areas. We explored parking-lot solar, green roofs, deep lake water cooling, district energy, compressed air energy storage, and other electrification steps. We have been gathering information about decisions related to our co-gen utility plant and university plans. We also realize that electrification will also require cleaner energy from Illinois energy companies in tandem with a greener plan at Northwestern.	A little.	A little.
University of Witwatersrand	Substantial. It inspired us to galvanise a group of concerned academics to put more pressure on our institution. We have seen some significant movement from management in response.	A little. Haven't yet looked at details of UCSD wins.	None. We have been more concerned with campus energy and water use than with divestment.	None. While we now have climate education for all at Wits, this was developed independently.

In August 2024 we sent out a survey to about a dozen universities where we had made presentations or with whom we'd been in contact. We asked respondents to indicate the level of impact our four campaigns had on a three-point scale (None, A little, Substantial), and also to write out any comments. We received responses from six universities. We intend these data as an anecdotal rather than scientific/generalizable picture of our influence and the wider issues encountered by other schools. All participants gave assent under a UCSD IRB Exempt Protocol to the senior author, #809500.

two-prong approach to be a source of tension; for us, it was a strength. For example, in the mid-1990s, ACT UP, the AIDS Coalition To Unleash Power, split bitterly into two (Specter, 2021). On the one side were the vanguardists who wanted to push for systemic change to the American medical system; on the other side were the reformists who preferred to discuss virology with public health officials. The two sides could not agree on goals or tactics, and eventually the more reformist faction left ACT UP to form the Treatment Action Group. The UCSD GND was founded with two corresponding sides in place from the start: on the one hand, an activist organization made up of students, faculty and staff and on the other, senate faculty members who subsequently ushered in an Academic Senate committee. Whenever the administration felt the moral pressure of student demonstrations, the UCSD Academic Senate CCCC was ready to propose an institutional reform, and the combination proved to be a powerful force. The activists also worked effectively with other inside-players including within the local and systemwide administration (including some sustainability officers), faculty senates and other bodies throughout the 10 campuses. At times, we engaged in effective coalition-building, as when we got UC unions representing over 50,000 workers to support our 2020 Energy System Petition that kicked off the decarbonization campaign.

Looking back, if we could do anything differently, we would have centered training programs for activism, organizing and leadership in the core of our mission. We instead took the approach of creating opportunities by *doing*. While this worked very well for some people, many others left us after one or two meetings, because they could not

see what to do, how to do it, or perhaps why it mattered. In brief, it was difficult for us to develop the internal capacity to draw new people into a team and equip them with the relevant skills on the front-end. The 10 campus organizing effort was even more challenging in terms of recruiting and retaining student activists, partly because of the lack of the hyper-local context and the accompanying opportunities for social interaction. Going forward, we intend to center the “Act-Recruit-Train” cycle in the trajectory of every campaign in order to help build capacity.

Beyond this, we suggest these practical recommendations for a university grassroots climate movement:

- Find experienced organizers on your campus and then build a group of committed individuals inclusive of undergraduate students, graduate students, staff, faculty, and possibly alumni and retirees
- Undertake research about (a) the state of climate action at your university (maintaining a skeptical eye about institutional “sustainability” and other claims until you have the full picture), (b) the key allies and holders of power so you know who to focus your campaigns on, and (c) your spectrum of possible allies so you can focus on broadening your base of support.
- Learn to play the Inside-Outside game, by identifying, meeting with and nurturing your institutional allies (especially faculty and students on key committees, and sometimes administration insiders), and, at the same time, launch highly visible and even

disruptive rallies, protests, and other public-facing campaigns that draw attention to the injustice, grow your movement and embarrass the administration with its inaction.

Conclusion

Our small group was able to fundamentally reorient the climate policy of a very large institution, train or involve dozens of students in activism, and increase belief in the efficacy of local action. Our efforts were also an inspiration to the struggles to decarbonize, divest, dissociate, and teach at other universities in the US and worldwide, and, more generally, showed how the university can be a site for new thinking and action in the climate emergency (Gardner et al., 2021; Humphreys, 2019). But for all we achieved in the way of policy changes, the UC still powers its campuses with fracked methane, takes industry money, and uses banks that support the fossil-fuel industry. Without continued pressure, it will certainly delay enacting many of the commitments that we pushed it to make. In order that our work does not end up buried in the UC's vast graveyard of unmet sustainability targets, short-lived environmental initiatives, and unenacted climate policies, we will have to keep focusing on implementation and accountability. The struggle continues!

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Written informed consent was obtained from the individual(s) for the publication of any identifiable images or data included in this article.

Author contributions

MN: Writing – original draft, Writing – review & editing. CG: Writing – original draft, Writing – review & editing. AC:

Writing – original draft, Writing – review & editing. VT: Writing – original draft, Writing – review & editing. AA: Conceptualization, Data curation, Project administration, Validation, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/feduc.2025.1491439/full#supplementary-material>

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