NORRAG SPECIAL ISSUE 07

Education in Times of Climate Change

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Network for international policies and cooperation in education and training
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NORRAG Special issue (NSI) is an open-source periodical. It seeks to give prominence to authors from different countries and with diverse perspectives. Each issue is dedicated to a special topic of global education policy and international cooperation in education. NSI includes a number of concise articles from diverse perspectives and actors with the aim to bridge the gap between theory and practice as well as advocacy and policy in international education development. The content and perspectives presented in the articles are those of the individual authors and do not represent views of any of these organizations. In addition, note that throughout the issue, the style of English (British, American), may vary to respect the original language of the submitted articles.

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Education in Times of Climate Change

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Foreword

The long and deep historical engagement with the environment in education has gained increasing attention recently, due to recognition of the contemporary climate emergency and its effects on people and societies, and therefore on education; whether in basic education or further and higher education, formal or informal learning, for children, youth or adults.

Climate and development actors frame education as a key contributor to overcoming what is increasingly framed as a climate crisis; in the Paris Agreement (UNFCCC, 2015), as well as in SDGs 13 and 12 (UNGA, 2015). At the COP 26 UN Climate Change Conference, at least 17 events addressed climate change and education. As recognised in the Berlin Declaration on Education for Sustainable Development (UNESCO, 2021) education is central not only to achieving SDG 4, but also as an anchor of all other SDGs. SDG 4.7 underlines the commitment of educators to contribute to building sustainable and just futures. Most importantly, young people care, and are reclaiming agency in building their own futures; as shown by school strikes, legal challenges to governments, and online and offline climate activism.

And yet, UNESCO-IBE's (2021) review of 100 countries' national curriculum frameworks revealed that nearly half (47 per cent) made no reference to climate change. Moreover, 95 per cent of teachers believe that it is important or very important to teach about climate change (UNESCO and Education International, 2021), but only 55 per cent of teachers had received training. This resulted in less than 40 percent of teacher respondents feeling confident in teaching the cognitive dimensions of climate change (40 per cent), and only 20 per cent feeling confident in how to teach for positive action (20 per cent). Nevertheless, decades of rigorous research has shown that education "about" environmental and social issues is not enough (Kwauk and Iyengar, 2021).

How then, should education address the global challenge of climate change? How can we best support children, youth and adult learners to address what Michael Mann identified as the new tactics of climate denial: deflection, division, doomism and delay. How are we to address the wider question of transforming the structures and functions of education systems to address these challenges? How are educational institutions responding to climate change in their buildings, meals, gardens, transport and more? How can education support the building of social and economic systems for sustainable futures, without losing sight of its educational mission and purpose?

Education's role in the climate crisis is to address the immediate emergency, and also extends to long term, holistic views of systems transformation; empowering local communities for adaptive and mitigation action. Rigorous research exists that examines how education can contribute to students' future building; indeed, education is seen as being key to making that happen. Education provides ways to conceptualise futures; to recreate, transgress and transform imperfect presents by engaging learners in defining and meeting the needs of a future that they are reimagining (Dryden-Peterson, 2022).

At the same time, recognition has grown that it is not possible to address environmental challenges without taking social issues into account: the most marginalized are the most vulnerable to changes in climate at the same time as they are least responsible (what Fussel (2010) calls the double injustice of climate change). In addition, a triple injustice is visited on the same marginalised people when purely environmental protection policies cause them additional vulnerabilities (Cook, Smith and Utting, 2012). Education in times of climate change as described in the pages of this NORRAG Special Issue (NSI) does not fall into this trap. Instead, the contributors chart a course for educators (with their learners, institutions and society more broadly) to build towards more sustainable – and just – futures.

In this NORRAG Special Issue, Heila Lotz-Sisitka and Eureta Rosenberg have skilfully curated 28 contributions from 75 authors in 22 countries that showcase what is currently being done to close the gap between the potential of education to contribute to more a sustainable and just world and the experiences of those in education. Part 1 draws lessons across disciplines, issues and contexts. Part 2 addresses ways in which we can expand learning and agency across boundaries from three different continents. Part 3 goes beyond formal schooling to offer lessons in building transformative learning, activism and relations. Part 4 leads the reader past western, rational, techno-scientific ways of knowing to engage diverse knowledges in climate change responses. Parts 5-8 offer a range of perspectives on active engagement with and responsiveness to different learners and demographics for

sustainability and justice. Parts 5 and 6 challenge the reader to listen to and engage with young people and children's views and voices in climate action. Part 7 focuses on higher education responses and Part 8 concludes the NSI by considering other places and spaces relevant to education for sustainable and just futures.

All contributions emphasise the need for the transformation and transgression of current practices, policies and planning; for teaching practices to incorporate more participatory or *ubuntu* methods; for curricula to provide more integrated concepts of society, environment and economics – notions that have never been conceptually or practically separate in many Indigenous knowledge systems. As Radhika Iyengar said, quoting a protest sign, education for climate change without a focus on justice is just gardening.

NORRAG Special Issue was launched in 2018 with the ambition to be an open-source periodical giving prominence to authors from a variety of countries and with diverse perspectives. In line with NORRAG's strategy, and seeking to bridge the gap between theory and practice, each issue focuses on current debates that frame global education policy and international cooperation in education. The first NSI was on the Right to Education Movements and Policies: Promises and Realities, the second edition on Data Collection and Evidence Building to Support Education in Emergencies, the third edition focused on Global Monitoring of National Educational Development: Coercive or Constructive?, the fourth edition examined New Philanthropy and the Disruption of Global Education, NSI 05 addressed Domestic Financing: Tax and Education, and the most recent, NSI 06 considered States of Emergency: Education in the Time of COVID-19.

Moira V. Faul
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Education in Times of Climate Change

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Setting the Scene

As far back as 1992, at the very first Intergovernmental Conference on Environment and Development held in Rio de Janeiro, Brazil, the UN Framework Convention on Climate Change (UNFCCC) was adopted. It stipulated that parties should regularly meet to address climate change, specifically at the Conference of Parties (COP). In 2021, governments, scientists and policy advisers gathered at COP26 in Glasgow, UK. Here, the Education and Environment Ministers of the world recognised "the critical role played by education and learning in the transition towards a climate positive future and the urgency of embedding climate considerations into all levels of education". They agreed "to collaborate and invest in education for a sustainable future". Their statement entitled "Learn for the Planet, Act for the Climate" is worth considering in some detail:

> *"Recalling Article 6 of the UNFCCC and Article 12 of the Paris Agreement, we welcome the adoption of the Berlin Declaration on Education for Sustainable Development as well as the Catania Declaration of G20 Ministers of Education that emphasise the importance of education to address the climate crisis and promote sustainability and the new COP26 work programme on Action for Climate Empowerment. We celebrate the organisation of the Youth4Climate event in Milan, Italy, as part of the Pre-COP, and the Mock COP26 conference in 2020 underlining youth voices and activism in the face of the climate emergency*
>
> *We welcome the progress made in recent years to mobilise education to address climate change. However, we recognise the large remaining gaps in providing everyone with knowledge, skills, values and attitudes needed to effectively participate in the transition towards climate positive societies. Recognising that climate change and extreme weather already impact the education system in developing countries, undermining children and teachers' safety, and access to basic education."*

Beyond and sometimes in response to the slow pace and limited visible impact of formal intergovernmental engagements, civil society and, particularly, the youth around the world have called for stronger and more direct action to tackle the deep-seated development practices contributing to anthropogenic climate change, which is captured in the call on many protest banners, for "Systems Change, not Climate Change".

With the case for climate change education already being made, this special issue of NORRAG addresses the question of how education can equip learners to participate in climate action that would fundamentally change problematic systems. Just how this is to be done in the context of education at all levels and in all societal contexts as learning spreads beyond the traditional "walls" in response to climate change challenges has not always been clear. The educators and facilitators of learning and the learners themselves–who occupy diverse fields and spaces–need to share a deeper analysis of climate change education and social learning, how it is experienced and what the gaps might be. Such shared meaning-making is emerging from different geographies, political economies, ecological spheres, cultures, classroom settings, social learning contexts and more. Such an analysis needs to inform pedagogical praxis, colearning, curriculum, climate action, policy formulation, the frameworks for evaluating success, resourcing decisions and what we might consider educative acts for engaging with climate change and its multidimensional uncertainties, risks and opportunities.

The contributions of this special issue are responses to exactly this call, which went out in 2020 to help us understand the contours of education in times of climate change and what policymakers need to consider to enable the kind of educational change needed. The 28 papers in this issue give voice to young scholars, early career educationists and development practitioners, as well as internationally renowned practitioners and academics who have devoted their careers to sustainability and

educational change. The 75 authors come from 22 countries and all continents, bringing voices from the Global South and North, West and East and multidimensional vantage points that nonetheless clearly converge on the matter. These researcher-educators draw on practical experiences in more than 30 projects and programmes and on diverse scholarly and theoretical traditions. They propose new ways for educators and learners to engage in and conceptualise climate change education and learning while presenting new imaginaries for framing learning and education. Beyond calls for "more resources", they articulate what resources should be used for and why. What are young people asking for, and how should rural communities be involved? This collection of diverse works unpacks the challenges that have emerged in the past decades, brings new lenses, imaginaries and insights to them and shines a stronger, clearer and more transgressive light on the way forward.

Special Issue Themes

Papers are clustered around eight interrelated themes that, when combined, align with the recent World ESD Conference policy call from UNESCO (2021): "Transformative learning for people and the planet is a necessity for our survival and that of future generations. The time to learn and act for our planet is now".

What is distinctive, however, is that these papers each offer a unique vantage point on how such transformative learning needs to be conceptualised and established in the education system conceptualised broadly. The contributions cover various types of research, principles, sites of learning, types of learning and curricula, pedagogical innovations, teachers, children, community and young people's voices, relations, perspectives and roles while offering metaphors and examples of transformative processes. The shared argument is that transformative processes and epistemologies are needed in education, but more than that, the arguments are made via various experiments with transformative processes.

Overview Perspectives

The first theme of this NORRAG Special Issue presents some broad overview perspectives with international scholars and policy advisors Marcia McKenzie and Aaron Benavot making the case for better knowledge on the intended and implemented policies for climate change education and communication. They argue for policy research that compares approaches, conceptualisations and methods as an important leverage point for fostering climate change education. Writing from Mexico and Spain, Edgar González-Gaudiano and Pablo Meira present principles that should underlie policy for climate change education both inside and outside formal education systems, giving special attention to the role of the social and educational sciences which have, they argue, largely been silent on the matter. Christina Kwauk draws on her experience in girls' education to provide insights on education for climate justice that would tackle root drivers of the climate crisis: inequitable social structures, vested interests, and economic practices that have exceeded our ecological ceiling and social foundations; her work positions climate change education in the dialectic between such systemic structures and learner agency. From Zambia, environment and development educator Justin Lupele describes the participatory process of developing Zambia's National Climate Change Learning Strategy, putting learning at the heart of climate change policy and strategy development.

Expanding Learning and Agency Across Boundaries

The Education and Environment Ministers at COP26 recognized education as a "society wide learning process" that spans formal education, schooling, teacher education, other educational institutions and levels within these. They also committed themselves to "the integration of sustainability and climate change in professional training, public awareness and information activities, and other areas of non-formal and informal learning". The second theme of this NORRAG Special Issue suggests that transgression of the boundaries between these contexts, is also important. A case study from Finland by Annelisa Sannino and Yrjö Engeström opens the theme. Their analysis reveals the importance of research into the cultural-historical roots of sustainability issues and efforts in a particular locality and of appropriate theory and educational tools to help us understand and support the learning of city collectives as they develop agency to address their climate and sustainability challenges. The second case study of organisational learning across boundaries comes from Colombia. Here, Thomas Macintyre and his colleagues worked with an organic coffee growing collective to adopt a new governance model and process that would help them take climate issues seriously and respond appropriately to them. The third paper is a contribution of Canadian Sarah van Borek, who is living and working in South Africa, where she studied a project exemplifying a "hybrid of formal and informal learning". In recognition of the impact of colonialism into the present day, on our ability to fully understand and respond to climate injustices, knowledge keepers from the margins of mainstream society are given a central place in university and broader education programmes, which is an example of "decolonized climate change education"'.

Transformative Learning, Activism and Relations

There is common agreement on the importance of new knowledge, as contributed by scientists and others understanding climate change and its impacts. However, educational processes that only raise awareness and address the cognitive domain, focusing predominantly on a cognitive-technical understanding and the immensity

of the risk, are not adequate. In fact, problem-oriented education can have negative psychological impacts on learners (see Hoffman, 2021). Emotions are an important dimension of climate change education, given both the risk of anxiety, depression and resultant apathy among learners, and the importance of positive emotions to energise action. This is an underexplored aspect of education, and the four papers in this theme address this gap.

Art engages the emotions of both the artists and their audience and can express deeper and different understandings of climate change issues. Drawing on the arts as part of a transformative public conversation engaging diverse ways of knowing is the purpose of the Living Libraries project in Sweden. Authors Laila Mendy, Isabel Baudish and Stefania Barca highlight a range of challenges that emerge from such innovations. How to facilitate and bound these brave conversations, how to deal with the many uncertainties that arise and how to even set them up the first place are important practical, conceptual, political-ideological and relational considerations. Taryn Perreira-Kaplan and Dylan McGarry's paper starts to provide some answers to the challenges the Swedish authors highlight; they describe methodologies for empathically engaging stakeholders in sustainability conversations with policy intent, which is explored in a multiyear socioecological justice programme on the South African coastline. The importance of giving time and attention to net-work, building solidarity and relationships, becomes evident.

Also highlighting the importance of relationships is the multiauthor paper led by Elizabeth Barratt Hacking from the UK. This contribution explores why nature experiences and an exploration of humankind's kinship with the natural world should be a fundamental part of climate change education. Nature-immersive experiences are complemented with reflection that encourages learners to recognise that after all, we are one with nature, even if our thinking, technologies and actions at times lead us to forget this.

Laura Bello Benavides describes the popular educational methodology of project work and its practical application in a technical high school in Mexico. Through an exploration of global knowledge and local issues, learners choose an issue they wish to work on and collectively come up with solutions that they then try out. What is particularly innovative in this case example is that the ensuing projects are an integral part of the school curriculum–across subjects–and that disciplinary knowledge also features strongly in the search for solutions. The diverse knowledges for eco-citizenship that they put forward is both "traditional and scientific", which leads into the next theme.

Engaging Diverse Knowledges in Climate Change Response

Across the Special Issue is a commitment and concern for diversifying knowledge in climate change responses. In this theme, the authors offer interesting vantage points on this crucial question. Lurio University in rural Mozambique requires all undergraduate students to undertake a study-stay in the surrounding communities to experience the daily routine of small-scale farmers and co-construct sustainable farming knowledge with them; author Adriano Felix explores this model for its potential to improve agricultural sustainability in Sub-Saharan African under changing climate conditions. In their contribution, Du Toit, Pollard, Chikunda and Ison analyse a series of implemented climate change education interventions in Sub-Saharan Africa, from which they identify key principles to codesigning such interventions with local stakeholders; co-constructing new and locally relevant knowledge with them and bringing in flexibility. It would seem that climate change education policy cannot prescribe a blueprint or one-size-fits-all solution, but nonetheless, it needs to capture the key principles these authors identified through their years of development, research and capacity building in the field in regions desperately affected by increasingly extreme droughts and floods. Juan Carlos Sandoval Rivera and his coauthors from Mexico propose how we need to rethink the engagement between schools and communities, mobilising diverse forms of knowledge and experience in creating participatory policy for climate change education in schools.

Young People and the Call for Climate Action

As outlined above, young people are calling for climate action. In this theme, Nokuthula Daweti and fellow collaborators pierce through the conventional logics of perfunctory awareness and behavioural change objectives of climate change education. Instead, they ask for regenerative youth futures to be constituted as a response to systemic alienation from environments via years of violently disruptive colonial histories. Regenerative futures in a South African context, they argue, must be imbued with and born from within African concepts, histories, intergenerational learning(s), cognitive justice and more. Ole Andreas Kvamme and colleagues, here writing from Europe, engage with the meaning(s) for climate change education embedded in the recent school climate strikes. The message from both South Africa and Europe's young people is clear: climate change education is not just a "content issue". Their point is that the same students that are striking against a world at risk are equally embedded in it, which calls for education that is transgressive, disruptive and oriented towards the common good. In another South African context, this time in the City of Johannesburg, Coleen Vogel and a team of youth activists argue for direct voices and contributions in the formation of policy. They want to "write directly" into climate policy, showing urgency and willingness in cocreating regenerative futures among young people.

Children's Voices in Climate Action

As in the previous theme, the authors in this section provide impassioned perspectives on the urgency of taking the time to support and listen to children and, through this, letting their voice, political and ethical agency flourish. The authors all speak to children's experiences in the world, as well as their political and moral authorship and agency. They all argue that for too long, these have been silenced in education systems and approaches the world over. The authors are, however, not naïve in their call for giving children voice; instead, they are sensitively engaged in what this means. For example, Karin Sporre and Christina Ostbeck explain how to recognise children's moral authorship while avoiding moral indoctrination or falsely constituted normative guidance. Irida Tsevreni and her colleagues urge educators to halt the ongoing alienation from nature, offering simple yet powerful insights as to how children's experience of weather can open up transdisciplinary, ecocentric pathways in education. The paper by Anna James and Nanna Jordt Jørgensen argues for place-based and open-ended educational experiences for young children. They call for a "reconfiguration of educational cultures" that sensitively and with care "cultivate and affirm children's political agency".

Transforming Higher Education for Sustainable Futures

Several earlier papers in the Special Issue highlight dimensions of how schools, universities and technical institutions should prepare learners for living with climate change and participating in climate change action to slow down global warming and transition away from the systems that have led to and lock us into anthropogenic climate change and climate injustices. A clear understanding of how institutions need to change is vital for policy guidelines. However, author contributions also make it clear that policy is needed at multiple levels, and intrainstitutional policy development is as important as national guidelines and international agreements. One area of emphasis is higher education because higher education often holds power and sway in framing educational transformations in various ways.

Swedish authors John Holmberg and Johan Holmén argue for a new approach towards leadership in higher education to make new policy and practice possible; they argue that universities need stability and transformative change, which encourage leaders to engage in both a "cruise" and "expedition" mode to explore transformations to the entire system: the university and its multiple stakeholders including industry, as well as its own campus management and sustainability practices, a point that is relevant to all education institutions in transitions to climate resilience. Luciana Brandii and colleagues from Brazil point to the importance of adopting diverse strategies in making these transitions, highlighting that where policy is not conducive for making transformations in response to climate change, communities of practice with a shared interest across institutions can "make a start", which can lead in climate change education transformations. In other contexts, such as West Bengal in India, more enabling national policy provides direction for catalysing innovations. Collectively, the authors in this section of the Special Issue point out that leadership, practice and policy can all be mobilised in driving educational institutions' transformations. In Malaysia, Zainal Sanusi and Dzul Razak argue for strategic curriculum transformations, or those leading courses that can drive movements for change in higher education institutions.

Inclusive, Responsive Educational Transformations in Service of Sustainable Futures

The last theme in this Special Issue focuses on the need to pay renewed attention to inclusive and responsive educational transformations in response to climate change in the service of sustainable futures. Nthalivi Silo and her colleagues at the University of Botswana indicate how, over many years of engaging with teacher education institutions and schools, change projects have emerged that are inclusive of students, teachers, children and communities, and how these are responding to the real needs experienced by communities. Ying-Syuan Huang and her coauthors discuss teacher education institutions as innovation brokers, linking teachers and communities in sustainability innovations, while Sydney Muhangi and his coauthors from Uganda consider a reconfiguration of TVET to be more inclusive of both formal and informal learning. Christelle Cazabat highlights the need to give more attention to the challenges of climate-related displacement. Children miss school when rivers flood, buildings collapse, wildfires rage and temperatures soar. As the Education and Environment Ministers at COP26 have recognized, "climate change and extreme weather already impact the education system ... undermining children and teachers' safety, and access to basic education". Nowhere is this more evident than in the migrations and displacements caused by prolonged droughts and collapse of traditional livelihoods. Cazabat explains that migration is not an isolated instance, but rather, it is a part of life, affecting large parts of the world, both North and South. Educational policy and planners need to recognise the precariousness of educational futures due to climate change and provide new solutions. It is a theme explored elsewhere in this journal and a vital reason why society has been called upon to radically rethink the nature of not only schooling, but education as a whole.

In Conclusion

Over the course of two years and drawing on the inputs of over a million people, an International Commission under the leadership of the President of Ethiopia, President Sahle-Work Zewde, prepared a global report on exactly this vital societal question. The result, UNESCO's (2022) report Re-imagining our Futures Together: A new Social Contract for Education,

calls for a new social contract to reimagine education for the common good, as a common good. This report adds to the voices in the current volume that are demanding new ways to look at, think about, approach and configure education and learning; ways that respond to realities such as climate change fallout, displacement and global migrations to the days and weeks when accessing the conventional classroom is just not possible because of extreme weather impacts.

This Special Issue demonstrates that new, positive practices are already emerging: community members join university classes not only as learners, but as sources of vital knowledge; students spend time in communities to learn. Collaborative projects addressing real local issues identified by learners themselves become integral across the curriculum. Art, activism and Indigenous knowledges challenge and advance academic understanding. New organisational forms and leadership styles are being explored. Intersections of coloniality, gender, economic and other inequalities are exposed and alternatives are being actively explored.

Of course, there is always more that could have been included in a Special Issue such as this. For example, more could have been said about integrating actual sustainability practices in whole institution development because this models sustainability praxis for learners, teachers and communities; this is a topic well covered in a recent book on Green Schools Globally (Gough et al., 2020). More research on the comparative models of climate change education is in development in the global Monitoring and Evaluation of Climate Change Communication and Education Project, producing country profiles and a global peer review mechanism informing UNESCO Global Monitoring and Evaluation reporting on education. More could also have been said about the complexities of policy transformation processes, which have been deliberated on in a recent Special Issue of the Environmental Education Research Journal (Rickinson & McKenzie, 2021). All of these dynamics of this moving field ultimately depend on transformative, transgressive learning processes and relations (cf. Lotz-Sisitka et al., 2015), such as those that have been uncovered and articulated in this Special Issue.

Anthropogenic climate change is a slow crisis that has been creeping up on Planet Earth over decades. However, at this time, there is a new awareness and unprecedented commitment to make the changes needed. It is a moment not to be wasted. Answers are emerging. Policymakers need to engage, see and listen to educators who are developing emerging solutions and recommendations for policy shifts. The idea of a policy blueprint for all and for always should be abandoned. What is needed instead, as shown in this Special Issue, is policy that is a learning process in and of itself; that is formulated and implemented with input from scholars, practitioners and youth; and that is open to ongoing reflexive revisioning as we monitor, reflect on and learn from our actions. With its 28 analyses of over 30 projects, by 75 authors from 22 countries, this Special Issue presents an outstanding example of evaluative "learning in and from climate action".

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Part 1

Overview Perspectives

The Uses of Policy Research

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Summary

If effective communication and education are the key responses to global climate change, then comparative knowledge of the intended and implemented policies in this area is critical. This article argues that comparative policy research, which draws on diverse approaches, conceptualisations and methods, constitutes an important leverage point for fostering change in climate education policy and practice.

Keywords

Comparative Policy Research
Global Studies
Theory of Change
Climate Change Education
Climate Change Communication

Introduction

The growing immediacy of the effects of climate change can lead to questions of whether one is doing enough or enough of the right kind of work, especially as educational researchers who are committed to furthering climate action. A touchstone in our own decision making on where we, the authors, put our time and attention, has been to use the tools and approaches best suited to the leverage points where we hope to contribute to advancing change. As a simple example, if we want to focus on work with and for youth, we could engage in participatory research with them. If we want to improve our understanding of and strengthen educational practice, we might undertake interviews and observations with educators and NGOs in the field. When we hope to better understand and inform policy and policy making, we carry out comparative and collaborative policy research.

Leverage Points and How to Mobilise Change and Societal Transformation

Meadows' (1999) classic typology of 12 places to intervene in a system to effect change is ordered by the level of effectiveness: informing policy change as a way of shifting the rules or goals of a system is listed close to the top, in the third to fifth places.[1] These leverage points for system change are only topped by those at the level of the mindset out of which the system arises or transcending such mindsets or paradigms altogether; arguably the key aims of transformative teaching and learning.

Another typology or theory of change that is common in climate action is the three spheres of the transformation model (O'Brien, 2018). This frames societal transformation as requiring shifts in each of the interacting areas of *political* systems and structures, *practical* technical responses and *personal* values and beliefs. Each of these are considered to be essential areas of focus, with a greater proportion of work to date focusing on the sphere of practice and with political systems often remaining underexplored.

We are not evaluating which of these heuristics or frameworks of change might be the best. However, they can each

be helpful for thinking about *where* and *how* and *with whom* we are undertaking research to further climate and broader environmental action. Additionally, each underscores how there are always multiple possible points of intervention and action, thus showing the importance of bringing in a range of skills, perspectives and approaches, whether by the researchers within a given research project or across the range of projects in which different researchers will engage.

Strategic Methodology as Touchstone

A "strategic methodology" is one way we have previously described this consistent touchstone of centring how our research might best "be of use" in critical social change (Fine & Berraras, 2001; Tuck & McKenzie, 2015). This means emphasising broader modes of engagement, including criticality in the public sphere and using imagination, rather than specifying particular methods of research. These can be selected according to their efficacy for achieving the desired impact at the intended leverage point or sphere of action (McKenzie, 2009; Rickinson & McKenzie, 2021).

With these considerations in mind, in recent years, we have undertaken a collective programme of comparative policy research on climate and other environmental issues in education. This includes several studies on climate change and environmental education that we have completed for UNESCO (2019a, 2019b, 2021) and, most recently, through the Monitoring and Evaluating Climate Communication and Education Project (Sustainability and Education Policy Network, 2022), which we lead with Heila Lotz-Sisitka in collaboration with over 100 other organisations and researchers around the globe. The intended sphere of action for these research activities is mainly "political," with the aim of informing and impacting governmental and intergovernmental action on climate change communication and education (CCE). The focus also includes informing "practical technical responses" such as national education policy, and practices of climate change communication and education across a range of sectors (O'Brien, 2018).

In the above UNESCO studies, we have undertaken comparative analyses of official education policies in terms of the extent and type of inclusion of climate, biodiversity and broader environmental focus. This has involved either manual content analysis, namely, the full reading of policy texts or curricular documents and coding them to capture the extent and type of content; or in cases where the amount of material is prohibitive, using "text queries" to find the content of interest. In both types of analyses, there are also additional qualitative examples that show how the issues are addressed; in some cases, other methods have also been used, such as interviews, surveys and desk reviews, which span beyond policy to teaching, extra-curricular activities or peer and parental support.

"Head, heart and hand" or other heuristics (Reid et al., 2021) are sometimes used in analysis, in alignment with the extensive literature indicating the importance of the psychosocial and participatory dimensions of climate and environmental learning, for example, going beyond understanding the science or other facts about climate change and engaging learners emotionally, socially and culturally in taking up and calling for climate action (cf. UNESCO, 2019a).

National governments are the main audience for these international reports, which offer an otherwise unavailable bird's eye view of the extent and type of inclusion of environmental issues in education policy, both within and across countries. These reports are undertaken with the aim of helping inform and propel future policy making and redefining the aims and substance of practice.

Scale of Data Analysis and a Comparative Lens

The Monitoring and Evaluating Climate Communication and Education (MECCE) Project also collects and compiles comparative data and policy information, along with other data sources, in order to provide a previously unavailable scale of data analysis on CCE and inform policy decision making. This involves making data accessible for countries and for organisations working within and across countries regarding how climate change is being approached in communication and education sectors–see, for example, our COP26 research brief (The Monitoring and Evaluating Climate Communication and Education Project, 2021).

These comparative collections of data, indicators and profiles offer new opportunities for developing or advocating for subnational, national and international benchmarking and target-setting in CCE in ways that suit the regional and cultural characteristics of a country or sector. With relatively few national and cross-national policy studies completed thus far and limited resources for within-country monitoring by national governments, there has been little information on whether climate change is currently included in communication and education policy (Cheeseman et al., 2019; McKenzie, 2021). As a result, in many cases, there has also been little incentive or pressure for governments to prioritise the development of policy to fill the gaps in this area.

While recognising that there is no simple flow-through from inclusion in policy to enactment in practice, there is also ample evidence that other policy supports (such as curricular plans, targeted funding, professional development and administrative support) are critical in furthering climate change inclusion in practice (McKenzie & Aikens, 2021). Working together across researcher, policy maker and NGO boundaries can help ensure that research processes and tools are best suited to the targeted sectors and points of intervention (Pizmony-Levy et al., 2021).

Policy as Leverage Point

Although policy is only one "leverage point" in advancing CCE and CCE is only one domain of advancing climate action, for us, it is worth pursuing through collaborative research. We are convinced, as also shown across the papers in this Special Issue, that other colleagues and research communities are furthering additional points of impact through a range of other methods, conceptual dynamics and contextual starting points and that together, we are contributing to a much-needed shift towards sustaining life on the planet.

Endnotes

1. Items informing or influencing policy change include items 3 to 5:
   - The goals of the system.
   - The power to add, change, evolve, or self-organise system structure.
   - The rules of the system (such as incentives, punishments, constraints) (Meadows, 1999).

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The Banality Of Climate Collapse: What Can Education Do?

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Summary

In this paper, we propose lines of thought and paths of intervention for addressing the challenge of climate change education, with a view to fostering action-provoking movements within and outside educational systems. Given the inadequacy of scientific literacy, we propose that policy needs to enable the questioning of dominant ethical, cultural and socioeconomic social structures.

Keywords

Climate Change Education
Climate Crisis
Social Indifference
Challenges of Environmental Education
Curricular Constraint

Introduction

In the 1980s, when the climate crisis resulting from the accumulation of greenhouse gases started to become a global-scale controversial issue, the subject of climate began to slowly take root in educational systems. This subject was ascribed to the field of natural sciences, with a prominent cognitive dimension and was informed by the epistemology of the natural sciences as disciplinary, objective and value free. From this perspective, climate literacy was introduced into the conventional curriculum to explain the atmospheric impacts of the greenhouse effect, amplified by human action. These impacts were portrayed as remote in time and space, socially irrelevant and psychologically distant.

The results of this approach are all too evident. People do not feel involved in the problem and relegate it to a subordinate level on their scale of existential priorities. This calls for a shift in which education focuses on the social dimension of the climate emergency, by prioritising axiological, intersubjective, cross-disciplinary and sociocritical criteria. Such a shift should emphasise the complexity and global scale of the climate crisis and should aim to generate an emotional response from the participants. This might make people perceive the problem as a significant, relevant and urgent issue in their lives. To avoid the worst possible scenarios, the necessary time frame calls for designing climate emergency curricular frameworks that are adapted to the responsibilities, particularities and vulnerabilities of each society. This should be the operational interpretation of Article 12 of the Paris Agreement (UNFCCC, 2015). In contrast with the usual slow pace of educational reform, in this matter, the reaction time will be the focus of a political-pedagogical action.

Climate change is not a recent phenomenon; however, for many people it remains unknown or irrelevant. Notwithstanding, this is the greatest challenge that humankind and the whole planet will face in the twenty-first century and part of the century to come. It will affect all areas of human activity and come at the high cost of a decline in people's quality of life by altering vital

conditions such as water availability and food security. The future availability of these resources depends on measures that should already be in place (Figueres et al., 2017; Stammer et al., 2021). According to Garcés, we are living in a posthumous state of things, in an "age when everything is coming to an end" (2017, p.13), radically affecting civilisation as we know it. Paradoxically, this is also the age that Garcés describes as a situation where "we know it all, but we can do nothing. With all the knowledge of humankind at our disposal, all we can do is slow down or speed up our fall into the abyss" (2017, p. 9).

Few phrases could better express the challenge that the climate emergency poses for education. Garcés' reflection highlights the inadequacy of scientific literacy: we need to produce and generate profound sociocultural changes that go beyond science with a view to questioning the dominant ethical, cultural and socioeconomic bases of our current society and building a new civilisation that can live with sufficiency and dignity without surpassing the limits of the biosphere. In addition, we need to generate these changes at a speed that defies the inertia of educational systems. It will be necessary to reflect on the question proposed by Leichenkoa and O'Brien: "Why are we still educating high school and university students to live in the Holocene?" If indeed we are living in the Anthropocene, then we will have to envision curricula more broadly, not only for secondary and higher education; curricula which consider the challenges of this new geological era when human beings have become such a decisive natural force that they threaten their own existence or the possibility of a decent existence. The first thing we can be sure of is that curricula based on the imperative to respond to market demand, which have been especially frequent since the 1950s, are no longer useful in the face of the current socioenvironmental crisis. In fact, such models are so unsuitable at present that neither the agents responsible for the implementation of school curricula nor the people for whom such curricula are intended can understand them.

The troubling signs of the perturbation of the Earth system, the crossing of critical thresholds and the alteration of the planet's biogeochemical cycles have caused alarm and great concern among scientists who monitor the dangerous advances of this issue (Ripple, 2020; Steffen et al., 2015; World Meteorological Organization, 2020). However, this has not had the expected effect on political leaders and economic interest groups, who insist that the system can go back to its original parameters by correcting imbalances and negative externalities. The United Nations Agenda 2030 is largely based on this belief. The conclusion we can draw from this is that wealthy societies are reluctant to reduce or change their consumption patterns. As David Orr suggests, "we do not have an environmental crisis as much as massive failure of political institutions and governments to foresee and forestall what has grown into the long emergency" (2020, p. 270). It is a narrative of postponing the inevitable even at the cost of greater sacrifices and suffering now and in the future. How can we change that course? What can education do to avoid the social naturalisation of this collapse?

Climate Change Education

Fifty years after the worldwide emergence of environmental education, the scope and orientation of the field have changed considerably. Regional differences between the Global North and South can be seen in, on the one hand, greater diversification of the area and better training of environmental educators, and, on the other hand, greater theoretical and practical sophistication (O'Donoghue & Lotz-Sisitka, 2005; Payne, 2005). Additionally, there is a proliferation of different voices, among which we can include those promoted by multilateral organisations, business corporations and de facto power groups that are part of the political sphere.

In a certain sense, the climate crisis has had the effect of rekindling interest in the environment, particularly in environmental education, a field that has suffered both from the reforms that followed the Washington Consensus, which were defended as necessary measures for neoliberal structural adjustment, and from the institutional noise generated by Education for Sustainable Development. However, the latter has been only a lukewarm contribution to the very process that is struggling to survive its own functional imbalance: that is, educating with the oxymoronic aim of sustainable development, here based on the United Nations 2030 Agenda and neocapitalist tactics such as those proposed in the Green New Deal. By diving deeper through education and social sciences into the assumptions underlying the models that support these proposals, we can only find debatable thinking where the economy grows regardless of whether people really prosper and ecosystems regenerate. We conclude that there must be alternatives that can reorganize the system towards regenerative and distributive economies that allow for balancing what the people need to satisfy their needs and preserve their rights within planetary limits (see Raworth, 2017).

However, this rekindling of alternatives has not had worldwide reach, given that the climate crisis has not been fully included in the social sciences (Henderson et al., 2017). The field of environmental education has not been unanimously accepted as providing sufficient reason to modify current dominant priorities and approaches. Whether intentional or not, this is a form of organised denialism.

In this way, the field of climate emergency education has begun to apply the same failed strategies previously used in environmental education to increase scientific environmental literacy, now called "climate literacy", with a view to rectifying those social behaviours that contribute to the phenomenon solely by providing information despite all the evidence showing the ineffectiveness of such strategies. Furthermore, such literacy strategies have focused on science education as though the most

elemental phenomenology of environmental degradation has not demonstrated their socioenvironmental roots. Ecological conflicts are not limited to the physical and natural worlds but rather impact human populations in several ways and at different levels by perpetuating and magnifying the map of global social inequality. Socioenvironmental conflicts act as chronic augmented reality lenses for the specific problems generated by power coloniality (Quijano, 2007). In this whirlpool, the climate crisis constitutes the focal point of the epistemic and political centre of the power structure of the world system.

This is the reason why an educational strategy limited to cognitive literacy has contributed to the perpetuation of the climate crisis by constructing it as an ethereal phenomenon, distant in both time and space, with indistinct causes and remote consequences, whose possible solutions have been discarded by society because they require giving up satisfiers that are perceived as basic and whose benefits (if any) can only be achieved in the future (González-Gaudiano et al., 2020). We know there is no Planet B, but we find it hard to imagine and build a Planet A we can live on because our system of thought has been colonised by a hegemonic way of thinking about the world and life. Changing this situation requires educational processes reoriented to think substantially differently. The fine arts and literature play a relevant role in this process.

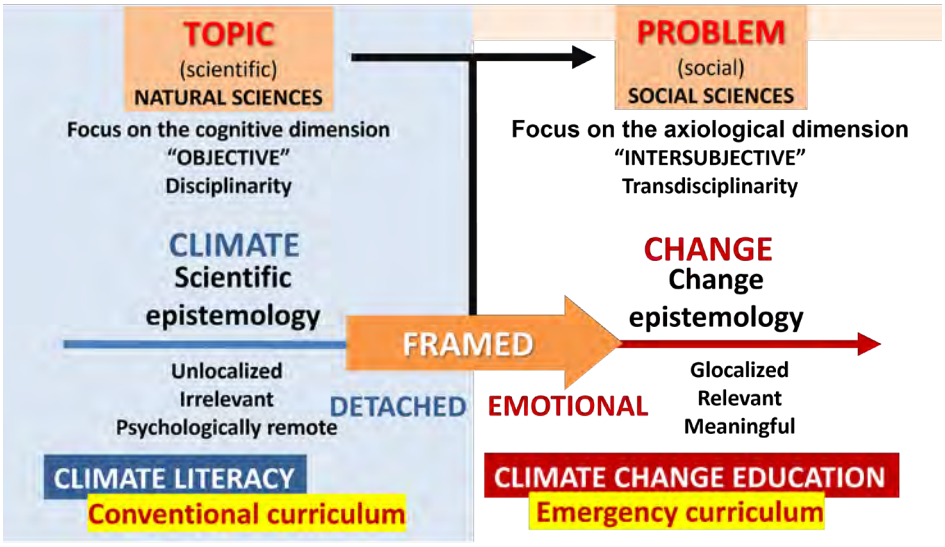
In the environmental and climate change education carried out in the Spanish-speaking Global South, critical and postcritical approaches are gaining momentum. Especially prolific are approaches related to decolonialism, ecofeminism and the defence of territory against neoextractivism. However, there are tensions between such approaches and the supposedly apolitical and patriarchal orientation of environmental education over the past 30 years, which has focused on individual change and the essential role of education in the conservation of the environment.

This history is why it is so important to foster antineoliberal and anticolonialist climate change education to shed light (with the aid of different pedagogies) not only on the foundations of the economic system, but also on the implicit rationale that guides and shapes the priorities, preferences and actions of those who lead and those who are led (Laval & Dardot, 2013). In other words, biopolitics (Foucault, 2007) regulates social behaviour by aiming to produce those social relations, lifestyles and personal views that ensure that individuals themselves regulate their lives in such a way as to make them more manageable.

If we are not able to strip away this underlying layer through education, it will be impossible to transform the neoliberal habitus (Bourdieu, 2007) that makes us see the world in a particular manner and behave according to this representation and that moulds our character, feelings, behaviour and attitudes. This habitus is decisive in how we tackle the events in our life, and its transformation must be one of the bases of an emergency climate change curriculum.

The curriculum for climate change education must not continue to be seen as an annex to the main didactic activity. On the contrary, it must be a part of the goals and aims of educational projects implemented in schools. Thinking only about how to integrate the climate emergency into educational systems and educational policies that go beyond formal education is a mistake. We should instead think about how to better orient the educational system and educational policies as a whole to tackle the climate emergency (see Figure 1). This means defining the expected learning goals, the abilities students should acquire and the types of situations they should be able to solve or overcome.

Figure 1. The climate crisis as an urgent curricular challenge



Source: Authors

Such educational change also means that a completely different narrative is necessary. This should focus not only on the cognitive, but also on affective and axiological aspects of climate learning, and on social action. The educational process should be grounded in its ability to stir up emotions to bring about change in people, both at the personal and collective levels. Despite all that we already know on the subject, we have not been able to elicit a proper socioemotional response to climate change. Perhaps this is because we have not been able to come up with a convincing alternative story that could stand up to the capitalist colonisation of the self (Merlín, 2019). We find it hard to imagine alternative futures and integrate them into the curriculum. We find it even harder to build such futures. However, we are ever more convinced of the didactic value of not only what we say, but how we say it.

Because of teacher training, institutional rigidity, atavisms, social inertia and an addiction to endless economic growth, none of this is easy to reach. However, no one said that changing people and societies would be easy. We must first conceive it and set it as our goal as the condition that will allow us to walk toward that horizon. Neoliberalism has convinced us that utopia is something impossible and unreachable. We argue that utopia is simply something that has not yet found its place. Let us build it.

Note

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Towards Climate Justice: Lessons from Girls' Education

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Summary
The climate crisis has exposed an urgent need to radically transform how we "do" education. This article looks to the field of gender equality for insights into how education for climate justice can tackle the root drivers of the climate crisis: unchecked power of vested interests, inequitable social structures, and economic systems that have exceeded our ecological ceiling and social foundations.

Keywords
Climate Change Education
Girls' Education
Climate Justice
Gender Equality
Systems Transformation

A Call for Climate Justice

Around the world, communities that are the least responsible for present-day levels of greenhouse gas emissions are often the most vulnerable to the impacts of climate change (United Nations, n.d.). Indeed, these communities, including girls and women, Indigenous communities, communities of colour and much of the Global South, especially Small Island Developing States, are on the frontlines of the climate crisis (Malala Fund, 2021; United Nations Children's Fund [UNICEF], 2021) and are affected first and the worst (Kwauk & Braga, 2017). They are also often the least equipped, for structural and historical reasons, with the capital and resources to adapt to its impacts (Islam & Winkel, 2017).

In response, activists from frontline communities have worked to expand the global discourse on climate action to include discussions on climate justice.[1] They have pointed out how addressing climate change is not just about carbon accounting and transitioning to renewable energy. It is also about enhancing and achieving civil rights, children's rights, gender equality, racial equality, Indigenous sovereignty and the wholesale transformation of our economic systems (Mock COP, 2020; Thomas, 2020; Uthman, 2020). It is about righting wrongs that have led the top 10% to contribute nearly 50% of today's emissions, while the bottom 81% of the world's population bears between 75-87% of its costs (Busch, 2015; United Nations Environment Programme , 2020). At the heart of this call for climate justice is a call for the interrogation of our collective values, our social contract and the principles of governance that structure our social and economic relations.

Implications for Education

What are the implications for the education sector, which I have argued elsewhere is still struggling with a basic response to the climate crisis (Kwauk, 2020)? I would offer that a call for climate justice requires more than getting governments to mandate climate change education. Rather, it requires the urgent reorientation of the very purpose of education and radical transformation of how we "do" education–from its design to delivery and assessment.

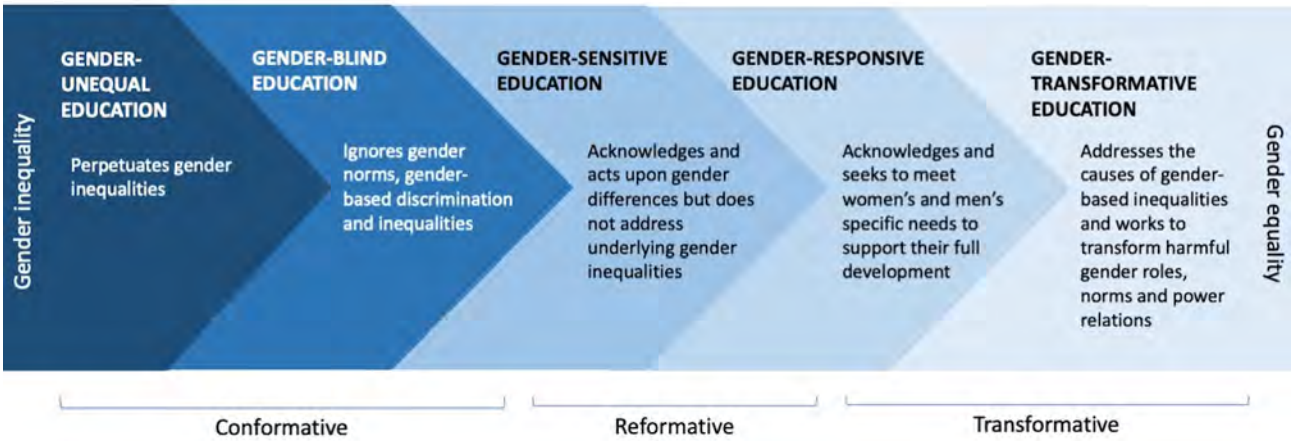
Yet what does "education for climate justice" mean? Are we splitting hairs by generating yet another term for climate change education? As someone who has only recently begun to research and write on the topic, I have been complicit in the mixing, conflating and creating of terms. However, as I engage in and observe public debate and policy discussions on the kind of education needed to tackle the climate crisis, I have become increasingly concerned that even when we use the same terms, we are not always talking about the same thing. A shared lexicon would be helpful as collective attention expands from policy advocacy for climate change education to its implementation. Importantly, a shared understanding of the terminology being used can help advance those programs, pedagogies and accountability systems that are aligned with and oriented to transformation. This is something that has been debated for other terms such as "ecoliteracy" (McBride et al., 2013).

Insights from Girls' Education

It is here that I lean into insights from the field of girls' education, the field which I call my professional community, to shed light on the importance and impact of terminology on implementation. For decades, thought leaders, researchers and practitioners in girls' education have been working with governments and education stakeholders to advance gender equality in and through education to achieve education for all. However, implementation has not always been aligned toward this vision. As a result, the outcomes have varied enormously, progress toward gender equality has been slow, and education for all remains elusive.

One reason is that stakeholders talking about gender equality in education were not always talking about the same thing, hence leading to ineffective program design and implementation. However, over time, the field began to settle on a collective understanding of approaches to gender equality, as illustrated in Figure 1, and its limitations and possibilities for creating systemic change.

Figure 2. A continuum of education approaches toward gender equality



Source: Adapted from United Nations Population Fund, 2020

On the one end of the continuum, are those approaches to education that are "gender unequal", perpetuating gender inequalities by overtly discriminating against girls. For example, school policies in some countries require pregnancy tests for girls or ban pregnant schoolgirls from attending or returning to school after giving birth. The equivalent in climate change education may be the outright teaching of misinformation, such as approving fossil fuel industry–endorsed curriculum on the benefits of oil (cf. Zou, 2017).

Equally destructive to achieving gender equality are those approaches towards education that are "gender-blind", ignoring how gender norms discriminate against girls. This can manifest as schools hosting voluntary after-school sports programmes while requiring girls to wear school uniforms that are inconducive to active play or offering no private spaces to change into active wear. Both gender-unequal and gender-blind education create learning environments that teach girls and boys to conform to existing gender norms. The equivalent of a gender-blind approach in climate change education could be education as we currently know it–one that ignores the climate crisis or does not attempt to address it.

The next three approaches begin to take a more active stance on gender. "Gender-sensitive" education attempts to remove obstacles to girls' access and participation in spaces in which they are typically discouraged from joining. Gender-sensitive approaches acknowledge gender norms but may not necessarily address their root causes. As such, they tend to lead to conformative gender relations but have the potential to achieve more reformative ends. For instance, a school principal may recognise that girls are less likely to enter an

upcoming robotics competition and, therefore, make extra effort to place competition flyers in the library where the girls' after-school programme is conducted. While the intentions of the principal may be to encourage girls' participation, these actions do not address the underlying reasons why girls might not participate.

The equivalent in climate change education might be characterized as "education about climate change" or perhaps even the next step up, that is, "education for climate action". The former recognises the need to bring climate change into the classroom by teaching students about its causes, impacts, and solutions. The latter attempts to link that knowledge to action. However, by approaching climate change from a technoscientific lens, both approaches often end up ignoring the social structures and economic systems that differentially shape the experiences of the climate crisis for different communities, as well as their capacities to act. As a result, the knowledge and skills imparted through education might lead to some action (mitigative or adaptive), but this action is often limited to individual behaviour change (e.g., recycling) and is not necessarily directed at disrupting existing unhealthy or unsustainable systems.

A more "gender-responsive" approach to the above example about the robotics competition is to recognise that girls may not have completed the requisite science and technology courses to be able to compete on equal grounds with boys, who have likely been encouraged to build and tinker since childhood. Therefore, our school principal might offer an after-school Robotics 101 course that is tailored to girls, building the remedial knowledge and skills needed to participate in the competition. Such an approach recognises the impact that social structures have on the individual and, as a result, attempts to create a more empowering environment that enables the individual to overcome systemic barriers to reach their full potential.

In the context of climate change education, "education for climate empowerment" offers a similar approach to reformative action–with the potential to be more transformative. It attempts to address the specific needs of communities in ways that empower them to overcome historical, structural, and systemic barriers to engaging in climate action. This could be through building green skills for green jobs among communities displaced by low-carbon transitions, creating educational pathways for girls into the green economy, or nurturing "green life skills" among climate vulnerable communities (cf. Kwauk & Casey, 2021). Importantly, although this approach may consider the larger community in defining its specific needs, it is operationalized at the individual level. That is, it aims to empower the individual via improved knowledge, skills, and attitudes. Here, systems change is positioned as a secondary benefit.

A "gender-transformative" approach to our example above would be to recognise that girls may not have the requisite science and technology skills because negative gender stereotypes pushed them out of those classes early on. These stereotypes may have been perpetuated by the school's own science, technology, engineering and mathematics (STEM) teachers. Additionally, gendered relations of power and gender norms may discourage girls from asking their parents and community members for funds to support their participation in a robotics competition. To address these structural issues, the school principal would take a more systemic or holistic approach towards addressing the root causes behind girls' unlikely participation in a robotics competition. Our principal might organize a gender training workshop for her teachers to tackle gender biases; invite female engineers to speak to the entire student body (boys and girls) and the Parent Teacher Association to help combat gender stereotypes and STEM at school and in the community; and provide student teams with a small stipend to purchase basic materials. These approaches attempt to transform systems to achieve long-term social change.

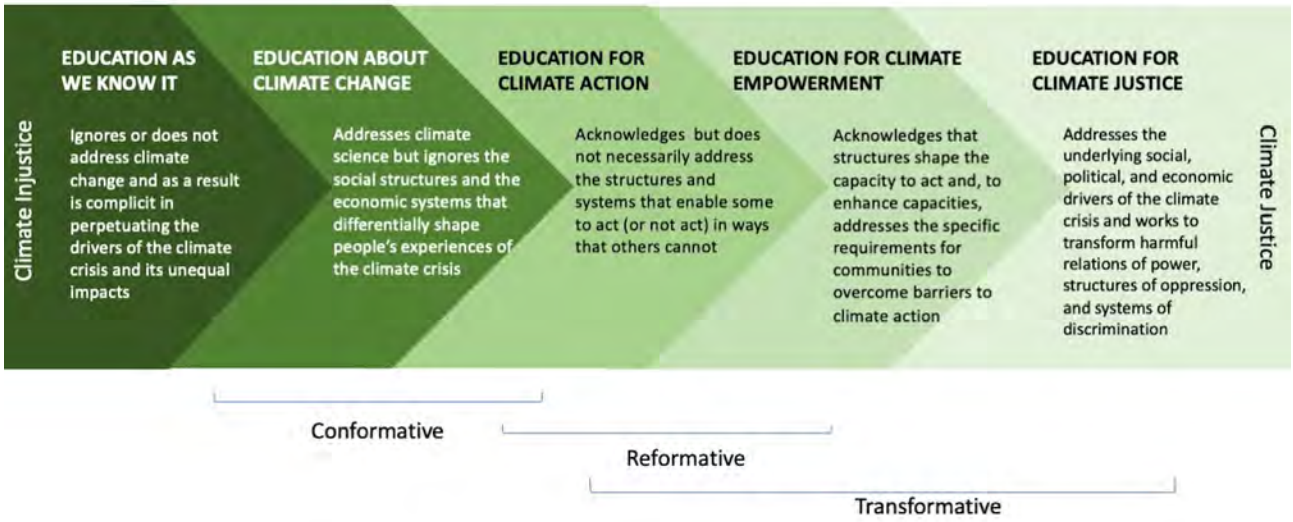
Distinguishing "education for climate justice" from other approaches becomes germane for policy discussions and implementation. To achieve climate justice, the previous approaches simply will not do. They are not enough to transgress the legacies of patriarchy, genocide, colonialism, racism and extractive capitalism that have placed girls and women, communities of colour and others in conditions of vulnerability. Nor are they sufficiently focused on transforming social and economic systems that perpetuate the marginalisation and exclusion of these groups from society and decision making. The climate crisis is an existential threat that requires us to fundamentally re-examine our ways of being. This includes interrogating the incompatibility of education as we know it and sustainability; the complicit role that education plays in perpetuating the values of extractive capitalism; and the dominance of neoliberal logics in educational approaches to climate action. Elsewhere, I have described this as a need for a new green learning agenda, as well as the need for education to advance among learners a "feminist planetary consciousness", that is, the recognition that the root problems of power and patriarchy undergird both our social and planetary challenges (Kwauk & Casey, 2021). Such a call seeks to shift attention from changing the individual to changing systems.

Recommendations for Climate Change Education

Reflecting on advances in the field of girls' education helps illustrate how achieving climate justice–like achieving gender equality–requires transformative education that seeds mindset expansion and paradigm shifts in the context of our socioecological relationships. This process may begin with the individual, but it ends in the achievement of political agency, solidarity and collective action.

Drawing from these insights, in Figure 2, I visualize how the field of climate change education might begin to harmonize around terminology. Each approach entails different philosophical foundations, assumptions, pedagogies, resources for implementation and possibilities for transgression and transformation. It is an imperfect translation from gender equality to climate justice. Nonetheless this figure is intended to spark discussion and debate within the field to further define and refine.

Figure 3. A continuum of education approaches toward climate justice



Source: Author

For policymakers and advocates, the bare minimum target must be the mandatory teaching of climate change, including its causes, impacts and solutions, across all disciplinary areas. However, as illustrated above, this approach offers reformative, if not merely conformative, change (Sterling, 2010). Achieving climate justice requires systems transformation. This means we must radically reorient our education systems so that climate action and climate justice become the main pillars of the educational endeavour.

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Endnotes

1. See, for example, the NAACP (https://naacp.org/know-issues/environmental-climate-justice) and the Climate Justice Alliance (https://climatejusticealliance.org/)

Developing National Strategies: the Zambia Context

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Summary
In response to international calls for concerted efforts to tackle the effects of climate change, Zambia has published its National Climate Change Learning Strategy. The development of the strategy was premised on putting learning at the centre of climate change policy and strategies. This paper contextualises and reviews the participatory processes involved in the development of the strategy.

Keywords
Climate Change
Typologies of Participation
Ladder of Participation
Stakeholder Collaboration
Learning Strategy

Introduction

The National Climate Change Learning Strategy (NCCLS) for Zambia (Ministry of Lands and Natural Resources, 2021) was developed with support from the One UN Climate Change Learning Partnership (UN CC: Learn). UN CC: Learn is a joint initiative of more than 30 multilateral organisations helping countries achieve climate change action both through general climate literacy and applied skills development. During the pilot phase (2011–2013), the aim of UN CC: Learn was to strengthen human resources, climate change learning and skills development to advance national climate change development agenda in Benin, the Dominican Republic, Indonesia, Malawi and Uganda. In southern Africa, this list has expanded to include Zambia and Zimbabwe. The Zambian NCCLS adopted a participatory trajectory including global and local partnerships. The UN CC: Learn Guidance Note provided methodological and organisational guidance "through cross-sectoral and multistakeholder collaboration, and with the engagement of national education and training institutions" (United Nations Institute for Training and Research [UNITAR], 2018, p. 17).

Background

In 1992, international concerns about global warming were translated into the United Nations Framework Convention on Climate Change (United Nations, 1992). Since then, climate change learning continues to receive increasing international attention. Nations have been urged to integrate learning into the fight against climate change. A variety of initiatives has shaped the development of national climate change learning strategies, including the Paris Agreement (United Nations Framework Convention on Climate Change [UNFCCC], 2015), the 2030 Agenda for Sustainable Development that enshrines the 17 Sustainable Development Goals (United Nations Department of Economic and Social Affairs [UNDESA], 2015) and climate education and training, which is bundled into Article 6 of the United Nations Framework Convention on Climate Change.

Participation?

Participation has a long and rich history. It is a contested concept and has been used in different ways in development work (Blackburn et al., 2000). Barrow and Murphree (2001) argue that the concept of participation is broad and reflects the different interests that people have regarding who participates, for what purposes and on what terms. Blackburn et al. (2000) view participation as building partnership and ownership from the bottom up.

A number of authors (including Arnstain, 1969; Brodie et al., 2009; Burrow & Murphree, 2001; Nurbaiti & Bambang, 2017; Wilcox, 1994) have developed typologies to explain the different levels of participation and the implications they have for the quality, or "depth" of participation that they enable. The development of so many typologies of participation is evidence that there is no single ideal of participation (World Bank, 1995). In developing the Zambian NCCLS, I identified the following key elements from this expansive literature on typologies of participation: information sharing, consultation, involvement and collaboration. I have drawn on the typology of participation expounded by Wilcox (1994) to contextualise participation in the process of developing the NCCLS. Wilcox's (1994) model is grounded in collaboration and partnership with a range of stakeholders, which is the central theme of the UN CC: Learn (Table 1).

Table 1. Wilcox's (1994) five rung ladder of participation

Rung	Description
1. Information	Tells people what is planned
2. Consultation	Offers some options and listens to feedback but does not allow new ideas
3. Deciding together	Encourages additional options and ideas, and provides opportunities for joint decision making
4. Acting together	Allows different interest groups to decide together on what is best and includes a partnership carrying out the plan
5. Supporting independent community interests	Offers funds, advice and other support to local groups or organisations to develop their own agendas within specific guidelines

Methodology

The methodology for the development of the NCCLS was informed by the UN CC: Learn Guidance Note (UNITAR, 2018). The process involved cross-sectoral and multistakeholder collaboration and national education and training institutions. The process was preceded by a study that culminated with the Background Report on National Climate Change Priorities and Relevant Capacity Development Goals and Initiatives in Zambia (Lupele, 2020); this report formed the basis for the planning and formulation of the NCCLS. The process involved a series of meetings, workshops and a survey on the learning needs of higher education institutions and other sectors, as well as their capacity to deliver learning.

Results: A Deeper Look into the NCCLS Participatory Processes

Based on the literature and my experience of leading the development of the NCCLS for Zambia, I take a deeper look into its participatory nature, here using Wilcox's (1994) typology as an analytical lens.

Information

Information on the need to develop the NCCLS Learning Strategy was shared through the UN CC: Learn. The initiative started in 2009 as a collaboration between United Nations agencies that were committed to supporting and contributing to effective, results-oriented and sustainable learning to address climate change and related development challenges, particularly for citizens to mitigate against the effects of climate change. The UNITAR played a large role in disseminating information about the need for a national climate change learning strategy development; it also provided substantial guidance on the overall methodology of development. At the local level, stakeholders knew about the project through information shared by the Climate Change Technical team comprising the Zambian Ministry of Lands and Natural Resources, the Zambian Climate Change and Natural Resources Management Department, the Zambia Environmental Management Agency and the Zambia Climate Change Network.[1]

Consultation

Consultation started at the global level with 33 multilateral organisations collaborating with UN CC: Learn. The development of the Guidance Note involved consultations and input from members of the UN CC: Learn Steering Group and discussions at several international and regional meetings and workshops. The Guidance Note built on the experiences of five national pilot projects conducted in Benin, the Dominican Republic, Indonesia, Malawi and Uganda (UNITAR, 2018). Locally, the consultation involved meetings, workshops and a survey with higher education institutions, and ministries of agriculture, energy, forestry, education, and also civil society. Unlike Wilcox's assertion that "no new ideas are allowed" in the consultation phase (see Table 1), we consulted with more stakeholders than was provided in the Guidance Note. Furthermore, we undertook an extensive literature search on the climate change issues and policies in Zambia.

Deciding together

In the process of developing the NCLSS, we held heated debates on issues such as the content and style of the

presentation and who participates in the process. Identifying the key priority areas for the strategy, for example, was a result of "deciding together", and agriculture, energy and forestry emerged as priority sectors in the Nationally Determined Contribution to achieve the Paris Agreement targets (UNFCCC, 2015). However, as we worked on this strategy, we included the education sector as key to knowledge and skills delivery. The team noted that the health sector was also affected by climate change, with an increased risk of illness through variations in weather patterns. As much as there was country flexibility around the choice of content in the strategy, there were moments when I felt that global procedural inflexibility worked against the principles of participation (Blackburn et al., 2000). For example, I planned to enhance participation by using an approach called the Whole System in a Room[2] (United States Agency for International Development, 2006). This idea was embraced at the local level but shot down at the global level because it was argued–in a subtle way–that it did not resonate with the UNITAR Guidance Note nomenclature and procedures.

Acting together

Different sectors and interest groups worked together to come up with how to develop the NCCLS. Stakeholders argued for the strategy to be managed and implemented through the existing sector-wide structures and coordination mechanisms of the Zambian National Climate Change Policy framework. This policy provides for collaborative efforts by all stakeholders through a coordinating and management structure that includes high-level government officials and is headed by the Zambian vice president and civil servants (Ministry of Lands and Natural Resources, 2016). The team resolved to expand the existing coordination and management structure to include nontraditional members who were critical towards the implementation of the NCCLS.

Supporting independent community interests

In the fifth rung of Wilcox's (1994) ladder, local groups or organisations are offered funds, advice and other forms of support to develop their own agendas within specific guidelines. In our situation, the National Climate Change Network was part of the technical team and the entire process. The budget included activities to be carried out by civil society. However, it is yet to be seen whether or not local organisations will be offered the funds, advice and other support to enable them carry out activities as spelled out in the NCCLS.

Conclusion

This paper demonstrates that the process of developing the NCCLS for Zambia followed basic participation principles. In addition to the more global-level guidance provided by the UN CC: Learn, we also found our own ways of participation. The nature of participation was not a straitjacket as some literature suggests, but instead, it allowed more contextual responsiveness, though not all dimensions of this were fully developed, as outlined above. Wilcox's (1994) model offers an interesting way of reflecting on the process followed. The process supported partnership and ownership, though this could not be described as a fully-fledged bottom-up approach as articulated by Blackburn et al. (2000). The overall methodology and approach were decided at the global level, defying the rhetoric of "bottom-up approaches" in development policy formulation.

However, local stakeholders did have some flexibility in adding local content, skills and knowledge. One of the outcomes of this process was the fact that stakeholders felt more empowered to engage with climate change learning issues at a strategic level. This is evidenced in the willingness of both governmental and nongovernmental organisations to be part of the process. Strong partnership and cooperation among all stakeholders emerged. UNITAR Director Angus Mackay thanked the participants for putting Zambian climate change concerns into the document rather than just rubber stamping it. From these results, it was clear that a participatory process for policy making around climate change learning can be an empowering process. It was also clear that the concept of participation is broad and reflects the different interests of participants, which can shape the various ways of participating in climate change education policy processes. The learning and empowerment potential of policy making processes could be enhanced by further research.

Endnotes

1. The Zambian National Climate Change Network is a climate change justice and sustainable development membership network.
2. The Whole System in a Room and participation. Participants represent as wide of a variety of stakeholders connected to the issue as possible. The more diverse the participants, the greater will be the innovation and potential for shared implementation. Future scenarios are put in historical and global perspective, encouraging participants to think together comprehensively before acting locally. This approach fosters a shared understanding and a higher commitment to common goals.

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Part 2

Expanding Learning and Agency Across Boundaries

Transformation through Crisis: A Municipal Enacted Utopia in Finland

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Summary
This article presents the example of the City of Lahti, Finland, for its pioneering environmental activities. The focus is on those historical circumstances that possibly indicate a utopia in the process of being enacted. The article opens up prospects toward empirically grounded and theoretically sound understandings of cities' learning and agency for climate sustainability and the pedagogical tools for supporting them.

Keywords
Learning Cities
Sustainable Development
Homelessness
Climate Change
Transformative Agency

Introduction

Cities play a key role in counteracting climate change. But how do municipalities learn to become environmentally and socially sustainable? And how can educational research engage with cities to support these pursuits?

The approach proposed here prioritises the documentation of how innovative effective solutions come about and can be sustained, despite obstacles and setbacks. We may call such solutions "enacted utopias" (Sannino, 2020a). Such enacted utopias are generated through lengthy cycles of expansive learning (Engeström & Sannino, 2010; 2016) and transformative agency (Sannino, 2015; 2020b).

Lahti is a mid-sized city (120,000 inhabitants) in Finland. Its very rapid industrialisation and population growth after World War II resulted in some serious environmental problems. Notably, the nearby Lake Vesijärvi became seriously eutrophic during the 1970s and 1980s. From this problematic background, Lahti has emerged as a leader in the struggle against climate change, and it was recently appointed European Green Capital 2021 for its pioneering environmental activities. Since 1990, the city has reduced its greenhouse gas emissions by 70%. Lahti offers us material to examine processes of expansive learning and transformative agency.

The Story of Lake Vesijärvi

It all started with Lake Vesijärvi. In a recent online interview (Green Lahti, 2021), limnologist Juha Keto recounts his memories from the 1940s: "From my childhood, I remember Lake Vesijärvi as clear and warm. When diving, I saw the fish and water plants, unlike in other lakes. It was unbelievable." When Keto returned to Lake Vesijärvi in the 1960s, he was shocked:

> *People did not want to talk about Lake Vesijärvi at that time. Nobody swam in the lake because untreated wastewater was poured into it straight from the sewers. The mass of algae could almost have carried a human*

being. When you left the harbour with a boat, it left a track that was visible days later. Fishermen rowed quickly to cleaner waters from the rubbish and smell of sulphur.

This was a key reason why Keto became a limnologist.

When I took samples for my Master's thesis, I understood in how bad [a] shape the lake really was. On the basis of my studies, I drafted an agenda for actions that should be taken to improve the condition of the lake. When in 1975 the city opened a position for a limnologist, I thought that I will finally get a chance to implement my agenda in practice. But things did not at the beginning move quite so smoothly. Although I had received support for the regeneration of the lake, a number of people regarded me as a certain kind of oddball–a peculiar environmentalist. In those days, people talked even about filling the lake to get rid of the problem.

In 1976, the sewage waters were redirected to a newly built treatment plant–the first important step in the protection work. After that, efforts were focused on the reduction of the large masses of blue-green algae in the lake, using biomanipulation. This was successful, but the problems recurred in the early 2000s, and a new phase in the regeneration work was needed:

Fortunately, there were lots of volunteers. We held many lake fish days and Lake Vesijärvi evenings. During a period of five years, I organised over 580 such evening gatherings. Also, farmers from the lakeshore villages joined in as volunteers. At best, we had more than 100 volunteers doing regenerative fishing and shore repair.

As Keto says, "Lake Vesijärvi was saved by collaboration."

Today, the lake is in better condition. However, continuous work is needed to meet the goal of good ecological status. A recent authoritative research study (Salonen et al., 2020, p. 4616) concludes:

The efforts to improve the water quality of the Enonselkä basin of Lake Vesijärvi from 1975 led to the re-establishment of sustainable fisheries and the recreational value of the lake. Although the progress was predominantly due to the diversion of the waste water and the following dilution, planktivorous and benthivorous fish removal and the stocking of predatory fish also supported the recovery… The recovery of the Enonselkä basin has evidently reached a stable phase where the sediment and external load are the key factors determining the future recovery trajectory.

The Lake Vesijärvi project led to the founding of the University of Helsinki Department of Environmental Ecology in Lahti in 1996. In 2007, Lahti, together with two adjacent municipalities and a number of private sector actors, created the Lake Vesijärvi Foundation. This has stabilised the funding basis for long-term work on the lake, including research and raising of public awareness.

Lake Vesijärvi may be seen as the "germ cell" (Engeström & Sannino, 2010; 2016) of the comprehensive environmental strategy pursued by Lahti today. In expansive learning theory "germ cell" refers to a simple explanatory relationship or a powerful new concept and practice that is initially produced in the form of an abstract. This initial abstraction is, step-by-step, enriched and transformed into a concrete system of multiple, constantly developing and expanding manifestations. In other words, the initial simple idea is transformed into a complex new form of practice. The germ cell carries in itself the foundational contradiction of the complex system. Also, it is ubiquitous and so commonplace that it is often taken for granted and goes unnoticed. When discovered and worked on, however, a germ cell opens up a perspective for multiple applications, extensions and future developments (Engeström et al., 2012).

The serious eutrophication of Lake Vesijärvi was indeed a commonplace embarrassment in the 1970s–so commonplace that many people wanted to forget the lake or get rid of it. Eutrophication carried in itself the foundational contradiction between the quest for rapid economic growth and profits on the one hand and, on the other, the quest for a liveable and sustainable environment. When Keto and his colleagues discovered the state of the lake and eventually created a conceptual model of the challenge (Keto & Sammalkorpi, 1988), Lake Vesijärvi became a generator of collective actions and expansive developments. After some 50 years, this germ cell is still such a generator. As the philosopher Il'enkov puts it, the germ cell "also exists in itself as alongside other isolated individuals derived from it […] in that there is nothing even remotely mystical; a father often lives a very long time side by side with his sons" (1977, p. 355).

Transformative agency (Sannino, 2015; 2020b) emerges when actors experience a paralysing conflict of motives and adopt an artefact or idea that can be used to break out of this paralysis. In Lahti, Lake Vesijärvi and its history of regeneration have become this type of powerful instrument. The lake is a constant reminder of what started it all and what must still be done.

The Process of Expansion

Expansive learning is learning something that is not yet there. It is learning "in which the learners are involved in constructing and implementing a radically new, wider and more complex object and concept for their activity" (Engeström & Sannino, 2010, p. 2). This is a cyclical process that ideally includes the transformative collective learning

actions of (1) questioning, (2) analysis, (3) modelling a new solution, (4) examining and testing the new model, (5) implementing the new model, (6) reflecting on the process and (7) consolidating and generalizing the new practice.

Full-scale analysis of these steps in the case of Lahti is beyond the scope of this paper. However, a brief look into the official materials of Lahti: European Green Capital 2021 demonstrates that something new is indeed in the making. Lahti has already abandoned the use of coal and will become a carbon-neutral city by 2025, the first major city to do so in Finland. Lahti has created new kinds of jobs in circular economy companies, and as much as 99% of household waste is recovered. The city aims to become a zero-waste circular economy city by 2050.

These results were built on a broad-based and longitudinal learning process among the citizenry of Lahti. As pointed out above by Keto, more than 580 evening gatherings of local residents were organized in a period of five years to mobilize people to save their lake. This generated a robust mass of active volunteers who engaged in regenerative fishing, shore repair and dissemination of information among the population. Breakthroughs can be attained when such bottom-up expansive learning intertwines with policy making backed by research.

Expansive learning and transformative agency are driven by historically accumulated contradictions in the existing activity. Lake Vesijärvi is a very clear example of the power of contradictions. Yet it is important to acknowledge that systemic contradictions do not easily disappear or become resolved. In each expansive learning action, the learners face systemic contradictions over and over again as they arise in new forms and practical manifestations. Enacted utopias are not states of harmony. In studies and interventions supporting expansive learning, participatory analysis of contradictions plays a critical role (Engeström & Sannino, 2011).

Expansive learning and transformative agency require continuous renewal of the artefacts and ideas that serve as instruments in efforts to address and overcome climate change. Research can effectively support this by conducting studies as formative interventions, such as change laboratories (Sannino et al., 2016; Sannino 2020b), which articulate and produce instruments that keep the process going.

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Climate Change Resilience through Collaborative Learning in the Colombian Coffee Region

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Summary
This article tells the story of climate change resilience in a peasant association located in the coffee region of Colombia, South America. Addressing their own perceived lack of connection with and apathy towards climate change challenges, the peasant association adopted the governance system of sociocracy as a tool to improve their communication, transparency and capacity to act together.

Keywords
Sociocracy
Peasant Association
Climate Resilience
Distributed Leadership
Collaborative Leadership

Introduction

At the time of writing, a general strike was taking place in Colombia. What started out as protests against proposed tax reforms spiralled into protests against corruption, inequality and police brutality. As in many societies across the world, the protests acted as a safety valve for the desperation that the Colombian people have bottled up during the challenges of the pandemic, which has exacerbated the hardships of new extreme climate change phenomena. In Colombia, the capacity to respond to these climate events remains limited, and a large part of the population is highly vulnerable to their effects. Small-scale agriculture is especially vulnerable in areas overexploited by livestock farming, areas with extensive depletion of aquifers and areas facing erosion. This is especially the case in the coffee region of Quindío, where this story takes place (MINAMBIENTE, 2020). According to the Plan for the Management of Territorial Climate Change of Quindío there is evidence of an "inter-institutional disarticulation in the educational and environmental spheres resulting in little participation of civil society, grassroot organisations and the private sector in knowledge construction processes and the development of actions to address climate change" (MINAMBIENTE, 2016, p. 95). The message of this article is that from a climate education perspective, the resilience of populations and regions can be increased through organisational empowerment; however, this involves a learning process that must come from within organisations themselves.

The Existing Paradigm: Hierarchy and Opacity

As part of an international project called "Transgressive Learning in Times of Climate Change", the three authors of the current article started working with the Filandia chapter of the peasant organisation Asociación Nacional de Usuarios

Campesinos (ANUC) in 2016 (Lotz-Sisitka et al., 2016). As part of a larger action research project, this involved initially reviewing 10 ANUC member farms in 2018 about their resilience to climate change. The results of the farm interviews show clear challenges around water capture and storage and low food sovereignty. This research demonstrates a lack of resilience to upcoming climate crises. This is a major concern in the coffee region of Colombia, where temperatures have been calculated to increase by 2.3°C and precipitation by 24% by the end of the century (MINAMBIENTE, 2016). Ironically, short periods without rain, alongside high water usage due to mass tourism, have led to water shortages in the Filandia municipality (see Figure 1 below). To address these challenges, the authors codesigned a community-based course with ANUC and other grassroots initiatives in Colombia, in which the participants could exchange experiences and ideas with other communities concerning climate change challenges (Macintyre et al., 2020).

Through critical reflection exercises in the course, ANUC participants acknowledged their lack of organisational capacity and general apathy when compared with other communities that participated in the course, voicing interest in learning other ways of organising themselves. For the practical part of the course, the ANUC members generated a climate resilience plan that included farm improvements, as well as the creation of a common fund for climate action through a participatory business idea to sell farm products at a café at the ANUC headquarters in the town of Filandia. However, when the ANUC participants were ready to implement the business idea with seed money from the Transgressive Learning Project, the president of the ANUC saw an opportunity to personally benefit from the project and made executive decisions that raised questions about the transparency of the community process. The hierarchical and autocratic structure of the ANUC organisation became apparent to its members, resulting in the implementation of the resilience plan being put on hold and leading to apathy and disinterest in the project.

Figure 4. Firefighters delivering potable water to residents during a drought in the town of Filandia, Colombia

Source: Macintyre (2019)

Organisational Transformation Towards Sociocracy

To avoid the seed money being used in a nontransparent manner, the authors guided a participatory process where ANUC members discussed how to reinvest the seed money. Those members who had participated in the community-based course had been particularly impressed by the module on sociocracy,[1] and they collectively decided to invest the money in an in-depth capacitation process around the tools of sociocracy, here by looking at how to bring a more circular and, hence, inclusive decision-making process to the activities of the ANUC. The authors realised the importance of stepping aside to allow ANUC members to appropriate the tools of sociocracy, to make their own decisions and to adapt the tools of sociocracy to the necessities of the ANUC organisation. During the sociocracy course, the ANUC members identified the need to address the structural obstacle to their organisation moving forward: the legal statutes of the organisation. The result was that two ANUC members–Luz Mary and Jesús Alonzo–led the process of translating the principles of sociocracy into statutes for the ANUC. The result was a major overhaul of the existing ANUC statues, with a new proposal for including the sociocratic elements of decision making, assignment of roles and conflict resolution.

The general assembly, in which the changes to the statutes were presented and discussed, took place through rounds of consent, giving everybody a voice. The new statutes were approved, and there was general excitement about the efficiency of the decision-making process during the assembly, where new people took up leadership roles and everybody was given a chance to voice their opinions. Luz Mary and Jesús Alonzo are currently preparing a sociocracy course that will be translated for the rest of the ANUC members, and a school for peasant sociocracy traineeship is under development, as a collaboration between the ANUC and the authors. The general feeling among the authors and the peasants of ANUC Filandia is that there is new energy and trust in the ANUC. As a strengthened organisation, there is now a sustainable path towards implementing the ANUC's resilience plan.

Conclusion

The main idea we have presented is that collective reflection and collaborative leadership is vital for making a grassroots organisation resilient to climate change, as it strengthens the adaptive capacity of the organisation and incentivises participation in addressing structural obstacles to transformation. Sociocracy is one example of a governance system that can lead to more cyclical feedback, here appreciating that learning is organic, taking place in its own time and related to the context. However, sociocracy is not a panacea for organisations; it requires constant learning processes among its members to lead to effective outcomes (Christian, 2016). Importantly, noting how the story above

unfolded, sociocracy had to be embraced and appropriated by the ANUC association themselves because transformation must come from within an organisation. It is not enough to simply provide an innovative course on methodologies and expect an organisation to change. When we look at the policy implications of this message, we realise the immense challenges of instigating transformative changes at higher political levels. Instead, more attention should be paid to supporting local organisations on the frontlines of climate change and providing collaborative leadership training, based on working with problems related to members' day-to-day lives and their local community.

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Endnotes

1. Sociocracy is a governance system based on collaborative leadership and a circular rather than hierarchical and autocratic structure. It is used around the world to improve organisations' efficacy, transparency and equity

Towards an Unhidden Curriculum

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Summary

Populations that are marginalised by ongoing settler-colonialism are the most impacted by climate change. These are the very populations whose knowledge keepers should be included in decolonised climate change education. The example provided in this article proposes a hybrid of formal and informal learning that can help maximise the opportunities for doing so in a meaningful way.

Keywords

Curriculum
Decolonising Approach
Informal Learning
Climate Change Education

Why Unhidden Curriculum Matters

Although the global reach of COVID-19 underscores our shared human situation, preventative health strategies (for example, handwashing in light of water insecurity) highlight our differentiated experiences of the pandemic and climate crisis. Effective climate solutions cannot be achieved through the formal learning systems of higher education institutions alone. Ongoing settler-colonialism in educational institutions perpetuates anthropocentric behaviours, thereby exacerbating climate change through a bias towards formal knowledge. Therefore, climate change education requires a decolonising approach that both values and creates bridges between informal and formal learning systems and the populations that they can each meaningfully involve. Drawing on my practical experience as a researcher-educator working in South Africa, I propose a new imaginary for framing learning and education, which I refer to as the "unhidden curriculum".

Eisner (1985) identifies three types of curriculum: explicit, implicit and null. Explicit refers to what is provided for students, for example, lectures, reading materials and grading rubrics. Implicit, or what South African scholar Le Grange (2016) calls "hidden curriculum", refers to the dominant institutional culture, including its values. Null refers to what is absent from both teaching and learning or that which is not yet there. In 2015 and 2016, student-led protests across South Africa, known as the #FeesMustFall movement, demanded the decolonisation of university curriculum (Curriculum Change Working Group, 2018). The Curriculum Change Working Group at the University of Cape Town engaged a wide demographic across that university in curriculum reform–related dialogues, and the key questions that emerged were as follows: "What knowledge? Whose knowledge? What/who gets privileged? Whose interests dominate? What is knowledge? Who owns knowledge? and How is it produced?" (Curriculum Change Working Group, 2018, pp. 7, 45). These questions speak to the hidden curriculum.

By "unhidden curriculum", I propose that decolonising a curriculum requires making visible the hidden curriculum and strategically enacting an unhidden curriculum that supports

decolonising aims. This refers to institutional cultural practices and values that promote authentic belonging of diverse peoples and knowledges, including the affective, while reconfiguring relations of power towards greater equity. The "affective" is herein used to refer to the emotional dimensions of learning based on Beard et al.'s theorisation of "the role of emotion in educational encounters" where they argue that, "the affective and embodied are already aspects of all pedagogical encounters but … in higher education, in particular, emotion is rarely acknowledged and is under- or mis-theorised" (2005, pp. 235, 236).

The unhidden curriculum critically considers the following: Who does the learning serve? How does the learning environment make us feel? Who belongs? Through a process of emergence, previously absent elements of the curriculum, known as the null curriculum, are addressed. In this way, the unhidden curriculum helps respond to the null curriculum. This reframes access in education as more than passing entrance exams or getting access to funding for tuition. As Mbembe (2016, p. 30) explains, "When we say access, we are also saying the possibility to inhabit a space to the extent that one can say, 'This is my home. I am not a foreigner. I belong here'". I argue that the choice of language of instruction is one example of a curricular choice that directly shapes the unhidden curriculum and, therefore, can potentially address the null curriculum. Because language is deeply entrenched in cultural identity and ways of knowing and being, the choice of the language of instruction has broader implications than mere knowledge comprehension; for example, it affects identity and belonging. Mbembe (2016, p. 30) elaborates on this by arguing that even an institution's buildings must be decolonised: "Apartheid architecture–which prevails in most of our higher learning institutions–is not conducive to breathing".

The Unhidden Curriculum in Practice

The importance of the unhidden curriculum surfaced through my role as a Ph.D. scholar and course co-convener, co-designing and facilitating a graduate course in Cape Town with Amber Abrams, the University of Cape Town's Future Water Institute Research Fellow. The course combined "cellphilming"[1] and a pedagogy of screening[2] (Mitchell et al., 2017) to foster a university–community or formal–informal knowledge commons around water narratives. The importance of the unhidden curriculum can be illustrated by a short course, called "Making Waveforms", hosted by the Future Water Institute in collaboration with Rhodes University's Environmental Learning Research Centre and the Tshisimani Centre for Activist Education and offered as an elective to several Master's programmes affiliated with the Future Water Institute (University of Cape Town) in 2019.

Core elements of the "explicit" curriculum included the following: site-specific creative work where the "sites" were local water bodies; observation/documentation of water bodies through audio/video mapping assignments; strategic artistic approaches known as "slow media" (a video method) and "soundscape recording" (an audio method); students producing cellphilms (including water narratives) focused on local water bodies; students meeting with knowledge keepers (Indigenous and non-Indigenous peoples from outside the university with existing relationships with the local water bodies); diverse guest lecturers from non-academic backgrounds; canoeing field trips led by peoples marginalised by ongoing settler-colonialism; and a public screening event hosted as a "third space"[3] in which the students shared their films and facilitated educational games they had created through the course. This course enacted explicit curricula that may traditionally be null curriculum in conventional universities, for example, perspectives, knowledge and educators silenced by institutions of ongoing settler-colonialism.

With the Making Waveforms short course, there were many ways the "hidden" curriculum was made visible, thereby surfacing the null curriculum; here, the unhidden curriculum was crafted to align with decolonising aims, thereby also reversing the null curriculum. For example, using the term "Knowledge Keepers" for people outside the university with existing relationships to water bodies and integrating them into the course in a meaningful way was a way to explicitly acknowledge and value the knowledge they bring and their roles as knowers. Using the term "guest lecturer" for people outside academia who joined our class on campus in a way that I, as an instructor, might have presented in the learning environment was also intended to show the potential fluidity of roles and hierarchies. Including this diversity of perspectives meant valuing what Santos (2018) refers to as a "pluriversity".

Students found value in assignments where they spent time with water bodies, observing and documenting them. The inclusion of work-in-progress critiques, focused on constructive feedback, suggested collaborative scholarship, and artistic and knowledge co-creation. Showcasing students' videos in a public event presented the course as serving both the registered students and the wider community, including nonhumans. Inviting the broader public to the events showed the valuing of a third space where the course participants and this public, consisting of a mix of academics, artists, activists, nonprofit organisations and civil society, could come together beyond binaries and disciplinary boundaries. Keeping these events free and accessible supported what Santos (2018, p. 275) refers to as "demercantilizing" the university, which he argues must be part of decolonising higher education. Encounters curated to enable artistic and knowledge co-creation with water and other nonhumans (Van Borek, 2021) demonstrated the institutional values of reinvigorating life rather than prioritising an economy dependent on the destruction of it.

Changing while Underscoring Relational Fluidities

Post-course interviews were conducted with Making Waveforms students by a third-party researcher to minimise researcher bias. In these interviews, students were asked whether they felt their roles as students, and their teachers' roles, were similar or different to what they had experienced in other courses. Students' responses can be summarised as aligning with five key themes, outlined below and reinforced with selected quotes from students' interviews:

1. Teacher-student power relations shifted from less hierarchical to more horizontal.

    - It was very much challenging that idea of the teacher having all the knowledge … the teachers were students in their own way … we were also teaching
    - You're sharing knowledge instead of teaching it
    - The class dynamic feels very equal

2. Students shifted from knowledge consumers to knowledge co-producers.

    - It felt more like a co-creation
    - Co-developing knowledge together
    - [The teachers were like] participants with us in knowledge generation
    - Collaborative involvement
    - Generating content ourselves
    - Not only were we constructing knowledge in terms of giving prominence to our thoughts on certain concepts, [but] we were also practically creating things and capturing those perspectives through our films

3. Ways of learning shifted away from cognitive-based methods towards embodied approaches.

    - There was always that very engaging thing… do[ing] mind maps and so on
    - You think a lot on your feet
    - The approach to teaching is more of a showing not telling

4. Affect shifted from one of disconnection towards one of connection.

    - We all bonded quite quickly
    - A really safe space
    - A very peaceful … space
    - Circle of learning and knowledge
    - Supportive
    - People in a way also trusted each other
    - I barely even felt like this was work … more like fun

5. Institutional cultural assimilation shifted to cross-cultural belonging.

    - I felt more ... heard
    - I felt like whatever you had to say was important
    - Like someone was actually listening to you and taking that into account
    - I felt like I could ask anything and be silly
    - A lot of the [teacher's] role was to allow space for students to develop their own narrative
    - Everyone can bring their own story

Reflecting on these observations, one can draw conclusions about the Making Waveforms course regarding the three main questions that the unhidden curriculum critically considers, and their practical implications in this example.

1. **Who does the learning serve?** Structuring a formal university course around co-creating context-specific, informal *public* education tools about *local* waterways allows for the learning to serve a wide range of stakeholders, including students, facilitators, Knowledge Keepers, guest lecturers, water bodies and broader community water users, both human and nonhuman.

2. **How does the learning environment make us feel?** The strategic inclusion of a pluriversity of both formal and informal knowledge, along with the knowledge holders' involvement in embodied modes of knowledge co-production, contributed to feelings of connectedness, safety, trust, support, empowerment, respect and being valued.

3. **Who belongs?** The use of story and narrative to draw out personal and collective knowledge, here through making and screening cellphilms, created the possibility for everyone, both human and nonhuman, to belong to this hybrid formal and informal learning community.

Recommendations for Unhidden Curriculum in Climate Change Education

The mainstream environmental movement has been viewed by many scholars as a predominantly European or Western undertaking (Curnow & Helferty, 2018; Taylor, 1997). This is one factor in the harsh reality of environmental racism around the globe, in which populations marginalised by ongoing settler-colonialism are the most impacted by climate change (Newell, 2005; Islam & Winkel, 2017). With climate change adaptation solutions requiring context specificity (Bierbaum & Staults, 2013; Clarke et al., 2019), these are also the very populations whose Knowledge Keepers should be included in decolonised climate change education. The practical example provided in this article suggests that a hybrid of formal and informal learning can help maximise the opportunities for doing so meaningfully. Educational

policies could foreground the unhidden curriculum, where institutional cultural practices and values are made visible, and they could promote authentic belonging of diverse peoples and their knowledges, including the affective domain. This would allow for changes in power relations, leading to more equal collaboration, shifting values towards promoting life rather than destroying it and authentically including a greater diversity of perspectives in co-creating solutions and implementing action.

We do not always realize what we do not know. As educators, we may need to consider the wider implications of our curriculum, for example, the choice of language instruction, the physical space (indoors or outdoors) in which we convene a class or the attitude we bring into our facilitation. Developing the unhidden curriculum requires that we first deepen our attention to that which may be hidden.

Endnotes

1. "Cellphilming" is a participatory visual method of research where participants make videos using cell phones to identify issues and create solutions (Mitchell et al., 2017).
2. A "pedagogy of screening" is a community learning experience (and participatory visual research method) created through the planning, enactment, and impacts of screening a video (Mitchell et al., 2017).
3. The "third space" is conceptualised by postcolonial theorist Homi Bhabha (1994) as a cross-cultural meeting point centred on hybridity, in which identities and power relations can be temporarily reconfigured along with new knowledge produced from these new (even if temporary) boundaries. In our case, the 'third space' is also enacted by hosting an event in a space that is neither distinctly university nor community but somewhere in-between.

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Part 3

Transforming Learning, Activism and Relating

The Living Library: Transdisciplinary Conversations

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Summary
This paper analyses the Living Library, an online conversation series convened by academic and artistic institutions to discuss knowledge, listening and acting in the era of climate change. In the context of transformative public conversations, enabling the not-yet-known to emerge through these collective meaning-making moments requires sitting with uncertainty.

Keywords
Transdisciplinary Conversations
Climate Justice
Uncertainty
Experimental
Art

It is not only about bringing people to the table, but allowing participants the chance to completely redesign the table itself. What emerges might no longer even be a table.

–Paraphrased from a speaker at the Living Library

Figure 5. Isabel Baudish (2021). The Living Library [painting].

Arts and science collaborations for public conversations about climate change and sustainability have broad intentions (Galafassi et al., 2018). The outcome-oriented intentions of these conversations often focus on knowledge dissemination, instrumentalising the arts and artists for science communication, usually to legitimise policy, increase awareness, or effect behaviour change (Shaw & Corner, 2016). Alternatively, process orientations assert the value of collective meaning-making within these conversations, placing greater emphasis on an experiential and emotional process through which creative ways of deconstructing and renegotiating normative ideas of climate change and sustainability can unfold (Davies et al., 2019; Trott et al., 2020).

The unfolding in process orientations appears to enable more transformative learning, which arguably can lead to "new patterns of interactions" (Galafassi et al., 2018, p. 71).

The emergence of these outcomes, though not guaranteed, can occur through the deliberate shift away from envisioning preconceived outcomes to a focus on process, where Latourian publics convene around a matter of concern and collectively disassemble, redefine and confront normativity to open up for the novel (Latour & Weibel, 2005). These moments are assemblages of ideas, publics and material. Yet how may new thinking and understandings emerge in those processes whose outcomes are asserted from the outset? This question suggests that the shackles of prescribing the impacts of climate change conversations, such as increasing awareness or changing consumer behaviour, must be shaken off to allow for the not-yet-known to be given space to reveal itself. The authors suggest that when new ways for experiencing, understanding and being in this world are anticipated in such processes, not defining them tightly from the outset is essential, for we do not know what we do not know.

In light of this, we discuss an online public-facing conversation series from spring 2021 that convened artists, researchers and activists to discuss climate justice and sustainability transformations. Known as the Living Library, it consisted of three conversations about multiple knowledge(s), processes of listening and ways of acting. During the first conversation on knowledge, the topics included reciprocity between participants, flattening power dynamics through disseminating ownership or collective activity, such as making music, and using imagination to understand more-than-human knowledge[1]. On listening, the participants acknowledged the privilege of convening people and stories and explained how those who are invited should be given the chance to redesign the conversation, to explain which stories they wanted shared and for convenors to actively listen rather than wait their turn to speak. The final conversation discussed action through the lens of lived and professional experiences, including the stories of being Indigenous in marginalised communities and being a woman within a patriarchal society. The conversations were broad and multilayered, ranging from technical conceptualisations of practices to sharing pieces of artwork or stories from research.

We interviewed five organisers and six guest speakers to understand their perspectives on what had occurred. We conducted inductive analysis on these interviews to explore the opportunities and challenges of facilitating meeting points around matters concerning climate and environmental justice with diverse guest speakers.

Discomfort in Face of the Unknown

Several responses concerned the expectations and reflections on the purpose of the series. Nervousness and excitement were common experiences of the guest speakers because they did not know what to expect without a script. This was echoed by some of the organisers, who explained that the conversations required "letting go". This was summarised by an interviewee as "a process that we did not necessarily have control over. It is not right, necessarily, to think about control. It is hard to know what these conversations do… If you are not doing things for a set outcome, how does it change how you approach it?" It should be noted that the lack of a script did not entail the absence of preparation; rather, the design of the conversations followed three months of deliberation over guests, public invitations and meetings with collaborators from neighbouring institutions. Each guest speaker met the facilitator in advance to give a brief on the format and questions.

For many interviewees, including the authors, it seemed that an open agenda was uncomfortable. Some guest speakers indicated that although they were interested to see if "it would work", entering the conversation space would have been enriched with time "before, not just inside the conversation" with fellow speakers, in order to better know "the experiences behind the bios". Those speakers who were familiar with a fellow guest indicated they were more comfortable taking a plunge into unknown and personal spaces. Therefore, balancing comfort and discomfort emerged as a fine line to tread. One speaker reflected on their appreciation for the research interview itself because no one had ever asked them for their reflections of such a conversation after the fact. When operating in this space of potential discomfort, practices of care grow even more significant.

Does Opening Up Mean Closing Off?

These conversations were open enough to allow multiple discussion points to take centre stage but also had the effect of side-lining some ambitions. The original intention of the Living Library was to explore the decolonisation of climate discourses, but some organisers became uncomfortable using the term alongside other agendas: "If you don't keep something in focus… are we causing more harm with that decolonisation label?" Another organiser described a conflict between having an open agenda and allowing an evolution away from the original intention without appropriation. Decolonisation was left behind in order to show sensitivity to those more deeply engaged in such work. This led to a further question for us: In being open to other perspectives, what may we deliberately leave behind or subconsciously choose to not open up to?

On Demonstrating, not just Describing, Diversity

Exploring transdisciplinarity was one of the authors' interests in the Living Library. We found that although guests at the "knowledge" conversation described the value of knowledge diversity, interviewees recounted a range of success in finding meaningful connections between guest speakers with different backgrounds. For some interviewees, a number of "gaps" persisted. One of the shortcomings was a lack of

time to relate to each other more deeply: “It’s not so easy to enter into each other’s worlds in these short moments”. Another limitation was relying on concepts and definitions that remained in the abstract, meaning it was “easy to fall into jargon” and difficult to find a common vocabulary. Where speakers were grounded in their experiences, more resonance was found. Presenting the visual components of artworks was similarly an important part of grounding storytelling and artistic practice. The reliance on conceptual expressions in the conversation was challenging because of different understandings of the same terms. By virtue of having the conversation in English and in a spoken online format, certain forms of knowledge were privileged over others, with one artist reflecting that “it is usually their art that does the talking”. One speaker suggested transdisciplinary “translators” as a strategy to improve future conversations.

Working with different knowledge systems is challenged by the task of translating between systems without appropriating meaning. Two interviewees referred to each other’s contributions in these terms. The first interviewee described a conversation between the second interviewee and member of the public in terms of a phantom vocabulary existing beyond one’s own epistemes that may transcend the limitations in our own thinking. Referring to the work of the first interviewee, the second interviewee raised the necessity of translation to “portray the reality of their own terms, in a way that reflects what they want to share but also needs to resonate with those who are listening.” These reflections suggest a somewhat tricky condition of non-normativity: How can diverse knowledges be revealed without appropriating them into our own terms?

On the Intersectional

Reflecting on the role of the artist, activist and researcher was a common thread in the interviews. Some guest artists critiqued the idea of categorising the participants: “What separates an art project which is activist in nature from proper activism?” Another guest speaker suggested that it is helpful to bring difference in identities into focus. This is where an awareness of the intersectional is important. Different interpretations of participants’ identities may lead to inaccurate expectations of their contributions. One of the speakers described changing what she said as she became inspired by her fellow speakers. In hindsight, she felt that the way she responded to the invitation to interact around a common experience–in this instance micro-actions and resistance–may have been inappropriate. She questioned whether it was appropriate for her, a woman from a Southern European patriarchal society, to connect to the experience of an Indigenous person of Northern Europe and whether her intervention was because of a different understanding of what had resonated with her. This indicates that more carefully curating the ways in which participants are given the opportunity to relate to each other is important. It suggests that the organisers of such conversations should consider how they describe and justify those who are invited: Are certain aspects of one’s identity or role over- or underemphasised? What might that mean for potential collective meaning-making among speakers?

Designing an Unknown Table

A repeated perspective from the interviews emphasised that in interdisciplinary explorations of ideas and practices, we are individually working with the not-yet-known. Furthermore, by allowing participants’ and collaborators’ preferences and perspectives to feed into the agenda, we are also collectively working with the not-yet-known. During a discussion about listening and climate justice, one speaker argued that participatory design should not end at inviting people to the table, but rather, it should also create space for complete redesign of the table by the participants themselves. How can we give the opportunity to those we invite to the table for such conversations to redesign the table or even throw the table out entirely?

The key argument that we can draw from this experience is that if we are asking for novel or transformative ways of living in and understanding a world with a changing climate, then we cannot necessarily bring into being our own independent visions of that transformation through this process. It is similarly important to be reflexive when relating to others’ ideas and to take note when our understanding of something may be an appropriation of meaning. We must work with the difficult, contradictory and uncomfortable process of allowing things to be brought into existence through collectively unpicking our own understandings and assumptions to, perhaps, enable new ways of relating to emerge. It is a challenging approach to take when we put resources into such a process, but it is not unlike the journeys that artists, activists and researchers often embark upon individually. In the words of one of the organisers: “They are often quite individual struggles, and you embark on something and you don’t know where it will end up. You go into the unknown and end up somewhere. It can be harsh sometimes and very rewarding sometimes”. Collectively, when given the space, time, resources and energy to do so, we may find that the novel is given space to emerge.

Recommendations and Reflections

Our recommendations build upon reflections of the Living Library and what is found in the literature. First, communication of science is a cultural process of meaning-making (Davies et al., 2019); thus, paying careful attention to the identities of participants is important when curating processes of collective meaning-making. Galafassi et al. (2018) propose that the process-oriented events of arts and climate science collaborations can enable things to emerge. Expanding from

there, we argue that attention should also be paid to what is left behind. Finally, considering the points from Trott et al. (2020), the opportune pedagogical effect of arts–science integrations is to challenge understandings of reality and to move from "what is'' to "what if?" We provide recommendations for practitioners embarking on conversational processes, such as those of the Living Library, below:

1. Consider what roles participants are taking. What are they representing? How can they be understood in relation to each other?

2. Pay attention to what is left behind and why, and enquire into the dynamic that enabled this.

3. Recognise the challenge of working with different stories and embrace the feeling of "not knowing".

Figure 6. Isabel Baudish (2021). The Living Library – Whose Knowledge? [painting].

Figure 7. Isabel Baudish (2021). The Living Library – How to Listen? [painting].

Figure 8. Isabel Baudish (2021). The Living Library – How to Act? [painting].

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Endnotes

1. One of the guest speakers explained how they used listening and imagination tools in their arts processes to hear ideas beyond the human.

Scholar Activist Solidarity in Ocean Justice Movements in South Africa

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Summary

As responsive and responsible climate justice educators and researchers, we are being called to embed our full selves into social movements, responding to intersectional socioecological injustices. We argue that transgressive climate change education requires researchers to be immersed in organising efforts, reflexive solidarity and warm, relational net-work. In this contribution, we make visible some of the invisible aspects of "call and response" scholar activism that have emerged through our practice in the Coastal Justice Network in South Africa, and we argue the importance of solidarity in the future of climate change education.

Keywords

Reflexive Solidarity
Empatheatre
Scholar Activism
Ocean Pedagogies
Transgressive Learning

Introduction

Where and how does progressive and meaningful change arise in society? What are the key leverage points (Abson et al., 2017) for change in terms of transforming governance so that it is responsive to climate change and ecological and social justice? What role can researchers play in opening up possibilities for this kind of change?

These are the questions that we are grappling with as scholar activists and climate change educators working for "blue justice" (Isaacs, 2019). Our pedagogy and learning are embedded in the social movements of small-scale fisherfolk and other community-based ocean defenders in South Africa. We work to put the leadership and knowledge emanating from grassroots social movements on centre stage, and to locate our most useful place and contribution within a broader movement charting a progressive way forward for transformative ocean governance. Through working reflexively alongside civil society activist partners in responding to the intensely local manifestations of environmental injustice in the context of oceanic lives and livelihoods, we are learning through embodied experience what injustice and solidarity looks and feels like in practice. This is the site of our learning and unlearning about the climate crisis.

We have an emerging understanding of our role as researchers and educators in this context: to leverage our privileged access to resources, knowledge networks and social capital in order to be in ally-ship and service to these movements. By challenging epistemic injustices that persist in our own communities of practice (such as academic and research institutions) and those we have access to (such as governmental policy processes or environmental impact assessment consultations) and by mediating knowledge flow and learning across scales and epistemologies, we aim to contribute to a flourishing pluriversity (Kothari et al., 2019; McGarry et al., 2021) for climate and all other forms of justice.

While some of the impacts of climate change on the ocean are quite visible in public discourse, many of the well-established climate change "motifs" relate, for example, to rising sea levels, declining fish stocks and bleached coral reefs. However, the more nuanced and politically mediated impacts will affect local coastal communities that are already dispossessed, excluded or exploited (Bond, 2019). Climate change will exacerbate these injustices. At the same time, despite incontrovertible evidence and mounting urgency to cut emissions immediately (Intergovernmental Panel on Climate Change, 2021), governments and business are proceeding with "blue economy" plans that hinge on large scale oil and gas extraction from the ocean (Findlay, 2018; Organisation for Economic Co-operation and Development, 2016;). The ocean is seen by the powerful patrons of late capitalism as the last frontier for fossil fuel–based economies to keep going for a few more decades. Its role in ecosystem health, food security and cultural sovereignty, as well as thousands of years of ocean cultural heritage and Indigenous knowledge is subsumed in development frameworks that position deep sea oil and gas as a "game changer" for a stalled economy (Cronje, 2019). In our capacity as researchers in the One Ocean Hub–a global transdisciplinary network–we have worked alongside civil society partners to meticulously monitor, expose and resist the ways in which blue economy development and decision making is moving ahead at full steam, with reckless disregard for climate change impacts, as well as actively excluding and further marginalising the communities that are the customary custodians of the ocean and whose lives, cultures, identities and well-being are inseparable from a healthy ocean (Sowman & Sunde, 2018; Sunde & Erwin, 2020).

In this crisis and in our solidarity with coastal and ocean peoples, we seek guidance. Anna Tsing et al. (2017) state that we need to develop arts for living well on a dying planet, while Donna Haraway (2016) suggests we stay with the trouble. Bayo Akomolafe (2017) encourages us to make refuge, and Injairu Kulundu-Bolus (2020) inspires us to find research worthy of our longing. While we resonate with these calls and find them to be generative framings within which we can understand our own unresolved identities and responsibilities, we feel that we have been unable to develop meaningful pedagogies, curricula and praxis without being immersed in the daily reality of the hot mess, alongside those experiencing it first-hand, and who are struggling for action worthy of their longing. By calling into the caverns of these concerns and attentively listening for what responses echo back, we can find ways in which our research and education praxis can be in solidarity with the social movements already actively addressing these concerns.

We argue that transgressive climate change education requires researchers to be embedded in organising efforts, decolonial solidarity building (Gaztambide-Fernández, 2012), relationship building, "net-work" (James et al., 2020), empathetic apprenticeship (McGarry, 2014b) and the important warmth work (Beuys, 1977) of conviviality. In this contribution, we share some brief lessons that have emerged through the development of an "empatheatre", that is, public storytelling through research theatre. A production entitled Lalela uLwandle led to the development of the Coastal Justice Network and subsequent public storytelling and counterhegemonic mapping projects, and we argue for the importance of solidarity in the future of climate change education.

Lesson 1: Embedded Solidarity with Social Movements

Climate change education needs to be embedded in and in solidarity with the social movements of those responding to broader socioenvironmental injustices, all of which are the expressions of the same systemic failures that have led to the climate crisis. This means that we, as scholars, need to be of service to these movements, and to use our privilege, resources, intellectual and political rigour (Temper et al., 2019) in support of these community-led efforts, thus "rendering each other capable" (Bozalek, 2021). The decolonial solidarity praxis is relational, reflexive and creative (Gaztambide-Fernández, 2012). We see this as "warmth work" (Beuys, 1977; McGarry, 2014a), in which we are making room for convivial, transgressive, imaginative and empathetic approaches to coengaged meaning-making in activist practice. This can be enabled through net-work, the relational, responsible and responsive work of holding space for the ethically configured, politically rigorous networks to grow and thrive and the weaving of intersectional knowledges and meaning-making into our pedagogies.

Being in solidarity with social movements as scholar activists requires becoming accountable in multiple directions: to individual community-based members of our network, to civil society partner organisations, to our transdisciplinary research colleagues, to our universities and to our funders, as well as becoming resilient to the tensions and paradoxes that this sometimes entails.

Lesson 2: Cognitive and Epistemic Elements of Climate Justice

This means we have a responsibility to work actively and with political rigour (Temper et al., 2019) to bridge the divides in terms of "whose knowledge counts" and "whose voices are listened to". As privileged members of the so-called "knowledge class", we are called to become "apprentices" to excluded and marginalised knowledge holders (Bywater, 2005) who are on the frontlines of experiencing and responding to the impacts of climate change. From our position as university-employed educators and researchers, we embrace our role as insider-outsiders, as scholar activists and as

apprentices to life, and we take seriously our responsibility to transform relations between the academy and grassroots social movements. In so doing, we recognise that privilege, oppressions, and intersectionality of identities mean that "different bodies produce different knowledge differently" (Daza & Huckaby, 2014, p. 802), and we endeavour to open up learning processes to honour the many different ways of producing embodied knowledge(s) through our public storytelling and solidarity methodologies. This approach inherently challenges knowledge hierarchies, expanding what is constituted as evidence within contemporary ocean decision-making discourses in South Africa.

Lesson 3: Scholar Activism

"Call and response"' (Kulundu-Bolus et al., 2020) scholar activism, or what McGarry et al. (2021) term "pedagogies of echo-location", is where ongoing back and forth storytelling, facilitates a democratic distilling and reshaping of research, so that educational imperatives and innovations can be surfaced and refined. One way we support this ongoing dialogue is through public storytelling using empatheatre methodologies (McGarry, 2018), as a means to facilitate public meaning-making that ensures participative parity. This is a methodological approach that sculpts empathetic spaces (McGarry, 2014a) and cocreates social instruments to navigate plural onto-epistemological groundings (Akomolafe & Ladh, 2017) across class, race and context. The empatheatre production Lalela uLwandle has helped us build a knowledge action network (Future Earth, 2019) for coastal justice in South Africa. This network is a space in which we practice embodied and embedded reflexive solidarity (Pereira, 2020).

We have learned that a pedagogy of echo-location encourages ongoing negotiation of an ethics of care. This includes ethics of representation, codefining of concerns (Lotz-Sisitka et al., 2016) and shared collaboration across partners. Research questions, research focus, data gathering, analysis and making claims (Coppen, 2019; Erwin, 2020) are shared and negotiated.

Within the Coastal Justice Network, our call and response practice involves being available to our social movement partners to put our particular skills and competencies to work in response to those needs identified by network members. For example, we are asked to develop a pamphlet explaining a new ocean policy or to compile and submit the testimonies of small-scale fishers objecting to a proposed offshore oil drilling development. These are the literature and learning materials of social movements (Choudry, 2015), and as scholar activists, we are well positioned to respond meaningfully to these kinds of calls.

Lesson 4: A Transgressive and Collaborative Ecopedagogy

A transgressive and collaborative ecopedagogy is needed for the oceans in South Africa and those across the globe. Such an ecopedagogy recognises that ocean literacy is not just about teaching about biodiversity, ecosystem services and ocean resources that require systematic management. Rather, it is about an Indigenous, cultural and politically conscious ecopedagogy that recognises that the ocean is the spiritual foundation of many South African cultures and a site of struggle for many Indigenous and local people who have been removed from coastal spaces through colonialism, Apartheid and now through extractive economic developments, as well as through conservation measures that restrict or criminalise resource use.

Making visible emotional connections to nature using empatheatre holds value for thinking through marine education. In a country still deeply divided by past injustices and current inequality, a country that remains heavily racialised in practice, despite a strong human rights–based constitution, the importance of engaging in complex issues of inequalities and social difference in storytelling cannot be over emphasised for ecopedagogy in the ocean space. As fellow scholar activist, Kira Erwin, writes, "Rather than skirt over these divides in a quest for a loosely patched together humanism to address concerns about the oceans (a tactic often seen as a problematic race blindness by activist and community organisations), our work in Lalela uLwandle told different stories that focused on power and inequalities together in the same circle. What arose from this research, the performances and the audience discussions was how different cultural connections offer valuable contributions towards conservation and environment efforts" (2019, p. 29). As such, Lalela uLwandle offers an invitation to an alternative conversation and environmental education, one in which local culture and conservation of biodiversity can align.

Lesson 5: Making Visible the Unseen and Undervalued Work of Scholar Activism

Finally, we have learned that to practise a form of solidarity that has integrity is reflexive and decolonial; disrupting power and knowledge hierarchies rather than entrenching them, is utterly relational work. It is intimate, emotional, loving, vulnerable, painful and paradox laden.

It involves, for example, the following:

- Giving critical, constructive feedback to colleagues
- Challenging sexist or racist vocabulary, whether from those in power or not
- Being shamed on Twitter by a disgruntled civil society leader for "speaking on behalf of communities" when

that is exactly what we are trying not to do and then apologising, listening nondefensively to their story of pain and exclusion and inviting them to join the network, by following the principle of calling in rather than calling out

- Sticking one's neck out to constructively challenge problematic research and policy practices of senior colleagues in the academy
- Lengthy reflexive team debriefing meetings after each network engagement to ask questions like "What did we enable through this exchange? What did we prevent from happening? What unintentional harm might we have caused? What are our blind spots here? What did we learn?"
- Regular meetings with civil society partners to discuss strategies for activist engagement with various problematic policy processes and to attend to conflict transformation processes between different members of the broader network
- Wrangling with university financial systems to enable the responsible but flexible channelling of funding to unresourced community-based organisations
- A mode of responsive readiness in the case of the sudden need for a press release about a human rights violation or a conference call with a lawyer. These urgent requests take precedence over other planned activities

Importantly, all of this work is largely invisible in terms of the deliverables and outputs most valued in contemporary academia and educational praxis.

Final Thoughts

In summary, we argue that transgressive climate change education, especially within the ocean space, requires researchers to be embedded in organising efforts of social and ecological activism. This entails asserting our identities as scholar activists, as "pedagogistas" or scholars in service of others, who cocreate pedagogies on the ground (James, 2021), supporting solidarity building through fostering, with vulnerability, warmth and conviviality, reflexive ongoing call and response collaborative research. We work toward becoming empathetic apprentices, in which we, as researchers, work in service of the knowledge holders, community-based activists and their allies in socioecological justice movements.

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Reimagining the Place of Nature in Education: Photographic Provocations for Relational Becoming

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This essay draws on the work of the "nature relations" group, which is part of the Climate Change Education Research Network (CCERN), funded by the GW4-Alliance Generator Fund, UK: http://ed-climate.net/

Summary

This essay advances a posthuman relational approach to climate change education by using eight images as provocations. We argue that an embedded, holistic and interdisciplinary nature relations approach is a fundamental element of the educational response to the climate emergency; one which is based in the natural world and that is creative, embodied and transformative.

Keywords

Becoming Relational
Making Kin
Nature Relations

Introducing Nature Relations

This photo essay advances a "nature relations" approach to climate change education. We reimagine nature's place in education, here by decentring humans. This approach rejects anthropocentrism (which views humans as exceptional) instead adopting an ecocentric, relational view where human-nonhuman nature is inseparable. This aligns with a new concept "childhoodnature" (Cutter-Mackenzie-Knowles et al., 2020), which disrupts understandings of childhood and nature, favouring a more entangled view of the child *as* nature.

A nature relations approach involves becoming relational with ourselves, other humans and nonhumans and the material world (Barratt Hacking & Taylor, 2020). Engendering individual and collective shifts in human behaviour is urgent as we strive to live less destructively. This essay opens up the space for thinking differently about education, focusing on opportunities to promote social and environmental justice.

This interdisciplinary essay combines biology, geography, ecology, ocean literacy, critical ecopedagogy, environmental education, school teaching and research expertise. Through the "relational becoming" lens (Barratt Hacking & Taylor, 2020), we present climate change education provocations from research and practice, using eight images (Figures 9–16). Provocations utilise emerging theory-in-practice, drawing on the posthuman concepts of childhoodnature and relational becoming and the growing evidence of effective climate change education (Barratt Hacking et al., 2010; Monroe et al., 2019; Rousell & Cutter-Mackenzie-Knowles, 2020). The images bridge the gaps between the current article's theoretical underpinnings and its practical manifestations.

Figure 9. Just a walk

Most photographs taken during a geography fieldtrip to Dorset, Southwest England, featured impressive Jurassic Coast rock formations, bringing textbook diagrams to life. Comparatively, Figure 9 was taken on arrival while on a walk to shake off London's busyness. No clipboards, no preamble, just a walk. Spirits were high, as was the sun.

Although formal classroom instruction and fieldtrips are essential aspects of CCE, informal green and blue space experiences must be part of children's lives. Research shows those who spend recreational time in natural settings are more likely to enact proenvironmental behaviours (Alcock et al., 2020). This supports arguments for active and engaging approaches towards learning in climate change education (Monroe et al., 2019). This uncomplicated photograph reminds us CCE is not only developed through the formal curriculum but that it should be embedded in the hidden and extra curriculum. Allowing children time and space for relational becoming within nature can inspire meaningful learning.

Educational experiences prioritising outdoor play, including forest schools and outdoor nurseries, resist dominant educational approaches, which place children indoors with predetermined human-centred outcomes. Time and space to play outdoors have declined, particularly during the COVID-19 pandemic. Green space access is a privilege that is often ignored in attempts to address inequalities. Yet all children need childhood nature experiences that foster relational becoming. Climate change education requires transforming how we see ourselves as "part of the world in its differential becoming" (Barad, 2007, p. 185).

Figure 10. Playful nature entanglements

Figure 10 captures a playful childhoodnature encounter, where human–nonhuman is indivisible. Sunlight reflects trees on water, leaves stick to muddy boots, ripples fling across puddles, and two children shriek with glee. Climate change education is developed through meaningful relationships. Humans and nonhumans emerge through entangled encounters, making the more-than-human nature personally relevant (Monroe et al., 2019). Figure 10 highlights the joy of mutual connections through relational becoming in, with and for more-than-human worlds.

Figure 11. Meeting watery neighbours

The ocean governs life in unimaginable ways, influencing climate, absorbing, storing and moving heat, carbon and water (Laffoley et al., 2020). Existence not entangled with oceans is inconceivable. Complex human–ocean relationships have fundamental implications for climate change education.

These worm casts (Figure 11) offer a glimpse into the lives of the Wadden Sea inhabitants, the world's largest intertidal mudflat. At low tide, this view stretches as far as the eye can see. Students dig with the mud, learning with this ecosystem. However, as sea levels rise, this ecosystem is being threatened by human exceptionalism. Could a different story be told? A story of relational becoming with myriad unnoticed relations unfolding beneath feet, "making kin" (Haraway, 2016) with watery neighbours. This more holistic education reflects interspecies connectedness and responsible coexistence, undoing past injustices and writing a more peaceful future with more-than-human worlds.

Figure 12. Biological becoming

Ground-breaking research on microorganism ubiquity is challenging understandings of ourselves as autonomous entities (Bordenstein & Theis, 2015). Less than half our cells are human (Sender et al., 2016); the rest are microbes upon which we rely. These codependencies extend outwards from microbes to insects to humans and beyond. Figure 12 captures an enchanted moment between child and dung beetle. The creature's habits spark curiosity. This intimate encounter provides the space for becoming as two lives connect in childhoodnature.

Our lives *are* intertwined with dung beetles, which are found on all continents except Antarctica. They are essential for nutrient cycling, soil fertility and regulating livestock dung greenhouse gas emissions (Slade et al., 2016). Opportunities to interact with science and fieldwork can ignite interest in unnoticed ecological systems (Monroe et al., 2019). Moments of biological becoming, as pictured here, give rise to appreciations of entanglements and the codependence of life. This empowers learners to engage with CCE in ways scientistic educational practices alone cannot (Rousell & Cutter-Mackenzie-Knowles, 2020).

Figure 13. Lost in a microworld

A boy encounters a creature through an insect magnifier, noticed while researching how children living within Brecon Beacons National Park explored, played, learned and engaged with nature during a Summer Club (Dunkley & Smith, 2019). This research revealed that the children explored and understood micro-ecological worlds differently from adults; small insects and micro-ecosystems were encountered with curiosity and joyfulness.

Though brief, early experiences of micro-ecological worlds, such as those depicted here, can be significant within the process of ecological becoming, in different times and places, both in encountered moments and through recounted stories. Children, like adults, draw upon ecological memories, recalling and restorying in an ongoing process of relating to the natural world. Early experiences, however small they may appear to the adult gaze, afford children opportunities to make kin with other species.

Figure 14, was taken during research at Grass Roots Forest School, where participants were immersed in nature: digging, planting, clearing, creating and cooking together. The research examined the roles of skilled forest school mentors in addressing the disengagement, marginalisation or exclusion of young people from a deprived urban area, who are also those less likely to be able to spend time in nature (Natural England, 2019). Such nature experiences away from classroom and cityscape are particularly urgent for students who may feel marginalised, penned in or adrift.

Here, these young people see themselves differently, as learners (Youdell, 2006), as part of the local and wider community and as nature. Through relational becoming, the layers of being and becoming are interwoven, like onion layers. These young people need quiet moments and safe spaces to remake every layer, to step back, catch their breath and only then explore themselves as childhoodnature.

Figure 14. A safe space to become in nature

Climate change education should be a globally inclusive endeavour. However, research and practice largely focus on the minority world (Rousell & Cutter-Mackenzie-Knowles, 2020), yet children in the majority world "face the greatest risks from climate change" (Currie & Deschênes, 2016, p. 3). Figure 15 portrays childhoodnature at the margins: a school for the unschooled in a kampung, Jakarta, Indonesia. In the kampung, human and nonhuman health is degraded, and wildlife is scant due to long-term environmental depredation. Informal dwellings sit among dereliction and smouldering rubbish, and the air is toxic from burning plastic.

Figure 15. Childhoodnature at the margins: an open-air school in South East Asia

This open-air charitable school offsets degradation effects, fostering local social and environmental justice. Children, who would otherwise be begging or scavenging, have access to healthy local food (cooked in situ), fresh air and green space. This Indigenous-style school is constructed from steel, bamboo and thatch with living walls that are home to orchids, creepers, ferns, insects, lizards and birds. In this childhoodnature setting, Indigenous species thrive. Children breathe, play and grow, becoming relational with Indigenous ecologies.

Figure 16. Response-ability for climate change justice

Figure 16 features the only school climate striker from Chinchilla, Australia, sitting in the shade of a watermelon, a powerful image because Chinchillans are proud watermelon producers. However, with the discovery of coal and gas, this identity has been eroded. Now, the town resembles a transitional mining community, with livelihoods dependent on fossil fuels.

In the school climate strikes, children and young people exercise responsibility and enact "response-ability" (Haraway, 2016, p. 34), the ability to respond to injustice continuingly by cultivating "collective knowing and doing". The strikes present opportunities for teachable moments, activism and shifting ethical practices toward social *and* environmental justice. Education should engage in conversations about climate strikes. Otherwise, we risk transferring all responsibility to learners without giving them the tools or agency to act.

Conclusion

The eight photographs represent Significant Life Experiences (Chawla, 1998), here manifesting hopeful and relational understandings of our role *as* nature. Reorientating education towards interconnections and decentring humans will transform approaches to climate change education.

This essay aims to provoke a cultural shift towards viewing humans as nature in order to tackle the climate emergency. We argue for more space in education for nature relations, slowing down, learning and becoming with nature to build learners' understanding of themselves as childhoodnature

(Cutter-Mackenzie-Knowles et al., 2020). Nature relation experiences are indoors and out, formal and informal, curricular and extra-curricular and should be an inseparable part of education.

Nature relations benefit *all* learners, including urban children, where "nature" is harder to find, especially those at the intersections of social disadvantage, who have less access and opportunities for becoming relational with the natural world (Natural England, 2019). Equally, nature relations benefit rural children, including the millions in the majority world who live extremely close with nature and in ways others can learn from. Relational becoming is vital in recognising, sustaining and regenerating natural environments and an imperative for human well-being. A relational approach expands educational horizons, acknowledging that the futures of all lifeforms are intertwined. Climate change education must decentre humans, ensuring efforts to address climate emergency consider humans and nonhumans concomitantly.

Prioritising nature relations is essential because knowledge and skills alone will not solve the climate emergency (Kollmuss & Agyeman 2002; Rousell & Cutter-Mackenzie-Knowles, 2020). A relational shift can be foundational for action because learners come to see themselves *as* nature, interconnected with all life, provoking an imperative to act and a more response-able approach. "Nature relations" is not a romantic or idealistic notion, nor is it new. The concept has complementarity with–and is underpinned by–Indigenous philosophies, which have avoided anthropocentric destruction by living relationally for millennia. More than ever, all humans must understand our lifegiving entanglements with more-than-human nature.

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Eco-citizenship Development in a High School in Mexico

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Summary
This contribution presents an experience of climate change education in a technical high school in Mexico. The project focused on generating eco-citizenship in the students' own communities; it encouraged collective action around the causes and impacts of climate change. The results reveal the relevance of incorporating these work perspectives and articulating both traditional and scientific knowledge.

Keywords
Technical High School
Climate Change Education
Eco-Citizenship
Project-Based Learning

Introduction

The incorporation of climate change education in the national educational system in Mexico has been a nonlinear process emerging from ecological approaches and scientific literacy. Climate change education has become one of the environmental education themes in secondary schools, cutting across the curriculum in the current educational model for high schools. In this paper, I present my experience of climate change education developed in the Chemistry II course with first-year students in a technical high school in Xalapa, Veracruz, Mexico. I used a project-based teaching and learning approach to address mitigation and adaptation to climate change. The region is socially and economically vulnerable, and the geoclimatic context is distinguished by its high vulnerability to hydrometeorological impacts aggravated by climate change.

I divide the paper into three parts. In the first part, I show some pedagogical and curricular characteristics of the technical high school. In the second, I detail the experiences of climate change education, and finally, I conclude with some reflections.

Climate Change Education in Technical High Schools

High schools in Mexico comprise three years for students between 15 and 18 years old and are part of children's compulsory education. The technical high school is distinguished by being dual-purpose: the graduate obtains a double degree, consisting of a high school certificate and technical college degree. The latter is in one of the 19 technical careers offered by the Ministry of Public Education/ Secretaría de Educación Pública (SEP). The most recent educational reform in high schools (SEP, 2017) incorporates climate change education as a cross-curricular topic in the subject area of science, technology, society and environment (STSE). The purpose of the reform is for high schools to develop conscious and active citizens who are able to face socioenvironmental realities through competency-based learning. This is characterised by attention to conceptual, procedural and attitudinal dimensions.

With these pedagogical elements, a climate change education experience was designed for the Chemistry II course to address climate change through the development of eco-citizen competencies. These competencies are a complex form of learning with the general objective of developing student capacity to learn, to transform their learning into action and to invigorate and integrate local knowledge, attitudes and values from their sociocultural context, both individually and collectively, when they are faced with the environmental challenges of climate change (Bello Benavides, 2017; Sauvé, 2014). The pedagogical approach took the form of education for action, which, according to Meira-Cartea, "is a specific area of environmental education that aims to design and develop educational responses based on informed decisions that are intended to be effective in the context of the climate crisis" (2019, p. 1).

The Educational Project

The experience was developed in a technical high school located in Xalapa, Veracruz, Mexico. It is an urban school with a student population of 2,150 students. The study population consisted of 48 first-year students between the ages of 15 and 16 years old. The activities were developed by three professors who taught Chemistry II and were coordinated by the author.

The purpose of the project was to develop eco-citizen skills among the students through a project-based methodology aimed at mitigation and adaptation actions against climate change. The project was implemented during one semester. The methodological plan is detailed in Table 2.

Table 2. Methodological plan for the project "Eco-citizen actions for mitigation and adaptation to climate change"

Stage	Activity
Design	Formulation of objectives
Planning	Design of educational activities to be carried out, follow-up strategies for each activity and an evaluation. Pedagogical approaches and regional socioenvironmental conditions on climate change identified
Development	Monitoring and evaluation of the activities carried out
Evaluation and analysis of the results	Analysis of the results in light of the theoretical approach formulated

Table 3 summarises the development path of the project. It should be noted that each student group developed an average of 10 projects throughout the semester. Special emphasis was placed on applying the content of the Chemistry II course to everyday environmental problems to better understand them. Additionally, the project proposals had to have a scientific basis relevant to the identified problem. Thus, it was possible for students to develop projects on the climate change issues that they faced every day and to formulate possible solutions.

Table 3. Methodological approach

Stage	Activity
1. Exploration	Identify local causes and impacts of climate change
2. Project presentation	Presentation of a project related to climate change mitigation and adaptation actions in the local and regional context
3. Previous knowledge	Identification of the necessary chemistry contents Developing a plan for gathering and managing information
4. Preparation of short papers on the project	Investigation of the characteristics and elements of the selected issue or problem
5. Development of a work plan	Development of activities and monitoring of each project; activities included visits to research centres, field visits, interaction with expert guests
6. Communicate what was investigated	Project presentations: video, model, prototype, wall newspaper, brochure, in class and in the local social space where it was developed, e.g. family, neighbourhood, school
7. Coevaluation and self-evaluation of individual and teamwork	In plenary, reflection on the impact of each project on the selected social space, on the eco-care competencies deployed and on the socioenvironmental relevance of the applied knowledge

Results and Conclusions

Analysis of the climate change education that unfolded showed that all the issues were linked to climate change, within the immediate contexts of the students. For example, the students developed projects on reducing the consumption of red meat, making home gardens, reducing solid waste from food consumption, consuming local products, making homemade biodigesters and more. Progress was made in the development of a complex vision of the phenomenon and relating content from the various fields of knowledge that affect climate change and responses, with an emphasis on chemistry. It was possible to use, as well as transcend science content knowledge about climate

change, through teaching and learning about the biophysical, environmental and sociopolitical dimensions of climate change. Of special relevance were the spaces for critical discussions of the local and global socioenvironmental reality. This made it possible to reflect on the social dimension of climate change and eco-citizenship as a way to develop mitigation and adaptation actions.

The educators were particularly interested in including specific chemistry topics such as stoichiometric and enthalpy calculations[1] to understand concepts such as carbon footprint and energy consumption. This knowledge was input for the formulation and development of the various projects, exemplifying the integration of the STSE approach. Likewise, the content knowledge was linked to the actions and attitudes that responded to local climate change problems. Project-based learning methodology seems to be a pertinent didactic strategy for the development of eco-citizen competencies among high school learners.

However, for such a methodology to be successful, it is urgent to deepen teachers' pedagogical knowledge related to climate change and climate change education and to address these issues from complexity and STSE perspectives. In the current study, I noted that incorporating climate change education into teaching activities represented a didactic challenge in terms of designing learning experiences that included conceptual, procedural and attitudinal dimensions. Therefore, I recommend that teacher training programmes on climate change education should be developed.

On the other hand, I identified that to develop climate change mitigation and adaptation competencies among students, it is necessary for them to understand the complexity of local and worldwide impacts. An example of this complexity is the relationship between climate change, health, water scarcity, food production and human migration. In addition to developing scientific literacy, educators also need to develop collective and eco-citizen actions to address climate change (Sauvé, 2014).

Considering the above and the climate emergency that humanity is facing, it is urgent that governments incorporate climate change education into the school curriculum. This includes putting knowledge into action and using eco-citizen development approaches to enable societies to collectively face the impacts of climate change. It is necessary to teach students not only theoretical knowledge about climate change, but also how to develop action strategies. This is where the project-based approach to climate change education described in the present paper becomes relevant.

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Endnotes

1. Stoichiometric and enthalpy calculations refer to energy and matter conversion calculations in chemical processes, respectively.

Part 4

Engaging Diverse Knowledges in Climate Change Response

University–community Engagement in Mozambique

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Summary
Lurio University has been implementing the One Student One Family outreach programme as a compulsory subject at the Faculty of Agrarian Sciences at Lurio University, Niassa Province in rural Mozambique. Students experience the daily routines of small-scale farmers and coconstruct sustainable farming knowledge with them. This model for universities could improve agricultural sustainability in Sub-Saharan Africa under changing climate conditions.

Keywords
Climate Change
University
Sustainable Agriculture

Introduction

This paper was written within the context of participatory social education for sustainable agriculture in Sub-Saharan Africa with the objective of showcasing an outreach programme implemented at the Faculty of Agrarian Sciences at Lurio University, which is in the Niassa Province of Northern Mozambique. It could be a viable model of knowledge and technology transfer between the academy and small-scale farmers to promote sustainable agricultural practices. The name of the outreach programme, One Student One Family, reflects the approach in which students have a curricular obligation to interact with farming families throughout their studies under the supervision of their teachers. This paper analyses the outreach program by looking at the literature on sustainable agriculture, and identifying local potential in relation to the outreach program. The crucial features in this model of interaction between academia and farmers communities, such as systematic and intensive knowledge and technology transfer towards sustainable agriculture practices, are highlighted.

Outreach Programme Description

Agro-ecological profile of Mozambique

Mozambique has a total land area of 799,380 km^2, with a 2,470 km shoreline on the Indian Ocean. The country is endowed with substantial natural resources, with approximately 50 million hectares available for agricultural production. Despite steady economic growth over the last two decades, more than 66% of the population still live on less than USD 1.90 a day, and 55% live below the national poverty line, with rural poverty being more pronounced (Food and Agriculture Organisation of the United Nations, 2015).

The agricultural sector is the mainstay of the country's economy, accounting for approximately 79% of total employment and contributing an annual average of 18% to the Gross Domestic Product (GDP) (World Bank, 2015). In Mozambique, this sector has high a large potential to contribute to poverty reduction and to alleviate food insecurity. However, this has been significantly impaired by the absence of an agenda focused on equity in agricultural

development and economic growth, as well as by the impact of climate hazards, causing annual losses of US$ 790 million (United States Department of Agriculture [USDA]; 2015; Instituto Nacional de Estatística [CIAT], 2017).

Mozambique ranks among the most vulnerable countries in the world in terms of weather variability and climate change, with hazards such as droughts, floods and cyclones. To cope with these threats, farmers have adopted low-input and cost-effective climate-smart agriculture (CSA) measures, such as small livestock rearing, intercropping, crop residue management such as mulching and the incorporation of manure and animal waste into the soil. Because farming is an important contributor to the country's greenhouse gas emissions and given the mitigation opportunities of many CSA practices and technologies, there is a need to systematically integrate mitigation into agricultural development policy and programming, alongside existing adaptation and productivity goals (USDA, 2015; CIAT, 2017).

University profile

Established in 2006 as a public higher education institution, Lurio University is intended to become a major university servicing the country's three most northern provinces: Nampula, Cabo Delgado and Niassa. The latter is situated along the south eastern shores of Lake Malawi. The first student intake occurred in 2007 at the university's main campus in Nampula. A satellite campus opened in 2008 in Pemba, the provincial capital of Cabo Delgado. A third campus in Niassa offers courses related to agriculture and rural development. After 10 years of operation, Lurio University opened a fourth campus: a Business School in Nampula City, and a fifth campus, the Faculty of Social Sciences and Humanities on Mozambique Island. In Niassa Province, the Wanangu campus hosts the Faculty of Agrarian Sciences, offering undergraduate programmes in forest engineering, rural development engineering and animal husbandry engineering, along with a postgraduate programme in rural development. Currently, the university has around 4,889 students both at the undergraduate and postgraduate levels, over 468 lecturers and 346 nonteaching staff. The university currently offers 36 courses, of which 22 are undergraduate and 14 are postgraduate.

Locality profile (Niassa Province)

Niassa Province has an area of 129,056 km^2, with Lichinga being its capital city. The province is divided into 16 districts and five municipalities. Since 2017, Niassa has had a total population of 1,865,976, which is about 6% of the national population (Instituto Nacional de Estatística, 2018), with the lowest population density in the country (14.5 inhabitants per square kilometre). About 51.7% of the population is female. The economy is dominated by subsistence agriculture, and a few cash crops, including cashews, sesame seeds and cotton. Artisanal fishing and livestock production are also important subsectors in the socioeconomic life of the population for employment, income and food security. Large-scale graphite and limestone reserves can be found in Niassa. Tourism, including hunting, in the Niassa National Reserve are important for the economy of the province. Niassa Province is responsible for 2.7% of Mozambique's GDP, and 66.7% of the population of the province lives below the poverty line (Governo da Província do Niassa, 2017).

Programme design and philosophy

The outreach programme, which is known as One Student One Family, was introduced in 2007 at the Faculty of Health Sciences with the opening of the university. Within this faculty, a multidisciplinary team of students is allocated to a family with which it will interact by giving basic health care throughout their studies, here under the supervision of their teachers and extension technicians. One year later, this community engagement approach was included in all undergraduate programmes offered by the university in the three provinces of the northern region and in all the seven faculties. Each undergraduate programme has one compulsory subject related to the implementation of this outreach programme that is taught from the first to the last year of studies. The underlying principle of the programme is that students should become familiar with the surrounding communities' realities as part of their preparation for future professional careers; this is aligned with the institutional vision, which aims for the programme to become a channel for knowledge and technology transfer between the university and farmers' communities.

All undergraduate programmes at the Faculty of Agrarian Sciences are four years in duration. Each year, there is a subject related to the One Student One Family programme. Students are assisted by two important institutional units: the Production Sector and the Extension Programmes Department, here under the supervision of the deputy director for pedagogical issues and the deputy director for extension.

Students must prepare for the programme, which includes a 15-day stay as a member of a small farmer family in the community. This means submitting to the family rules and routines at the same time as fulfilling the pedagogical objectives of their teachers, who are expected to set up contacts and manage the logistics. They must hold separate predeparture meetings with students and community members, addressing the objectives of the programme, codes of conduct and technical procedures, such as the monitoring and evaluation process.

Small-scale farmers who are host families have to receive students in their homes and live with them for up to 15 consecutive days. Students bring knowledge and technology, as well as basic food baskets to alleviate the family's burden of hosting them. The local authorities are made aware of this

process. As new members of the farmers' families, the students must follow home rules and perform the tasks assigned to them. Each group of students is composed of representatives of all the three majors taught at the faculty, namely rural development engineering, forestry engineering and animal husbandry engineering. The students do housework and farming, including tasks such as cooking, homework supervision, cleaning the house and washing dishes. While performing these activities, the students are intended to find opportunities to talk about efficient farming practices, good nutritional practices, climate change and economics. Teachers do not stay in the communities for the entire period but pay occasional field visits as part of their monitoring tasks. In total, this programme has reached about 150 small-scale farmer households in the 12 communities surrounding the campus. Although all the stakeholders have expressed appreciation for the programme, the duration of the stay has recently been decreased from 15 days to 10 days or less. This constraint has serious implications for the training of the students and achieving knowledge and technology transfer between the university and communities. The main reason for this constraint is the inadequate finances available from the institution to cover the costs of 15-day stays. In fact, the institution strongly relies on central government funds, which have been decreasing year on year over the past decade.

Potential for scaling up

Sustainable agriculture practices are crucial for food safety and security in Northern Mozambique, which has been hit by extreme climate change–related events, such as drought, heavy rains, strong winds and floods. The Faculty of Agrarian Sciences has been interacting with local small-scale farmers since 2009, which is when the outreach programme was introduced in that particular faculty. The faculty leadership and the community of small-scale farmers gained mutual trust and developed a positive relationship with local authorities and community and household leaders. With proper financial and technical support, the One Student One Family programme can become the best platform for enabling knowledge and technology transfer from the university and its partners to small-scale farmers. The interaction of state agrarian extensionists with farmers cannot be compared with the approach of the One Student One Family programme. The latter substantially influences families' mindsets and daily practices as a result of its proximity, systematic nature, continuity, duration and intensive contact. This approach reduces the elite status of university students, bringing them into the households of ordinary small-scale farmers, where they become sons and siblings. The students and farmers have built relationships that allow the parties to communicate frankly, based on mutual trust and respect. This programme has managed to make itself a model for transformational interaction with local communities, particularly in terms of promoting sustainable farming practices.

Discussion and Conclusion

Persuading small-scale farmers–the biggest contributors to food security in the country–to adopt environmentally sustainable farming practices is of the utmost importance. To conclude, insufficient knowledge and technology transfer from research centres to farmers is one of the main constraints for the effective practice of sustainable agriculture in Mozambique (World Bank, 2017). Local governments and development agencies need to recognise the crucial role that universities, such as Lurio, are playing, when it comes to building platforms for facilitated interaction. This is based on over a decade of experience of working with communities, with the on-site involvement of students, here as part of a compulsory subject. Another aspect worth mentioning is the urgency of finding viable pathways to reach out to rural communities to generate change in Mozambique. Alternatives to government schemes are necessary because in general, communities have lost trust in the government. Thus, it should become compulsory for universities teaching agrarian education to include approaches like the One Student One Family, which can be driven by those universities. The government could introduce policies and strategies that promote agricultural practices based on scientific evidence and develop clear guidelines and regulations that incentivise the construction of networks between those who produce knowledge and technology (higher education institutions) towards those who need it for the benefit of their economic activities (farmers and extensionists) and, finally, provide adequate technical and scientific support from university staff during the implementation of their projects.

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Diverse Ways of Knowing: Challenges for Responding to Climate Change

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Summary
Climate change adaptation must include the recognition of uncertainty. This requires modes of learning that are strategically and practically flexible, adaptive and sensitive to actors' situations and orientation. Designs for future climate change education can draw on the seven-year program for building resilience to climate change in the transboundary Olifants River Basin to deliver transformative praxis innovations.

Keywords
Codesign
Coconstruction
Systemic And Transformative Social Learning

Background

We report on a research and development programme (2012–2019) aimed at building resilience in the Limpopo River basin located in the south eastern region of Africa (Association for Water and Rural Development [AWARD], 2018). The majority of the residents of the river basin are confronted daily with the challenges of increasing poverty, health risks, water insecurity and environmental degradation. These factors are compounded by climate change, which exacerbates food and water security challenges. There are major implications for agricultural practices. Governance is complex, and social system breakdown is a real risk (Kong et al., 2020; Pollard & du Toit, 2011a, 2011b; Pollard et al., 2014).

This paper is based on a synthesis of the highlights and suggested policy responses from the RESILIM-O project conducted by the research and development organisation, AWARD, with USAID funding. The project has focused on enhancing the resilience of the Oliphant's River Basin, which is part of the larger Limpopo Basin. We begin with an overview of the theoretical underpinnings and then justify and explain the conceptual framework that informed the activities. These were conducted as a basin-wide programme that aimed at building regional resilience. The key outcomes of these activities are discussed, and crucial policy-related suggestions offered.

Theoretical Underpinnings and Justification

The programme's original five-year time frame for addressing climate-related actions was intended to be prudent and

focused. Building on prior experiences (such as the Save the Sand Project (Pollard et al, 2008)), and working with partners such as local government, national government Departments of Agriculture and Water Affairs as well as conservation entities such as South African National Parks (Pollard et al., 2011), AWARD set out to design basin-situated activities associated with resource protection measures, rehabilitation initiatives and developmental activities that could contribute to climate change adaptation.

Drawing on complexity and systems theories (Cilliers, 1998; Holling, 2001; Ison, 2010; Walker et al., 2004), the basin was initially framed as a complex, open ecological system (Berkes et al., 1998), hence necessitating an approach that explicitly recognises change, heterogeneity and variability as the key characteristics but, at the same time, accepting the possibility of responding purposefully to unfolding climate change scenarios. Over time, this framing was consolidated as a basin that is a coupled, coevolving human and ecological system within a failing–or nonresilient–catchment governance system.

In reconceptualising governance systems, Ison and Straw (2020) point to the need to invest in recovering systemic sensibility, as well as building systems literacy and systems thinking in practice (i.e., praxis), among practitioners-stakeholders. These capabilities are needed because there can never be a "correct" answer or collection of answers to exactly what constitutes improvement in coupled, coevolving systems. In the field of hydrology, for example, understandings are shifting to an appreciation that because of human-induced climate change, stationarity is "dead"; that is, we can no longer pretend that the past can be used to predict the future (Milly et al., 2008). The realisation that we are inhabiting a territory new to human history–and in a radically new and uncertain world–highlights the quality and types of learning needed for adaptation to change.

In the face of this uncertainty, AWARD drew heavily on transformative social learning scholarship (Ison et al., 2013; Mostert et al., 2007; Reed et al., 2010; Wals, 2007), with the pursuit of social learning as a process based on "learning" in a very broad sense, including new understandings, identity development, change of practices, institutional development and agency building. It also included developing trust and a collective identity, and the ability to self-organise and self-regulate as the key attributes for ensuring collective action (Ison, 2010; Pollard & du Toit, 2013; Proost & Leeuwis, 2007).

Enacting the Project Design

As a river basin programme, RESILIM-O had to respond to a considerable and challenging spectrum of diversity. A variety of legislative frameworks with the associated obligations and implications for practice meant that institutions and government departments were not necessarily aligned with the same, or a similar vision, as each other. The practitioners were not familiar with each other's ways of working. The combination of sectoral interests, commercial endeavours, social benefit and conservation programmes had precipitated tensions and conflicts of purpose over time. Differences in intentions and ideologies associated with solutions and responses have emerged over varying time frames and in response to differing contexts and scenarios, as well as to the perceptions of political and economic systems. The challenge of alignment has been exacerbated by differing commitments to shared cultural beliefs, languages and knowledge systems. Equally challenging was the coexistence of plural governance arrangements in the African context, where traditional and contemporary governance systems with different decision- and meaning-making systems have far-reaching implications for civic engagement.

Given this complexity, we adopted a collaborative and colearning approach to programme design from the outset, where stakeholders were engaged in understanding the basin as a complex, socioecological system with socioeconomic, politicoeconomic and ecological attributes and, critically, where values could be made explicit (Pollard et al., 2020a). In doing so, the stakeholders were able to name what mattered to them and learn of each other's views, understandings and concerns, as well as integrate with "expert knowledge"', which was shared in appropriate ways. Working in this way, a diversity of knowledge was taken to be an asset. Based on this shared systemic understanding and recognition of the "other", the stakeholders moved toward collectively identified risks and priorities for action, or "places to intervene in the system" (Meadows, 1998).

Only then did the project move into project implementation and use a common thread of resilience-building (Pollard et al., 2020b) to work with project staff and partners around ideas of learning, reflection and adaptation. To a large extent, resilience-building, in this context, was about responding collectively to common-pool resources that are under pressure. In this regard, catalysing and supporting networks for collective learning became critical across the focus areas, which included water governance (Pollard et al., 2021b), civil society organisations (Du Toit et al., 2020), agro-ecology and food security (Du Toit & Mkhabela, 2020), land reform and beneficiation (Pollard et al., 2021a), climate change for disaster preparedness (Kong et al., 2020) and youth empowerment (Mponwana & Du Toit, 2020). Finally, a dialogical approach to climate change literacy was embedded in all project areas through a systemic, social learning design (see Pollard & de Villiers, 2020).

In this context of "diverse ways of knowing", the programme set out to build on dialogical learning (Freire, 1970;

Habermas, 1984) by introducing the various stakeholder groups to adaptation actions through a social learning process. Building on the ideas of Communities of Practice (Lave & Wenger, 1991; Wenger, 1998) and Engeström's expansive learning (1999), we offer the following reflections on "learning" in such contexts:

1. Starting with what is meaningful and what is locally understood is valuable for developing responsivity because doing so integrates local knowledge into planned responses.

2. Social groups – or any group characterised by sustained interaction and relationships – can build up experience to cope with changes through social learning because this creates localised knowledge systems, comprising sets of actors, networks or organisations that enhance adaptation by improving linkages between knowledge and the environment.

3. Social learning can be beneficial to sustaining strained common-pool resources by advancing collective actions with transformative potential based on shared problem framing, as well as commitment to design and implementation strategies.

4. The use of "blueprints and toolkits" robs the social learning process of the prospect of learning in specific institutional contexts and should be undertaken only with knowledge of this risk.

5. Standardised campaigns and messaging can be troublesome and confusing when they meet with a diversity of discourses and practices across multiple domains.

6. Decontextualised climate change messages can be experienced as disempowering and of little value if they are not linked to localised, transformative learning processes. There is an increased risk of this where language translation is an imperative.

Conclusions

Our experiences contribute to a growing body of work that recognises the importance of systemic, social learning for working with multiple knowledge systems in contexts of uncertainty and complexity, such as human-induced climate change.

At its core, the programme adopted social learning as a process of coenquiry and codesign, working across multiple scales, from local realities to regional and national governance. Starting with "what matters" to different stakeholders, the facilitated process gave rise to negotiated understandings and adaptation options. To build preparedness and responsiveness in diverse situations, we maintain that transformative social learning for climate change can be embedded across multiple fields of practice. The understandings and capabilities to engage in these practices as coinquirers, codesigners and coevaluators will be needed in by the alumni of future climate change education initiatives.

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Rethinking School–community Participation Policies in Times of Climate Change in Mexico

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Summary

This article describes a case of active and situated pedagogy in Mexico. It proposes rethinking school–community participation policies in times of climate change. The authors argue that exploring climate change at school from a situated perspective, while also including local knowledge and practices, helps understand it and generate actions to find solutions.

Keywords

School–Community Participation
Climate Change
Situated Pedagogy
Active Learning

Introduction

Climate change is a global phenomenon that may be considered one of the greatest matters of concern in the twenty-first century (González et al., 2020). The sixth report of the Intergovernmental Panel on Climate Change (2021) offers detailed analysis of climate change in Latin America, with relevant information that can help assess the risks and prepare countries to adapt to and face this phenomenon at the regional level. In recent decades, extreme temperatures, heavy rainfall and long periods of drought have impacted millions of Mexicans in their daily lives (Arreguín & López, 2013), particularly in terms of access to basic elements, such as food and water, thus compromising their quality of life. Educational actions need to be geared towards developing a better local understanding of climate change and actions in the local context focused on adaptation and impact mitigation.

Although climate change is a global problem, its regional and local manifestations are varied and, as such, are interpreted and addressed in different ways, here depending on local Indigenous knowledge and practices available in different contexts. In Mexico and Latin America, food production and access to enough good quality water are undoubtedly the two main concerns (Odeku, 2017) when it

comes to affecting rural and Indigenous populations that have historically been made vulnerable, as well as urban populations living in vulnerable conditions.

In our research project titled "Towards a new pertinence and relevance of rural and Indigenous education: situated learning for sustainability drawing on local narratives about socioecological concerns, knowledge and practices and their articulation with the national curriculum", we collected empirical evidence (Martínez, 2021; Mendoza et al., 2022; Sandoval & Mendoza, 2021) indicating that in basic education, schools in Mexico have failed to address climate change. Local impacts should be known, understood and dealt with straight away. Additionally, local and Indigenous knowledge practices are undervalued and absent from educational processes (Sandoval, 2019), including those related to caring for nature and adapting to climate change. Based on our field work in several states in Mexico, we have identified that exploring climate change, including its impacts and the knowledge and practices generated to face this global challenge from a situated perspective at school, creates better understanding and potential for proposals and actions aimed at finding solutions. To this end, it has been necessary to rethink the notion and practice of family and community participation in educational processes, making it possible for us to offer recommendations on how educational policy can impact social participation and, specifically, family participation.

In Mexico, every school within the basic education system has a school council for social participation (CEPS, per the Spanish acronym), with parents as the main members, along with the potential for other community members to participate. The council members can express opinions and proposals regarding teaching matters, syllabi and curricula, as well as educational matters in general (Diario Oficial de la Federación, 2014). Yet parents rarely perform this function, and CEPSs have focused on nonacademic matters related to school administration, the use of economic resources and accountability (Mendoza, 2017).

We argue for rethinking and refocusing participation around teaching and curricula. This should be based on the most pertinent local concerns, making use of the knowledge of families and communities and the practices they perform daily. This argument stems from Freire's alert on the epistemological error that what people know and do in their daily lives fails to be included in school (Freire, 1997). The SARS-CoV-2 (COVID-19) pandemic and its implications for home schooling in Mexico between March 2020 and July 2021 led to (1) strengthening the role of families in children's education and (2) highlighting the importance of teaching and learning about climate change and how to respond to it during the pandemic. Therefore, it is essential to engage the knowledge and practices of communities and families, both current and past, and introduce them into school learning processes in a reflexive and critical manner. If participation is promoted and valued, families will perceive themselves as being important players in situated and collaborative educational processes, based on their knowledge of and practices around nature and adaptation and mitigation of climate change at the local level.

A Participatory Pedagogical Model

In the face of climate change, we propose rethinking the policies related to families' participation in educational processes to include Indigenous knowledge and practices. We discuss the design and implementation of a situated learning pedagogy that we built collaboratively with teachers from different communities in the rural and Indigenous areas of Mexico since February 2019. The project includes both virtual and face-to-face training of basic education teachers, teacher trainers and student teachers, along with support for designing and implementing learning progressions inspired by the work of Edwards (2014), which was adapted by O'Donoghue (2014) for the South African context and then readapted for the Mexican context (Sandoval et al., 2021). Our proposal includes a four-quadrant model for designing learning progressions (see Figure 1) that can inform the design of course work materials for teachers. In Mexico, these materials focus on the local socioecological concerns, knowledge and practices linked to the school curriculum for situated learning (Lotz-Sisitka et al., 2017). Families provide the local component that draws on the past, present and envisioned futures.

Working with this pedagogy, we address climate change through local situations that we have identified during our fieldwork and that spark interest and concern. These include access to sufficient quality water for human use during long periods of drought, floods, soil loss and wildfires. We design learning progressions collaboratively with teachers, who help children learn about and start from the context where the school is located. We begin by working with teachers on identifying concerns in their work context and also documenting community knowledge and practices through their own narratives. Then, we link local knowledge to the curriculum. The process aims at designing learning progressions around local climate change concerns. For instance, a common concern in several regions where we worked was access to water after long droughts. These progressions were an opportunity to address topics such as hydrological cycles, the right to water and the role of women in accessing water.

Figure 17. Learning progressions (Quadrant 1–4) adapted from Edwards (2014) and O'Donoghue (2014).

Source: Sandoval et al. (2021)

In quadrant 1 of the learning progression, we explore what students already know and have experienced about climate change. We explore what the official curriculum and textbooks say about these phenomena, and we access local knowledge through the narratives that teachers have compiled from their families and other community members.

In quadrant 2, the students investigate how the phenomenon manifests itself in the daily lives of their families and the community, which is done by using tools and methods such as questionnaires, observation, interviews, conversations and involvement in practices. This includes how climate change is interpreted locally, its repercussions and how people adapt to its impacts. Family participation plays an important role in this pedagogical process. In this way, families bring forth their knowledge and experiences, which historically have been largely excluded from schools; they also share their knowledge and experiences of adaptation. This becomes the raw material that children and teachers explore for a better understanding of the global phenomenon in their local context and for learning in a situated, contextualised way.

In quadrant 3, the students present the results of the inquiry in the classroom. These are analysed collectively by teachers and students to identify patterns and characteristics, compare results and come up with possible solutions to the issues. This presentation strengthens the children's ability to ask, share and analyse individually and as a group. Our research shows evidence of children drawing conclusions; for example, during long droughts, not only is access to water for human and animal consumption compromised, but also there are more fires and the soil is less productive because of high temperatures, which might lead to local food scarcity. Learners also find that deforestation reduces water filtration during periods of heavy rainfall, and these learners can recognise that mainly women and girls walk long distances, carrying heavy weights of water, which can show them that this is not only an environmental issue, but also a gender and health concern.

Finally, in quadrant 4, with the support of teachers and in collaboration with the community and families, the children apply the plans they have made, based on their analyses, and take actions aimed at change. Inquiry and analysis lead to actions based on what they have learned. We call this "change challenges". For instance, children find out that during long droughts, the water supplied to the community is not enough for all the families in the community. This forces families to collect stagnant water from areas shared with livestock, which is unsuitable for human use, including bathing or washing dishes. When it is used out of necessity, it has caused skin and eye problems. In one case (Martínez, 2021), a water filter for home use was created to address this situation, and the children were familiarised with this process.

Findings

The research project offers useful insights that can lead to recommendations for a school–community participation

policy that rethinks the value and potential of families' knowledge and practices in the face of climate change.

Using the four-quadrant learning progression model, families' participation in situated learning processes is transforming the way in which families have historically engaged with schools. Previously, schools have largely excluded local knowledge. Based on this project's findings, we maintain that the pedagogical process in which children learn and reflect on their context through dialogue between local and school knowledge cannot succeed without family participation. In this way, children and teachers discover that families are the bearers of knowledge that they can draw on to strengthen lessons learned. This leads to children and teachers appreciating families' knowledge and learning to value local knowledge for understanding global phenomena.

Recommendations and Conclusions

First, we recommend the monitoring and participatory assessment of teaching proposals such as ours, which contribute to situated learning processes in collaboration with families, because these play an important role in facing the impacts of climate change and are the tools for developing accompanying education processes. Our second recommendation is to provide supportive training for teachers in relevant situated learning approaches, for example, applying the four-quadrant model, to face the current socioecological crisis. This contrasts with the more common "cascade" type of training offered to teachers in Mexico, which generally fails to provide follow-up activities. A supportive training process provides temporary mentoring after the initial workshop by the research team, with a view to situated appropriation and reflection on the design and implementation of learning progressions by teachers.

With the supportive, accompanying training model that we have developed, teachers can learn to recognise the context in which they work from a social and ecological perspective. This allows them to analyse which instances of situated learning are relevant in their work context. Socially, teachers find out that family knowledge is relevant for igniting those teaching processes necessary for understanding their context. Ecologically, teachers learn that the problems associated with climate change are interconnected, giving them the opportunity to link the school curriculum to the environmental context. Conceiving teachers as agents of innovation and change is an important step to be taken by decision makers in the education sphere.

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Part 5

Young People and the Call for Climate Action

Regenerative Youth Futures: Learning Beyond Perfunctory Awareness and Behavioural Change

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Summary
The authors focus on regenerative youth futures in Africa by reflecting on their engagements with young people and children; they offer a space for conceptual untangling from the dominant educational discourse on climate change in postcolonial, post-Apartheid South Africa. They argue for epistemically just and historically reflexive climate change education, moving beyond approaches that focus on perfunctory awareness and behavioural change.

Keywords
Climate Change Education
Apartheid
Coloniality
Indigeneity
Epistemic Justice
Intergenerational Learning

Introduction

When "education" is called upon in response to a problem, there is a risk that summoning it might collude with systemic alienation. This happens if the assumption is that the problem lies only with the individual and their awareness, rather than with a historical and material system that we are collectively and unevenly locked into. We are not arguing against education, but we want to make space for reclaiming the essential part of human freedom that we call learning, and we want to think about this carefully with youth and children in the context of the "majority world". This piece is a collaborative dialogue between practitioners who are focused on regenerative youth futures in Africa. In it, we offer the space for a conceptual untangling from the dominant discourse on climate change education with young people and children in South Africa.

Our collective thinking implores practitioners, educators and policymakers to consider the historical imprint of Apartheid and coloniality and its impact on our collective understanding of contemporary environmental issues. It calls forth new coordinates for climate change education that rest on the precepts of a justice yet to come. It asks that we release the discourse of climate change education into a realm beyond perfunctory awareness and individual behavioural change. This entails a deep dive into our values and belief systems, while stirring up our critical thinking and grounding ourselves in the present moment.

Nokhutula

Once, during a conversation with a few of the learners at Isikolo Sama-Afrika,[1] in an attempt to ascertain what I might include in an environmental education lesson I was planning, I asked about their concerns about where they lived. The answers I got ranged from socioeconomic issues such as substance abuse, poverty, child neglect and violence to concerns about the quality of education they receive at school, including overcrowding in classrooms, lack of access to learning resources and teacher absence. The environmentalist in me waited to hear if they would mention access to clean water, waste (solid and sewage) removal services or the clearing of dump sites as some of their concerns. The learners later told me that they had devised ways to address and live with these issues and that they were not much of a concern to them and their families any more.

I also learned that in their spare time, the learners recreationally hunt for small animals and birds. They fetch wood to help keep their families warm and also as a way of earning money for themselves and to contribute at home. The much younger children collect wild fruits for food. This is also how they play: by identifying different bird and plant species in the forest across the road from the township where they live. These activities are, however, perceived by most youth as embarrassing because of their links with poverty. As a result, when they grow older, the children feel pressure to leave these "childish" engagements with nature to more "socially acceptable" recreational activities unavailable to them when they were younger.

At this point, it became apparent to me that the most appropriate approach to learning about climate change and the environment in this context would have to focus on the values and belief systems of our learners. When working with youth in a similar context, Farrington (2006) found that considering the social and cultural environments that children interact with provides invaluable insights into the social spaces of the youth. Although most environmental education has focused on behaviour change, tackling complex issues such as climate change requires more than awareness raising and changing attitudes. Enabling more radical critical thinking may be necessary to spur youth into action (Jickling & Wals, 2008; Mayer & Tschapka, 2008; Wals, 2011, as cited in Vogel et al., 2015).

Sanele

There are 40 participants in Isikolo Sama-Afrika, and they are between the ages of 7 and 16 years old. They live in Makhanda townships and face similar environmental challenges, including access to quality water, which is a threat to their survival and livelihoods. However, do these challenges translate into immediate concerns and social justice ills to be fought by those who are the most affected? In one of our first sessions, at the inception of the programme in 2018, we asked "Ama-Afrika"[2]: "Where do you see yourself when you're old?" The responses ranged from "a police officer, a nurse, a soldier, a cashier" to a shocking one: "*umlungu*" (a white person). "Why? Why do you want to become *umlungu*?" I pressed one m'Afrika, and without even a pause, the response was "because *abelungu* have money, and I want lots of money." It must be underscored that such a response emanates from a post-Apartheid context. What is evident here is that the prevalent discourses and imagination of what it means to be a "dignified human" in the world privileges whiteness, without any critical engagement of its foundations, its function and how it is sustained. In this context, future goals and orientations are trapped within colonial frameworks and limits. The future and its aspirations are predicated on material agency without a proper engagement of its limits.

When climate change education is conducted in this context, how does one begin to make sense of these entangled, violent and complicated colonially inherited logics? How do educational experiments and interventions make sense of the fact that after 1913, "the South African Native found himself, not actually a slave, but a pariah in the land of his birth" (Plaatje, 1916, p. 6)? The failure of popular and formal climate change education programmes to foreground the historical contours that make contemporary environmental issues a possibility is one of the limits plaguing policy interventions and curriculum approaches. The use of African concepts to grapple with these issues is marginal, if present at all, in these experiments, curricula and policy interventions.

Isikolo Sama-Afrika foregrounds three pedagogic approaches as a way to untangle ourselves from these traps, or to at least begin to make sense of them:

1. Centralise radical humanisation of the empty shells (Biko, 1978) that Indigenous people have become after many years of violent histories. This means starting with the question "*ndingubani mna*?" (Who am I?) How can "*iziduko/umlando/izithakazelo*" (oral histories) open epistemic frames of talking about oneself? It means saying I am Black and beautiful. It means being able to say I am enough.

2. Promote critical intergenerational learning. This originates from the Xhosa idiom, "*inyathi ibuzwa kwabaphambili*" (the buffalo is sought from the ones who are ahead), meaning wisdom is learned or sought from the elders. This means critically engaging with the "living archive" in the form of "*oomkhulu*" (elders) in the participants' communities and the "book archives" that are scattered across the archival repositories in South Africa.

3. Think in, through and across Indigenous concepts. An example is this discourse about the scarcity of water in Makhanda between two young Xhosa-speaking individuals. One tells her friend that "Water is scarce in this town" and the other one responds, "Really? You mean "*amanzi la kaNonkala?*" (water of the crab?) Water is a habitat for creatures like crabs. This shapes the relationship and engagement these speakers have with water. By paying attention to these linguistic cues, one finds that there is sociocultural knowledge embedded in concepts that may play out in such a conversation.

Injairu

How can we respond creatively to the risk of climate change education becoming "learning by dispossession" (Carpenter & Mojab, 2017), a learning that takes us further away from our lived realities, families and communities? A spiritual and material existential crisis is deeply inscribed into the ways of knowing that continue to highlight the "conditions of respectability" that coloniality inscribed (Akomolafe, 2017, p. 143). These conditions of respectability have included the motivation "to forget one's connections to the non-human world", the land and one's ancestors, rendering intergenerational memories of place and time as "fabulations of superstitious minds needing the benevolent doses of the 'real' that only whiteness [can] provide" (Akomolafe, 2017, p. 143). There is a dulling of the senses inherent in practices that write youth and children out of the futures that they belong to, which is done by diluting their connection to place and time. Here, the futures that one may aspire to are best envisioned as belonging elsewhere. We lean outside our realities to gain our dignity through aspirational values.

At the heart of this crisis is a failure of education systems at all levels to adequately grapple with issues of 1) "cognitive justice" where we can "recalibrate our relationships with language, meaning and knowledge(s)" outside of the main highways that have inundated us to date; 2) "affective justice" that advances the space for us to collectively and intergenerationally "digest, compost and re-configure the neuro- biological connections" that have been ruptured through the "trauma, fear, denials and addictions" of colonial modernity and 3) "relational justice"'' where we can adequately "enact politics from a space of collective entanglement" through an ethic of "radical tenderness" (Pedagogy of attunement, n.d.).These three configurations of justice give us critical coordinates for how one can conceive the vectors for ecological and economic justice and dignity in the global south. They also provoke important meanings for the evolution of climate change education approaches, and turn most policy frameworks on their head.

These three forms of justice identify the separation from ancestry, history and land as a no man's land in education, a hollowing out of possibility suspended in a liminal world. These coordinates necessarily move us past the barometers of "sustainability" as the primary vector for change, by challenging us to intergenerationally root ourselves deeper into the contexts that we are in, to nourish what is "regenerative", and what can generously "reconcile" us as humans in our relationships with nature, history and each other, through experiments that are "restorative" (Wahl, 2016, p117). This is situated learning that is contextually relevant and that works with the "undigested"[3] archives that already exist. It is a regeneration of the historical archive in a way that takes us beyond a desire to eat one another in the paradigm of war and coloniality, towards praxis that sparkles with revelatory potential for new ways that we can reclaim our relationships with ourselves, each other and the earth.

Towards Policy

With this in mind, the policy frameworks that chart a way forward for education systems should be deeply attentive to how the values that underpin the very "present" colonial and Apartheid pasts continue to shape how youth engage and make sense of themselves and their environment in profound ways. Policymakers should foreground Indigenous knowledge systems, epistemologies and anticolonial practices that take intergenerational learning and different visions of justice seriously when grappling with climate change education.

We wish to reclaim learning for the climate emergency by welcoming all entry points in the hearts of those who are learning. This begins by tracing the "'sociology of absences" (Santos, 2016, p. 157) that can call up the collaborative search for wisdom, heart, hope, courage and a sense of belonging. The insights in this think piece provide inklings of where this work has already begun. This is the basis for transgressive, collective, youth-led, bottom-up and situated responses to climate change that are both intensely local and intensely global.

Endnotes

1. Isikolo sama-Afrika is one of Makhanda's Black Kollective programmes. The Makhanda Black Kollective is an interdisciplinary and intergenerational project consisting of artists, social justice and environmental activists, parents and students from Makhanda, Eastern Cape South Africa. See www.makhandablackkollective.com
1. 'Ama-Afrika' is used in a political, not lexical sense, and refers to those who subscribe to the Pan-Africanist school of thought. The concept roots one's being and allegiance to Africa. This is a nongendered concept used to refer to each other across age groups.
1. The author explains: I understand that this word sounds clumsy and heavy, and I think it is precisely this that makes it serve its purpose. It really feels like an undigested legacy for me. They were swallowed in the historical moment but have been undigested ever since.

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School Strikes as Catalysts for Rethinking Educational Institutions, Purposes and Practices

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Summary
In this article we rethink schooling and education in times of climate urgency. Climate urgency is not simply a content issue to be dealt with and solved. The students are themselves a part of the content, at risk and nested in a wider world shaped by deeply rooted and highly resilient structures. This situatedness has bearings on educational institutions and the functions of transgression, resistance and the common good.

Keywords
Environmental And Sustainability Education
Climate Urgency
School Strikes
Transgression
Common Good

> *We learn more about how to work towards sustainability out of school than in school.*
> Kristine Schultz, Leader of School Student Union of Norway, Oslo, 2020

Introduction

The school strikes for the climate emerged in Sweden in August 2018, soon spreading to other countries and mobilising thousands of students. In the spring of 2019, more than 1.4 million students around the world took part in the demonstrations (Carrington, 2019). The school strikes have been identified as a historical phenomenon and a political movement responding to the ecological and climate crisis (Intergovernmental Panel on Climate Change [IPCC], 2018; 2021; Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 2019).

At the same time, school strikes for the climate introduced a new perspective on climate change: the demand for urgent action to cut emissions of greenhouse gases to limit global warming. The concern for future generations was no longer general and abstract but was made specific and concrete when young people, among those with the least political power in society, claimed to represent and manifest the interests of future life on earth.

In the period from 2018 to 2020, the school strikes and their massive media coverage became part of the emerging global political discourse on climate, personified by the initiator, Greta Thunberg (Kvamme, 2019). This was gradually replaced by the COVID-19 pandemic that is still a vital concern requiring

attention, care and action around the world. In many countries, schools have been locked down, and classroom activities been transferred to digital platforms with varying success, demonstrating the fragility of the right to education.

In this contribution, we reflect on how the school strikes in a time of climate urgency may prompt a rethinking of educational institutions and the purposes and practices of schooling itself. We, the authors, are situated in a Northern European context, where affluent states are dominated by unsustainable social structures and practices that determine conceptions of society and education. This is now being challenged by numerous initiatives and practices demanding transformation to more sustainable societies.

Climate Urgency and Education

The relationship between the school strikes for the climate and education is intriguing and complex. On the one hand, leading figures like Greta Thunberg report that they learned about global warming and the climate emergency in school. In that way, formal education seems to have served the function of enlightenment, making students aware of the risks and hazards caused by human actions and how these impact their lives.

On the other hand, the school strikes challenge the school institution itself. Young people have abandoned the school building, dismissing the lessons provided in favour of political demonstrations on the streets. This symbolic act has resulted in quite different responses that all merit scrutiny from a pedagogical and emancipatory education perspective. The responses vary from prohibiting or penalising students who joined; to tolerating their actions but not actively encouraging or discouraging participation; to encouraging student participation, which is seen as an important life lesson in deliberative democracy.

From an educational perspective school strikes have publicly transformed many pupils into young citizens, who are raising their voices, particularly by leaving the school buildings. In this way, the school strikes may illustrate the 1970s institutional critique, expressed by figures such as Ivan Illich (1971) and Paolo Freire (1970), who point to the pacifying function of school and formal education. By turning climate urgency into a contentious, political issue addressed by young citizens in the public space, the school strikes challenge this function (Kvamme, 2019). However, regarding young people's engagement with the climate, this redirection still seems to be based on and encouraged by the learning processes going on in school. In other words, the function of school and education to bring about political awareness and action should not be dismissed but instead deserves further scrutiny.

The Purpose of Education in Times of Climate Urgency

The school climate strikes draw attention to the dimension of time as a central aspect of the students' historical situatedness. A main concern has been to challenge the persistent tendency to postpone necessary climate action. This temporal dimension emerges together with an emotional impetus, expressed as anxiety for the future (Manning & Clayton, 2018). From the perspective of emancipatory education, it is clear how emotions in this social movement have been transformed and expressed as political resistance, motivating political action, as described by Ojala (2013) in relation to environmental and sustainability education.

The temporal dimension includes the past, present and future, as well as "having time" and "running out of time", which are linked to the functions of school and education. Biesta (2009, 2013) famously points to the multidimensionality of educational purpose, distinguishing between three domains in which education functions or works: qualification, socialisation and subjectification. Climate urgency demonstrates how these functions should be ecologically grounded and should not separate human life from other life forms. With this grounding, climate urgency, which in itself is future oriented, paradoxically redirects the scope and attention to the present. In civic studies, this reorientation may be conceived of as shifting the emphasis on citizenship as a legal institution to acts of citizenship (Isin, 2017). From here, the students may be treated as citizens who already have interests in current policy and have a desire to participate in political deliberation and action.

In her many appeals, Greta Thunberg has persistently legitimised the school climate strikes by referring to cosmopolitan claims made by the United Nations (1992, 2015) (e.g., the Framework Convention on Climate Change, the Paris Agreement,) The rising concerns for present human beings, future generations and the more-than-human world may be seen as expressions of the common good and a recognition of the value of all life (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2015; Lotz-Sisitka, 2017; Kvamme, in press). In this way, the common good is turned into a critique of the unsustainable current state of affairs, one aligned with the conception of immanent critique within critical theory (Stahl, 2019). In the current situation, a concern for life on Earth is also included in educational policy documents and the national curriculum in several countries (e.g., the Norwegian Ministry of Education and Research, 2017). Such mainstreaming implies that the common good becomes a normative foundation for transformative education within the school system itself.

Bildung, Critical Thinking, Agency and Action Competence

In Northern Europe, the concept of education has been intimately linked to *Bildung*, with a historical background in the emerging democratic societies of the late eighteenth and nineteenth centuries (Horlacher, 2016). Here, the educated human being is not defined by their adaptation to an existing external order but is distinguished by being citizens who can think for themselves and is capable of their own judgement. Although the significance of education for a living democracy should still be upheld, *Bildung* may productively be seen as historically conditioned and expressed as an educational answer to a political question. "We need in other words, to begin with a 'diagnosis' of our time. It is only on the basis of our answer to that question that we can return and ask what kind of educational response, what kind of Bildung might be needed or might make sense for us here and today, and what kind of Bildung might be possible" (Biesta, 2002, p. 346).

In his rearticulation of *Bildung* in the 1980s, the German Wolfgang Klafki (1998) supplements a focus on self-determination with codetermination and solidarity, including environmental problems as one of the vital epochal key problems to be addressed in school. The Danish tradition of action competence (Bruun Jensen & Schnack, 1997; Mogensen & Schnack, 2010) has made an influential contribution to the field of environmental and sustainability education, referring as it does to a readiness to act in a way that meets the challenges of a given situation.

The school climate strikes may be viewed as practicing action competence. However, there is a new element. The young people are not primarily self-determined, cognitively governed citizens setting environmental problems straight (Bruun Jensen & Schnack, 1997). In their appeal to the cosmopolitan claims in the UN conventions, they appear as vulnerable, physical beings that need protection, just like other present and future living beings. In this way, the school strikes transcend modernity's conception of human beings with its emphasis on autonomy and agency, which in and of itself can be seen as a root cause of the climate crisis (see also Lysgaard et al., 2019; Kvamme, 2021). The students are themselves situated within a world that needs protection. From an educational perspective, this shift demonstrates the shortcomings of treating climate urgency in the classroom as solely a content issue to be discussed, dealt with and solved. The students–and indeed their teachers–are themselves part of the content, at risk, together with their surroundings, and nested in a wider world shaped by deeply rooted and highly resilient structures, which are sometimes described as Western, colonial, neoliberal and capitalist. Changing these structures is difficult and requires resistance, disruption and transgression. Climate strikes, Extinction Rebellion, Occupy Wallstreet and #MeToo represent such forms of resistance.

This raises the following question: Should schools play a role in students' capacity to resist and disrupt in light of planetary destruction and extreme inequality and, if so, how?

Transgressive Learning and Resistance Pedagogy

Recently, some scholars (e.g., Lotz-Sisitka et al., 2015) have highlighted the importance of transgressive learning and disruptive capacity building. This refers to learning processes and contexts or environments for learning that invite a counter-hegemonic response that unearths and uproots mechanisms of exploitation, oppression, "extractivism", colonialisation and marginalisation (Wals, in press). Resistance pedagogy allows people (e.g., teachers and students) to address injustices and forms of marginalisation and exploitation that they themselves identify by finding forms and spaces that can oppose the authorities and normalised established systems that are responsible for their existence (Bracher, 2006). Mohanty (1989) points out that resistance that is random and isolated is clearly not as effective as that which is mobilised through systemic politicised practices of teaching and learning. This explains why the climate strikes have been so effective in mobilising youth and drawing attention: because it is concerned activist students who jointly take the lead in organising the strikes.

Throughout the world, young people seem to be taking a lead when it comes to driving change and transformation. The school strikes are just one of several channels for youth to raise their voices and take climate action. "They tell us to stop striking and go to school to learn how to change the world. The problem is that we do not learn that in school," a 14-year-old school striker in Norway stated during an interview with one of us in 2019 (Sinnes, 2020). Young people sue governments for being too limited in cutting climate gas emissions (Nilsen, 2016). They engage in civil disobedience to protest against nature loss. They change to more sustainable lifestyles, start up social entrepreneurship businesses and write books on sustainable lifestyles (Sinnes, 2020). The traditional role of adults as the responsible ones is shifting to a situation where young people are "forced" to take the lead and are urging older generations to take responsibility for saving the Earth.

In interviews with young Norwegians engaged in sustainable development, the word "generation aggression" appears several times. They express aggression towards older generations for not taking responsibility for the future (Sinnes, 2020). Simultaneously, they report being bullied by grownups because of their climate engagement (Children's Panel on Climate Change and Eco Agents, 2020). These intergenerational tensions experienced by students have also been reported in other countries. In schools in Quebec, Canada, the climate strikes triggered resistance from school administrators, conflicts among students and discussions about the legitimacy of autonomous civil disobedience (Dupuis-Déri, 2021).

Conclusion

UNESCO's (2020) Education for Sustainable Development Roadmap calls for the entire learning institution to be aligned with sustainable development principles so that learning content and its pedagogies are reinforced by the way facilities are managed and how decisions are made within the institution. In other words, disruptive change is needed in the entire learning institution to capture and reinforce youth engagement and empower them to act. If schools are to become arenas where young people learn as much or even more about sustainable development than they do out of school, then students and school teachers must explore and evaluate how they themselves are situated in the problem and scrutinise how and what they must learn to be part of the solution. Such critical evaluation and scrutiny also invite a continuous critiquing, rethinking or even rejecting of sustainable development itself, provided that evaluation and scrutiny is underpinned by a consistent and genuine ethic of care for the Earth.

A whole-school approach (Wals & Mathie, in press) challenges the status quo by encouraging self-reflexivity and willingness to transgress traditional school-leader-teacher and student relationships, as well as school–community relationships. It requires all actors, both within and outside schools, to move out of their comfort zones. In this process, a new type of *Bildung* might emerge. Such a socio-critical-ecological rearticulation of *Bildung* acknowledges that the climate crisis is an aspect of the historical situatedness of all life on earth. This implies that the vulnerability of life is not ignored when learners within schools are empowered to address the urgency of what our planet is facing and to explore, act and reflect in an attempt to regenerate the Earth and all life that it supports.

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South African Youth Coengaged in Climate Policy Making

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Summary

In this paper we examine how those engaged in climate change awareness and education are actively coengaging with young change agents to enable more direct pathways to policy impact. In particular, we reflect on how various policy efforts are enabling more active participation in the actual "writing directly into" climate change policy in South Africa by youth and broader society.

Keywords

Climate Policies
Empowerment
Youth Participation
Climate Action

Introduction

Youth constitute a major group of citizens influencing global challenges, including climate change (O'Brien et al., 2018). In light of a growing cohort of younger generations shaping climate policies, both in local and international arenas, meta-questions about the understanding of youth in climate action and engagement skills have emerged as a theme of major importance for local researchers and policymakers.

In this paper, we focus on the crafting of the City of Johannesburg's (COJ) climate action plan (CAP). We consider some of the skills, engagement processes and lessons learned by both the youth and COJ. This provides insights into the empowerment of youth as active players in climate policy development.

Skills Development for Youth Climate Activism: The Wider Context

Over the past decade, there has been burgeoning discourse about how education is empowering youth and, more significantly, improving their climate activism and action skills in the climate decision making context (Dunlop et al., 2021; Mackay et al., 2020). Schools and civil society organisations are important actors for preparing youth to make intelligent decisions and informed choices in climate-related interventions for increasing their agency and for enabling regenerative, rather than reactive, actions. Despite the inclusion of climate-related themes in various curricula, there are gaps in critical systems thinking and in the repertoire of skills needed to participate in policy and practical spaces where climate change is being debated. These gaps are linked to a tendency to frame environmental education content "about" and not "for" the environment.

In South Africa, there are numerous environmental education programmes, school initiatives, university programmes, clubs, societies and organisational initiatives to promote youth action on climate change. Youth at various schools, such as Roedean School in Johannesburg, participate in social responsibility programmes that allow for interactions between a range of scholars. For example, at Roedean, well-resourced pupils engage with pupils in under-resourced areas that are close to the Johannesburg inner city. The students base their engagement on examples such as the educational hubs funded by Jane Goodall's Roots and Shoots Programme. At these learning centres, rural students can research climate change and access distance learning lessons created by global teachers on the Sustainable Development Goals (Jane Goodall Institute, 2022).

The skills being developed above, however, need to be leveraged and scaled into wider and deeper programmes for systems and climate action (Riemer et al., 2014; Hickman et al., 2016; McKay et al., 2020). In August 2020, a joint relationship was established between the COJ, Youth Programmes at the South African Institute of International Affairs, and the Global Change Institute at the University of the Witwatersrand. A wider, more systematic process was developed around the climate action plan (CAP) for the COJ (COJ, 2021; Vogel et al., 2021). This article provides an example of how youth between the ages of 13 and 24, including scholars from Roedean School, were convened by Youth Programmes at the South African Institute of International Affairs and supported by climate scientists and researchers from the Global Change Institute, before being invited to contribute directly to the city's CAP process.

Through a series of youth-led dialogues, workshops and continuous online drafting sessions, the youth participants crafted their input into the CAP. Issues of intersectionality, systemic change, just transition, leadership and advocacy, innovation, accessibility and sustainability were included in the CAP. This process involved learners and students from several high schools and universities, as well as out-of-school youth. While there was educator and lecturer support, the workshops happened outside of the formal schooling space and therefore created a unique gathering space of youth from different age cohorts and backgrounds.

The Johannesburg CAP (COJ, 2021) was released in June 2021, and engagement between the youth and COJ around the implementation of the CAP is ongoing. The youth cohort has also taken what they learned through a city-level experience and has developed a national process to create a South African Youth Climate Action Plan launched in October 2021 (South African Institute of International Affairs (SAIIA), 2021b). The skills demonstrated, developed and ultimately required for this type of climate action are rarely discussed because there tends to be a focus on the outcome rather than the process or means of achieving the outcome.

Research skills, climate knowledge and awareness of environmental sustainability were important for the participants but were not prerequisites. Soft skills emerged as equally important for completing the Johannesburg Youth Climate Action Plan (Ngcuka, 2021; SAIIA, 2021a). These included the ability to communicate openly, to analyse, to negotiate, to listen, to think critically and creatively, to have empathy, to manage time, to have patience, to problem solve and to adopt rotational leadership. Coupled with these were skills that included an embedded participatory and youth-led approach that used older youth, that is, over the age of 25, and nonyouth for mentorship, final editing, fact-checking and logistical support. This meant that in effect, the youth became their self-led project managers.

Challenges and the Need for Reflection and Learning

Despite these initiatives, the participation of young people in climate action interventions and implementation is fraught with complex challenges. The focus on how youth are engaged and given voice and agency are often not clear in many youth engagements, particularly in rapidly growing urban spaces that are confronted with complex challenges such as the COJ (Vogel et al., 2021).

We reflect on and examine some of these challenges and opportunities. The first relates to insufficient access to information to help shape policy. Curricula–whether at high school or undergraduate university level–rarely incorporate active public participation and policy engagement in teaching. There are multiple factors for why this does not happen. The general public is often disconnected from the policy and decision-making space. Young people are more

likely to comment on or offer suggestions about existing situations if they have access to materials and opportunities that enhance their analytical skills (Dunlop et al., 2021). Occasionally, a handful of well-informed youth is chosen to participate in policy deliberations, but their participation is often a "tick-box" exercise, where they are not treated as equal participants in policy development. There is an assumption, for example, that youth have little to contribute to discussions on climate change and land and resource management (Mackay et al., 2020). Mackay et al. (2020) argue that such assumptions may contribute to climate anxiety, including feelings of hopelessness. These challenges have spurred the youth to create and lead active engagement processes during the development of the Johannesburg CAP.

Recommendations

To enhance their effective participation in policies and practice, practitioners and organisers of youth programmes ought to reflect on their capacity-enhancing initiatives that empower young people to reclaim, reconstruct and, where relevant, to "transgress" existing climate norms and practices (Lotz-Sisitka et al., 2016; O'Brien et al., 2018). Youth participants in the Johannesburg CAP and the more recent South African Youth Climate Action Plan (SAIIA, 2021b; Evans, 2021) have provided a more transgressive approach than usual, advocating for their section and foreword in the policy document rather than having their inputs be considered as comments. This transgressive aspiration was attained through two channels: scaffolding and learning (Dunlop et al., 2021).

Possibly of greater importance, however, was the agency and understanding of youth because this can play a meaningful role in dutiful, disruptive and dangerous dissent (O'Brien et al., 2018). Youth are challenging political interests and power relationships that many argue are key for robust and just climate futures (O'Brien et al., 2018). Soft skills, together with the so-called hard skills, may indeed shift the technicist discourse of climate change technology solutions towards a more transformative, just and socially orientated space (Vogel & O'Brien, 2021).

Conclusion

Because young people are the generation that is the most susceptible to–or bound to–inherit the effects of rising greenhouse emissions, the importance of their skills development and genuine participation in climate governance cannot be underestimated. This sense of urgency is underpinned by one motivation: survival. Enhanced agency, voices, negotiating and influencing skills of youth, in both formal and informal spaces, remain critical endeavours as we move forward. The completion and writing into the Youth Climate Action Plan and, more recently, the South African Youth Climate Action Plan provide excellent examples of youth moving away from being "tokens" for climate change to becoming active change agents.

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Part 6

Children’s Voices in Climate Action

Responding to the Voices of Children

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Summary
Today, climate change is of concern to children and youth because it affects their future, that of the coming generations and also life on our planet itself. We address this matter firstly by looking for opportunities to practice and develop ethical competence, next by highlighting problems in ethics education and, finally, by pointing to a possible way forward.

Keywords
Ethics
Ethical Competence
Ethics-Informed Education
Students
School

Introduction

Since 2018, children and young people have jointly raised their voices in movements such as Fridays for future, and they have asked for a future where environmental ethical values are globally realized (cf. Kvamme, 2020). They have creatively assumed responsibility for what can be called "moral authorship" (cf. Tappan, 1991; 2010). This assuming of responsibility also raises issues as to their rights as citizens to have influence in forging a reasonable future that will inevitably be theirs (Biswas & Mattheis, 2021; Sporre, 2021c). They also bring to school and education their concerns, demanding to be listened to (cf. Biswas, 2021). How can their concerns be met in a responsible and helpful ethics education under the extreme challenge that climate change poses to us? How can such an education be conducted without being a form of moral blackmail, forcing young people to achieve what adults cannot manage (Larsson et al., 2010) or posited on such predetermined normative solutions and prescriptions that they are refused space and agency (Franck & Osbeck 2018)?

Common Problems in Ethics Education: Findings from Empirical Studies

In past and ongoing studies we have researched ethics education at the curricular (Sporre, 2017, 2020; 2021b), school and classroom levels (Osbeck, 2018; Osbeck, 2019; Lilja & Osbeck, 2020). We have an interest in the formation of an ethics education for both today and tomorrow. This form of education should respond to the ethical concerns of children and youth and take them seriously. In line with other researchers, we have noticed how ethics education tends to be based on classic dilemmas (e.g., Kohlberg, 1971), with the risk of being artificial, rather than drawing on students' perspectives (e.g., Infinito, 2003; Jie & Desheng, 2004; Leming, 2000). Furthermore, we have found how ethical competence from a Swedish curriculum perspective is based almost entirely on rational reasoning and argumentative ability (cf. Osbeck, 2017; Sporre, 2019), which means that limited space is left for children's own existential questions (Sporre, 2021a). Instead, in relation to a broad scope of current research, we understand and conceptualise ethical

competence as multidimensional, where not only moral judgement, but also moral sensitivity, moral motivation and moral implementation are central competences, and where being informed and knowledgeable about the matters at stake, as well as being context-sensitive and communicative, are important (Osbeck et al., 2018). This understanding is in line with students' perspectives that have appeared in interviews (Osbeck, 2018). Their expressed needs for ethical competences are related to everyday processes that involve at least four parts: 1) to identify a situation as ethical; 2) to examine different options for action take a position; 3) to carry out decisions; and 4) to follow up on decisions and identify signs of problematic consequences. We have also interviewed children and young people to obtain a better understanding of what they regard as ethical concerns and how they see things (Osbeck, 2018; Sporre, 2021c; Osbeck et al., 2021). It is obvious that there are concerns about the future, along with preoccupations about what knowledge is needed to face it adequately in light of climate change (cf. Manni, 2018).

Curriculum comparisons show that ethics education (Sporre, 2020) takes on various forms when it comes to social justice and human rights. However, the question of how an understanding of the global common good and, thus, a sustainable education in times of the Anthropocene could find adequate expression in policy texts still remains a challenge (Sporre, 2021b). Perspectives can be national or contextually shaped, so the "world" becomes "small" and limited to local issues (cf. Sporre, 2017).

A Possible Way Forward

In philosophy and ethics, strong theoretical argumentation for the possibilities of a fiction-based approach to ethics education can be found (e.g., Nussbaum, 1990; 2008). Through fiction, one comes into contact with scenarios that one may not have directly experienced. One can develop and cultivate sympathetic imagination, which helps in shaping knowledge of possibilities through which one can be prepared for possible future scenarios and then imagine alternative actions. These ideas do not come from previous direct experience but may emerge through imagination. Reading fiction can allow new visions, hopes, possibilities and beliefs to form, and these can shape and have an impact on one's ways to be in the world.

While the theoretical arguments are well known, there are few empirical studies on fiction-based approaches to ethics education. To address this, together with a group of teachers, we developed and tested a model for a fiction-based approach to ethics education for students in compulsory school, where the children are 12 to 15 years old (Lyngfelt et al. 2022; Sporre et al. 2022). The foundation of our approach is a multidimensional understanding of ethical competence (cf. Osbeck et al., 2018) paired with a sociocultural approach to moral development, which includes communication and dialogue in learning as important aspects (cf. Tappan, 2006).

An important part of multidimensional ethical competence is being informed and knowledgeable about the issues at stake. Our earlier studies demonstrate the need for linking the questions of "how" and" what" to ethics reflection and ethics education. Reflections and analyses presuppose both procedural and substantial knowledge (Sporre et al., 2020). For example, through listening to, exploring, discussing and responding to narratives, children are given opportunities to grow in "moral authorship" (cf. Sporre et al., 2022). Next, the subject matter of the ethical issues cannot be stressed enough. Norwegian examples by Kvamme and Saether (2019) demonstrate how sustainability perspectives are developed in several school subjects, such as literature, language learning, mathematics, geography, social sciences and ethics, in addition to the natural sciences.

The combination of procedural knowledge in ethical analyses, substantial knowledge about the issues at stake and, importantly, the student's interest seems to be of the utmost importance. However, Sporre (2021b) shows that this combination cannot be taken for granted. A comparison of Scandinavian curricula (Sporre, 2021a) demonstrates various approaches to children's existential questions. This includes putting their questions at the centre, creating dialogue with them but also, in some cases, neglecting their questions. Given the deep existential significance of climate change for children and young people, making the necessary curriculum changes should be a crucial concern of contemporary education policy.

Implications

Since children and young people of today have a strong interest in issues of climate change, we need to respond with an ethics-informed education. Such an education first demands a multidimensional understanding of ethical competence, adding the emotional, situational and informative knowledge aspects to more traditional argumentative and rational understandings of such a competence. Second, opportunities are needed to practice and strengthen ethical competence by identifying and articulating ethical concerns. In other words, children and young people should practice moral authorship, and conversations around fictional texts is one means of achieving this. Third, there is a need to focus on issues where children and young people have expressed interest and needs, namely climate change and sustainability. This requires an ethics education that includes both substantial and procedural knowledge, that is, the "what" and "how". Fourth, there is a need for opportunities to identify and create a "knowledge of possibilities" where children and young

people can see beyond the present through practicing and sharpening their imaginations.

The development and improvement of such an ethics-informed education demands the escalated implementation of practice-oriented research that examines how education is carried out, the dilemmas that arise, the shortcomings that become visible and the progress that can be identified. Through research findings, a foundation can be created for others to take the next steps. Such findings can guide the necessary policy processes that enable the development and exploration of a renewed ethics education responding to the voices of the children.

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Using Weather as Teaching Moments for Young Children

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Summary

The Anthropocene and current ecological crisis require us to redefine environmental education. This paper presents pedagogical principles and tools for using weather and climate as a framework for early childhood environmental education. The pedagogical praxis focuses on young children's everyday experiences, offering an alternative to abstract, information-transfer models.

Keywords

Climate Change
Weather
Environmental Education
Early Childhood
Experiential Learning

Introduction

Young children of today, who are growing up in the new era of the Anthropocene, are experiencing the disastrous consequences of the global ecological crisis (Crutzen, 2002). Children are among the greatest victims of a warming world and the most vulnerable to the consequences of climate change, such as high temperatures, climate-induced migration and malnutrition (United Nations Children's Fund [UNICEF], 2014).

The global ecological and climate crisis is a significant challenge that could help us reorient our lifestyles in alternative and ecological directions. The impact of this new epoch could lead us to "new, contemplative ways of being, and knowing our everyday coexistence-existence with others; how we engage with the 'planet' and how the 'planet' engages with us" (Malone, 2018, p. 6). If we approach climate change as a symptom of a deeper existential crisis, as a trauma caused by our anthropocentric relationship to the rest of the world, the healing of our relationship with the more-than-human could contribute to the emergence of a new ecological ethos (Woodbury, 2021).

This new ecological ethos in the era of the Anthropocene will not be established through legislation and theoretical principles, nor through environmental behaviourism, a green economy and technology, but rather, it will be created through changing our perceptions of the world around us–through a sensory and embodied approach to the more-than-human world (Abram, 1997). This point is important in the field of education, where it is widely discussed that many categories of children of the Anthropocene are alienated from the rest of nature. In most cases, they are trapped in absent,

theoretical educational schemes that encourage them to "save" threatened ecosystems and species that they do not see or engage with in their everyday environment. Furthermore, many children's lives are unfortunately characterised by a lack of authentic experience with the natural world (Sobel, 2013).

Early childhood is a learning stage where children develop their values, attitudes, skills, behaviours and habits (Pramling et al., 2008). Early childhood environmental education or education for sustainability is a field aiming to empower young children to participate and take action in relation to the problems in their own environment (Davis, 2010; Norddahl, 2008). Young children in the era of the Anthropocene can be viewed as active citizens of the world who take care of themselves, others and the world (Johansson, 2009). They can participate, know, decide and take action in their own immediate environment (MacKey, 2012; Tsevreni & Tigka, 2018).

The era of the Anthropocene and the global ecological crisis require a redefinition of the environmental education context and goals, starting from the stage of early childhood. This study attempts to provide a pedagogical pathway focusing on young children's experience with weather and climate to heal their alienation from the natural world. Climate change education is a crucial, widely established teaching and learning field and approaches the climate emergency with numerous and multidimensional potentials and challenges (Reid, 2019). We investigate how young children's experience of weather and climate in their immediate environment could be transformed into the educational practice of empowering climate awareness and ecological consciousness.

A Transdisciplinary, Ecocentric and Experiential Path

Educators are concerned that confronting young children with multidimensional, global environmental problems can frighten them or make them pessimistic and passive about their future and the sustainability of the planet (Davis, 2015; Elliott & Davis, 2009). Other limitations include the child-centred orientation of early childhood pedagogy, on the one hand, and, on the other hand, the fact that a focus on abstract knowledge can alienate children from their authentic environments (Malone et al., 2017).

An ontological shift seems to be necessary for quality climate change education in the Anthropocene (Reid, 2019). In this regard, the field of environmental philosophy has a lot to offer. Climate change, like every local or global environmental problem, should be approached through a basis of interdisciplinary integration (Naess, 2010). Apart from the economic and technocratic solutions that dominate Western societies and education for climate change, there is a need for the development of an ecological ethos of knowledge and action. This should be based on what is happening in the present rather than what may happen in the future, and it should include moral rather than economic aspects (Rommetveit et al., 2010).

A transdisciplinary approach requires the contribution of all scientific fields, including physical and social sciences, philosophy and the arts, in the design and implementation of climate change and environmental education programmes. For example, approaching global warming through conversing with notions such as the "hyperobject" hypothesis and dark ecology of Morton (2013; 2016), in a pedagogical frame could reveal an ecocentric reception of the more-than-human world in the era of the Anthropocene and an alternative way of knowing and living based on entanglement and coexistence with nonhuman others. This will cultivate ecological awareness and action (Saari & Mullen, 2018).

Furthermore, the weather is an environmental issue that has been examined in the framework of early childhood in multiple ways: in science education, environmental education and in the everyday routine of a nursery school (Ergler et al., 2013; Hatcher & Squibb, 2011; Henriques, 2002). Weather is also frequently included in pedagogical research and praxis for climate change (Porter et al., 2012; Shepardson et al., 2014).

Recently, in the field of environmental education research, the topic of weather has been considered as a means for empowering young children's relationship and consciousness of the nonhuman world. Inspired by "common worlds" pedagogy (Taylor, 2017) and "weather-worlds" (Ingold, 2010), Rooney (2018a) explores the interconnections between young children and weather, proposing an alternative dynamic in the field of early childhood environmental education. Rooney's (2018b) ecocentric approach of "learning with the weather", uses ecological encounters, experiences and interconnections with the weather as the central core of the pedagogical process of environmental learning.

Weldemariam (2020) explores child–weather relationships in early childhood, moving away from an anthropocentric view and taking the lens of new materialism, with learning possibilities emerging for environmental education. He describes lively child–weather assemblages when the weather interacts with humans and nonhuman bodies. In this approach, children do not learn about the weather from a distance to predict and control it. On the contrary, he suggests "attuning to the vitality of weather and understanding the fragility, permeability and vulnerability of our bodies as affected by the force of the elements has the potential to lead to ecological sensitivity and possibly caring about climate change" (Weldemariam, 2020, p. 13).

Hickey-Moody et al. (2021) propose affective attachments to climate, based on posthumanism and using art-based ethnographic research with children on climate change.

They describe children's creative reconfigurations of environmental futures and climate change solutions through their entanglements with energy cultures. In climate change education, there is a need to overcome the established disembodied and detached paradigm that is based on stereotypical scientific and knowledge-centred educational practices. There are other possibilities for reimagining an alternative future through approaching weather and climate change in an experiential and engaging way.

Concluding Thoughts and Propositions

In the face of the challenges of climate change, we are obliged to engage young children in learning, participating, acting and shaping the weather and climate world. To ensure quality climate change education in early childhood, there are challenges that we must confront, including the need to shift the environmental education paradigm towards attached, embodied and experiential learning in an intergenerational, transdisciplinary and healing framework. In line with the above, we propose the following:

- Educating early childhood pedagogues about designing and implementing environmental education programmes that emphasise ontologies and methodologies of coexisting with and learning from the weather and climate.
- Emphasising reflection on our coexistence with the weather and climate, rather than focusing on cognitive educational schemes.
- Further research and practice for the development of a transdisciplinary conversation that engages climate and environmental scientists, activists, artists, philosophers, citizens and young children to share information, knowledge, participation and action for ecological change.
- The engagement of environmental philosophy and ethics for confronting the climate change challenge in the anthropocene through an existential, ontological and moral path that Western societies have not yet optimised.
- Implementing early childhood environmental programmes that focus on developing young children's biophilia and healing their alienation from the more-than-human world.

Rather than knowledge-based approaches, this is the time for engaging young children in the affective dimensions of climate change (Rousell & Cutter-Mackenzie-Knowles, 2019), in an embodied, sensory intermingling with the weather in their local surroundings (Rooney, 2018a; 2018b; Weldemariam, 2020). This may bring the abstract, theoretical and impersonal dimensions of climate and ecological crisis closer to the authentic everyday environment of young children. The proposals above imply the need for an ecocentric paradigm shift towards the development of our future common world of coexistence and an alliance with our more-than-human others (Latour, 2004).

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Making Space for Children's Voices in Climate Action

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Summary
Current debates about children's climate change education are often challenged by science-biased cultures of education and Western-focused ideas of children in society. Drawing on experiences from South Africa, the article argues for listening to children's voices that are difficult to hear, through place-based and open-ended education. We call for a reconfiguration of educational cultures in ways that cultivate and affirm children's political agency.

Keywords
Climate Change Education
Children's Participation
Social Justice
Children in marginalised Positions

Introduction

Generally, children's voices are powerless in political debates about climate change. Some voices are seldom listened to at all, either because the speakers hold marginalised positions or because their forms of expression are different from those forms that powerful ears are ready to hear. Children share the paradox of the subaltern – in that their ability to voice is in part dependent on others listening (Wall, 2019). Furthermore, there is a lack of space for children to cultivate voice and political agency (Aitken, 2001; Rousell & Cutter-Mackenzie-Knowles, 2020) when compared with the time and space afforded to assimilating to the unsustainable status quo. Here we understand voice as a critical component in political agency: children's active participation and development in the world they are living in.

The reality of climate change and the recent resistance expressed by young people (for instance in the Fridays for Future movement) poses questions for educational approaches that can accommodate and cultivate voice, understood here as political agency, that children and young people hold. In other words, the cultivation and amplification of children's voices has implications for education and requires a response in terms of educational thought.

We explore the challenge of a pedagogical response to the cultivation and amplification of children's voices by drawing on discussions of educational practice and research with children in two different countries: South Africa and Denmark (James, 2019; Jørgensen & Martiny-Bruun, 2019). While conducting research in radically different social, cultural, political, economic and environmental contexts, we share an interest in exploring how children know climate change through their lived experiences and how their inquiries and voices might be taken further. In this article, we explore these questions through a discussion of barriers and opportunities for emergent and situated approaches to children's climate change education, concluding with suggestions for how to think about climate change education as a platform for

connecting children's lived experiences and learning to the global systems within which they are affected.

What Children Know about Climate Change

Since we live in a world affected by climate change, whether through heating, cooling, more frequent storms, pandemics, droughts or food shortages, everyone in the world is potentially in some way in contact with the effects of a rapidly changing climate. Furthermore, climate change is a topic of concern and discussion in social communities across generations, including children. Drawing on childhood studies (e.g., James & Prout, 1998; Esser et al., 2016), we suggest that children have the ability to make sense of complex social and natural dynamics from a young age and to actively contribute to shaping these dynamics. Children all over the world are affected by climate change. They have knowledge of their world, including climate change, whether or not they have entered a formal school classroom.

However, in the context of climate change education, the idea that children have nothing worth knowing about climate change is widespread. As suggested in Rousell and Cutter-Mackenzie-Knowles' (2020) review of climate change education, there is a tendency to focus on children's scientific knowledge of climate change (2019, p. 202), which is most often considered "limited, erroneous and highly influenced by mass media" (Cutter-Mackenzie & Rousell, 2019, p. 91). Although science knowledge is important, its conflation with climate change knowledge makes the intricate social and local knowledge held by children invisible. Along with other educational researchers (e.g., Rooney, 2018; Trott & Weinberg, 2020), Cutter-Mackenzie and Rousell (2019) call for participatory and creative approaches to climate change education that take into account children and young people. These approaches move beyond scientific literacies by making space for children's voices and their active responses to climate change's manifestations in their worlds (Cutter-Mackenzie & Rousell, 2019, p. 91), including interdisciplinary, embodied and affective pedagogical orientations.

Paying attention to children's knowledge and experience is not just a matter of encouraging their intellectual and democratic development. While science tells us a lot about how climate change works and about current, future and potential consequences, we still do not have a unified answer for how to solve the problems, nor how to create climate-resilient, socially just, sustainable communities and societies. Listening to marginalised or difficult-to-hear voices, including those of children, is a way of broadening our adult knowledge base of sustainability and to more authentically incorporate children's perspectives.

Listening to Children's Voices

Children in marginalised positions all over the world, but particularly in the Global South, have lives marked by recurrent droughts, floods, rising food prices, conflict and migration. Yet due to unequal and unjust social and educational structures that either exclude children in vulnerable positions completely from or marginalise them within the education system (Burman, 2016), their experiences and opinions are seldom listened to. Even if they are involved in climate change education and the educational approaches are dialogical and participatory, the language of climate change used in educational encounters often becomes a barrier. For instance, it is rare that children in South Africa have seen or experienced a greenhouse; yet this fundamental metaphor for understanding climate change derives from climate change knowledge production based on the English language and the Global North experience. Although the understanding of climate change through the metaphor of the greenhouse can be cultivated, we see how the central discourse of these issues normalises an unfamiliar reality, potentially obscuring the knowledge and experience of other realities. An intersectional listening to children's voices about climate change within climate change education must consider a decolonial and expanded idea of childhood.

Equally, in the Global North, inequalities and marginalisation frame the ways in which adults listen to children's voices. In Denmark, for instance, despite an educational system that values children's curiosity and democratic participation, educational encounters are often designed and practiced with the majority (white, middle class) child in mind. In practice, this leaves little space for the participation of minority children, particularly if their knowledge of the majority language is limited (e.g., Palludan, 2007; Jørgensen et al., 2020). The example of how language plays a role in situating a certain, Global North, experience shows the need to disrupt science-specific approaches to climate change education. While this concern is not particular to climate change education, it should be raised as a concern for an emergent climate change education culture that is transformative rather than reproductive. Significantly, the danger of dominant literacies or languages in climate change education risk sabotaging participatory education processes as attention is shifted to compensating language struggles. Instead, we should be inviting children to tell their own stories about their climate change experiences, situating climate change education in experience as a foundation for further transformative learning (Schudel, 2021).

Across the globe, age influences the possibility of children having their voices heard. Several early childhood researchers have suggested that young children, "not yet socialised into an established understanding of the relationship between nature and humans" (Heggen et al., 2019, p. 388; Wals, 2017)

have different kinds of knowledge and relations with the nonhuman environment which may be insightful for adult understandings of climate change and the Anthropocene. Yet listening to young children's voices requires attention to nonverbal, embodied and playful expressions, which often requires adult interpretation if this nonverbal knowledge is to be considered voices on climate change. This requires critical and reflexive ongoing listening to what children bring to educational encounters. Again, this is not particular to climate change education; instead, it reveals the need for a transformative impulse as this educational culture emerges. This impulse speaks to the necessity for climate change education to be transformative, not reproductive.

Emergent and Situated Approaches to Children's Climate Change Education

In our quest for examples of emergent approaches to children's climate change education, as characterised by social inclusion, justice and participation, we have been inspired by situated approaches that acknowledge the specific circumstances of children's everyday lives.

For instance, the South African Children's Movement designed and implemented a "Wonder Bag Project", which focused on connecting climate change with the development of a solution to a key matter of concern for their child members, the majority of whom live in under-resourced neighbourhoods. A wonder bag is a fabric bag filled with insulating material that retains heat and is used to finish cooking a pot of rice or let a stew simmer with no fuel. The project teaches children sewing skills, and also links education with creativity. By mixing theory and practice[1], this project encouraged a learning process connected to children's situated lives: measuring and comparing energy use, discussing income saving (found to be as large as 40%) and carbon emission reduction. Engaging children in practical solutions further builds their confidence to participate in discussions with adults in relation to energy and climate change (M. Solomon, personal communication). This voicing constitutes an experience of children's political agency in the world.

Thus, children's being and knowing in the world is developed through activities that accommodate their inherent curiosity and need to learn. The example above led to the cultivation of children's voices in the climate change discourse within their local contexts.

Other emerging approaches aim to broaden educational attention to include other forms of literacy (beyond scientific literacy alone), such as emotional and creative literacy. These approaches suggest that art and creativity may strengthen children's engagement with climate change topics (Bentz, 2020; Rousell et al., 2017). Furthermore, by widening the possibilities for expression, such approaches also have the potential for including children in marginalised positions (e.g., Jørgensen & Martiny-Bruun, 2020).

What to Do?

Education is one of the initial arenas in which children will learn the value or not of their voice in their unfolding inquiries in the world. Our central argument is that children's ability to voice and have agency in climate change discourses partially depends on the generative spaces created by climate change education.

In brief, we call for situated, knowledge-diverse, inclusive and child-guided forms of climate change education. By this, we mean, first, that climate change education should be situated in children's experiences, lifeworlds and languages, with educators paying attention to what is at stake in children's lives and locally relevant connections, metaphors and activities as a way to make sense of climate change experiences. Second, children's climate change education should be informed by a wide range of knowledge forms, including transdisciplinary scientific knowledge, local knowledge and embodied, sensuous and artistic knowledge forms. These arguments for transdisciplinarity and embodied and affective approaches (Rousell & Cutter-Mackenzie-Knowles, 2019) should be understood as having the potential to ensure that climate change education is decolonised and made sensible for Global South contexts (Dei, 2010; Nxumalo & Villanueva, 2019). Finally, climate change education should be informed and guided by children's own curiosity, engagement and agency.

Connecting children's lived experiences and learning within the wider world where they are situated is a critical reflective capacity. This requires adults, researchers and educators to attune to children's voices via pedagogies that respond to children's complex everyday lives in local places (Nxumalo & Villanueva, 2019) and make time and space for the affirmation and cultivation of children's political agency.

Endnotes

1. Children's Resource Centre (n.d.c): the wonders of the wonderbag: the wonders of the wonderbag poster: https://drive.google.com/file/d/1QZKe1JndPlO1_OUY45EbozAwn1nRirfJ/view(Accessed on 4th August, 2021.

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Part 7

Transforming Higher Education for Sustainable Futures

Higher Education Leadership: Cruise or Expedition?

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Summary

Higher education can create space for learning where students can work with integrated real-world issues, thereby creating value for others while building transformative leadership capabilities. It requires organisational leaders understand how to distinguish between two logics for leadership: the cruise and expedition logic, respectively. Good leadership understands the value of expeditions for the development of the entire system.

Keywords

Higher Education
Sustainability
Expedition
Leadership

Introduction

This article was partially born out of a recent contribution on leadership and institutional capacity within higher education in Sweden for Agenda 2030 (Holmberg, 2020). Its implications have been positively received in several forums. Below, we share its main message and policy implications with an international audience.

We start with the following question: How do higher education institutions (HEIs) prepare us for climate change and what kind of structural transformations are needed in HEIs for sustainable futures? We focus on students' learning processes for dealing with complex challenges such as climate change in real-world contexts. We build on eight years of experience from initiating and running such learning settings (Holmberg, 2014; Larsson & Holmberg, 2018), as well as experiences from related approaches, including literature reviews on sustainability oriented laboratories and experimentation (McCrory et al., 2020).

HEIs are still mainly organised in a one-way, hierarchical and reproductive relation to learning, and the content is often divided based on disciplines while lacking a holistic perspective (Wals & Corcoran, 2006). United Nations documents (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2014) and research on learning for sustainable development (Holmberg & Samuelsson, 2006; Tilbury, 2011) have claimed for many years that learning *about* sustainable development, including climate change, needs to be complemented with learning *for* sustainable development. The latter calls for learning settings where generic competences to deal with integrated real-world complex issues can be developed. The understanding that the climate challenge needs to be integrated with other perspectives, including justice, becomes obvious in a real-world setting. For instance, will a new carbon-neutral transport system look very different if accessibility and social justice are important design criteria or not?

There are many reasons why HEIs in general move too slowly in the direction of more challenge-driven approaches, as required by learning *for* sustainable development. One reason can be found in the structure of HEIs. They operate in the domain of learning, but when it comes to HEIs as organisations, especially the education system, they seldom behave as learning organisations, that is, "organisations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to see the whole together" (Senge, 1990, p. 3).

For any learning organisation, space needs to be created in which more exploratory-oriented learning for transformations can occur. Creating such space, however, requires that the leadership, especially within the education system, understands how to distinguish between but still acknowledge the interdependence of two logics for organisational leadership and management: the cruise and expedition logics, respectively (Holmberg, 2019).

Getting "Cruise" and "Expedition" Modes to Reinforce Each Other in Higher Education Institutions

Bateson (1972) distinguishes between four levels of learning, where the fourth level is unlikely to occur in practice. Winter et al. (2015) have referred to the first three levels as: conformative (doing things better); reformative (doing better things); and transformative (seeing things in new ways). Many researchers group the second and third levels together and think of learning organisations as a dichotomy. Argyris and Schön (1974) express this dichotomy as single- and double-loop learning, respectively. There are several related ways of expressing this kind of dichotomy: lower-level and higher-level learning (Fiol & Lyles, 1985); first- and second-order learning (Arthur & Aiman-Smith, 2001); marginal and radical change (Miner & Mezias, 1996) and adapted and generative learning (Senge, 1990). When organisations face major external changes, researchers claim that what is equivalent to double-loop learning is necessary. This applies not least to HEIs if they are to establish learning environments for a sustainable future.

There are strong links between learning organisations and the field of "sustainability transitions research" (Köhler et al., 2019; Markard et al., 2012; Rotmans et al., 2001). Navigating and leading such transitions is associated with experimentation and learning. The transitions literature tends to contrast system optimisation with system innovation (compared with single- and double-loop learning above). Optimising and refining existing systems follows a different logic compared with exploration and experimentation (March, 1991). Thus, the leadership required in the two logics is also of a different character. Metaphorically, we can refer to the former as the "cruise" and the latter as an "expedition" (Holmberg, 2019; Larsson & Holmberg, 2018).

As long as an organisation can continue without any major external challenge or pressure for change, the cruise logic functions well and most things can be handled with existing management systems, which give a sense of control. In the cruise, it is about doing what you already do but better (level 1 learning). As an organisation approaches the uncharted waters of new challenges with external pressures for change (for example the requirement for learning environments *for* sustainability transformations) it may be wise to send out an expedition to test new paths instead of jeopardizing the entire cruise, in order to minimise risk and maximise learning. In an expedition, conditions need to be created for doing better things (level 2 learning) and seeing the world in new ways (level 3 learning), or learning what is not yet there (Engeström, 2016). Table 1 presents some important differences between the two logics.

Table 4. Some differences between cruise and expedition modes

Cruise mode	Expedition mode
Current structures, routines, etc. provide support	Current structures, routines, etc. hinder
Optimising and refining existing systems	Thinking beyond existing systems
Goals, targets, steering, controlling	Guiding principles, trust, autonomy, flexibility
Measuring performance related to predefined results	Creating space for exploration, reflection and learning

Source: Adapted from Holmberg (2019)

We are not suggesting replacing the cruise logic with expedition logic. Both are needed. But each has different purposes and applications. In the business world, it is obvious that one must be able to both earn money with existing operations (cruise) while preparing for a future market (expedition). Compare this, for example, with the transition towards electrification in the car industry. Organisations that can cope with both logics simultaneously are often referred to as ambidextrous (O'Reilly & Tushman, 2013). Research shows that if the expedition occurs completely isolated from the cruise, then the cruise does not take advantage of the learning that takes place in the expedition, and if the expedition is completely integrated into the cruise, the expedition is not given adequate space to explore and learn. It seems important to keep the two logics separate, that is, to create room for the expedition while ensuring that the connection takes place at the highest level in the organisation (Smith & Tushman, 2005). If this happens, the expedition is desired by the cruise and is provided the right conditions to succeed while it becomes important for the expedition to return their learning to the cruise.

If we apply this dichotomy to HEIs, it is sad to conclude that we still see too few activities in expedition mode in their different roles: In their role of researching, transdisciplinary research lags behind traditional in-house monodisciplinary research; in their role of innovating, for example, challenge-driven innovation in comparison to traditional idea-driven innovation; and especially in their role of educating when it comes to establishing learning settings for dealing with complex challenges, such as climate change in real-world contexts. Research has shown that providing the right conditions for the latter has proved to be an enabler for expeditions in the two other roles (Larsson & Holmberg, 2018).

In HEIs, expeditions are often hindered by the inertia of prevailing structures and values. This may apply to ranking systems and incentive structures for individual researchers, traditional idea-driven innovation systems and cemented educational structures. Of course, this also applies to prevailing control and management models, for example, new public management (Bessant et al., 2015), with its strong focus on optimisation and control.

At most HEIs, the educational organisation is led completely according to the cruise logic. Active leadership is needed to create and learn from valuable expeditions, that is, new experimental learning environments in which researchers, students and managers can explore the responses to climate change–related challenges. A crucial problem is that these experimental learning environments can often not be easily incorporated into an existing educational structure. If expeditions must adapt to the structures of the cruise too soon, they will either never take place or will not be able to continue. Thus, there is a need for an awareness of the importance of both logics and an ability to handle them simultaneously. Today, too much responsibility is placed on the initiators of the expeditions to also find conditions for the expedition to thrive within the cruise. Good leadership within the educational organisation understands the value of expeditions for developing the entire system. It is also not reasonable that the financial responsibility for expeditions that intend to benefit all HEI activities, which are often seeking to invite students across educational programmes, is placed on an individual institution without any central support.

Expeditions need initial top-down support, but to be successful, they must happen from the bottom up with a minimum degree of trust and autonomy. This is well-illustrated in the case of Education for Sustainable Development (Chikamori et al., 2019). To guarantee a sharing of expedition-learning and up-scaling to the larger educational system (or cruise), it is important to move beyond the accumulation of knowledge on learning outcomes and student satisfaction, and move into understanding the underlying features and mechanisms; explaining what works, for whom and why; what can be generalised and transferred across cases and contexts, while leaving institutional freedom to adapt (Holmén et al., 2021). Hence, we need to move beyond a search for blueprints and best practices. This further strengthens the realisation that expeditions are beneficial in all HEIs that are seeking to transform towards sustainability.

It may be that earmarked funds from the national ministries of education are needed for encouraging and enabling HEIs to create space for expeditions, for example, institutional experiments, explorations, innovation and learning within their respective educational systems. Here, perhaps the motto of the Challenge Lab can be applied: “Think big, start small, act now!”(Holmén et al., 2021, p. 18).

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Strategies Advancing Climate Change Education in Three Brazilian Universities

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Summary

Climate change education can be pursued through several strategies that include integrating knowledge on climate issues, encouraging more sustainable behaviour and engaging with diverse communities. Given the role that higher education institutions can play in these strategies, this article explores how three Brazilian universities are contributing to climate change education and overcoming challenges associated with a lack of support from policies and national guidelines.

Keywords

Climate Action
Environmental Education
Brazilian Higher Education
Sustainability in Higher Education
University Initiatives

Introduction: Climate Change Education and the Role of Universities

Climate action, which is recognised as a Sustainable Development Goal by the United Nations, has been receiving increased attention given the climate-related challenges observed worldwide. The topic of climate change stands out among other sustainability goals (Salvia et al., 2019), representing a major global research trend and impacting both developed and developing countries (Nerini et al., 2019). Following the alarming conclusions of the most recent report from the Intergovernmental Panel on Climate Change (2021), climate change education must also receive more attention as a supporting tool for adaptation and mitigation strategies.

UNESCO (2010) indicated more than a decade ago that climate change education and its increased relevance should be addressed in formal, nonformal and informal education. Directly and indirectly, universities have a role in climate action through teaching, research and community engagement and in their campus operations (McCowan, 2020).

In these pathways, can climate change education be pursued with different strategies and approaches by integrating knowledge on climate issues and encouraging more sustainable behaviour and action? Although widely discussed in the literature, most efforts are isolated and lack support from policies or guidelines. This is the case in Brazil, which has some initiatives related to climate change education but lacks a national framework to support them (Brandli et al., 2021). Here, we explore the role of higher education institutions in contributing to climate change education by presenting the cases of three Brazilian universities.

Climate Change Education in Brazil

Although the Brazilian National Government Resolution (No. 2/2012) from the Ministry of Education (2012) emphasises that curriculum planning should address environmental issues, a curriculum in environmental education, education for sustainable development (ESD) and climate change education in Brazil is not mandatory at universities. These foci are more commonly addressed in primary and secondary education, even though they are not mandatory for these levels either. The National Environmental Education Policy (Diário Oficial da União, 1999), which also guides the actions of universities, addresses ESD in a very superficial manner and does not elaborate on climate change education. Thus, although environmental education is considered an essential and permanent component of national education, across all levels of education, there are no national guidelines for ESD or for climate change education (Diário Oficial da União, 1999; Ministry of the Environment, 2013).

This article presents the cases of three universities in Brazil that have been partnering with Transforming Universities for a Changing Climate (Climate-U), an international project that is extending knowledge and practice around climate justice, climate change education and the role of universities. Climate-U has as its central focus the establishment of multistakeholder participatory action research (PAR) groups to generate impact at the local level through cycles of reflection and action (Climate-U, 2021).

University of Passo Fundo: Academic Engagement with a Green Office

The University of Passo Fundo (UPF) has been dedicating itself to sustainability and climate initiatives, mainly through operational aspects such as implementing renewable energy generation on campus, improving energy and waste management and having a working group to apply for international sustainability rankings. Nevertheless, there are some challenges in these practices, including the lack of integration between initiatives and lack of communication with the academic community. The main insights from these challenges refer to opportunities for collaboration and the need to promote student engagement around sustainability and climate action.

Based on these challenges and insights, the participatory action research developed at UPF as part of the project Climate-U is focusing on the implementation of a sustainability office, following the Green Office Movement and representing the first of its kind in South America. Green Offices aim to inform and engage students and staff to act on sustainability. At UPF, the office will initially focus on climate action initiatives, particularly in developing climate and sustainability-related trainings and workshops. The stakeholders involved in the process of implementation include the university sector, students' movements, environmental consultancies, NGOs and local government. These partners support the process by discussing the impacts of climate change in the region and potential role of the university in addressing these.

The Green Office at UPF is expected to promote climate change education by raising awareness about the impacts of climate change, sharing behaviour change with the academic community in events and social media and involving the local community in learning opportunities.

University of São Paulo: Educational Initiatives on Climate Change

At the University of São Paulo (USP), most educational initiatives on climate change are carried out through the interdisciplinary climate investigation center (INCLINE). This research support centre was created in 2011 with the goal of promoting and integrating learning, research and outreach activities on the theme of climate change. The promotion of interdisciplinary educational initiatives is one of INCLINE's main areas of action, and its activities are often developed from collaboration between various areas of scientific research. For instance, each year, INCLINE promotes a two-week graduate course on "Climate Change and Interdisciplinarity", which welcomes not only enrolled graduate students at USP, but also interested participants from other institutions. People with different educational backgrounds can enrol and participate in this course, with the only prerequisite being the completion of an undergraduate course in any subject.

In the course, renowned speakers with different areas of expertise present and interact with students, covering a range of climate change topics. These broadly include the main scientific bases of climate change, climate change impacts, adaptation and vulnerability. More specifically, the topics include energy balance in the atmosphere; paleoclimatology; the economics of climate change; physical oceanography for climate change and variability; air pollution and climate; water resources and climate; human biometeorology;

sustainability, public policies and interdisciplinarities; and environmental governance and global climate change. This rich range of topics, together with the diverse educational backgrounds of both the lecturers and students, results in a unique opportunity to create a valuable interdisciplinary network of dedicated people who share common interests on the theme of climate change.

Federal University of Pará: Community Engagement to Create Collectives of Territorial Governance

In the Amazon region, large national and multinational projects focusing on intensive agriculture, mining, construction of hydroelectric plants, pipelines, roads and electricity networks have been developed without sustainability planning and have had irreversible impacts on Indigenous, traditional and peasant people. These projects also have had huge impacts on nature and the climate in the Amazon, destroying biomes and removing the original traditional and peasant people from their territories through deforestation, the destruction of water springs, gold mining in rivers, replacing forests with pasture or other monocultures and the intensive use of pesticides. These activities contribute to global temperature increases, ecological imbalance and the extinction of many species that constitute our biodiversity.

These projects stand in contrast to the action of Indigenous, traditional and peasant people, who use nonpredatory means of production for their continued existences, thus contributing to the preservation of the environment and sustainability of their territories. In this context, by means of participatory action research, the Federal University of Pará is contributing to the creation of collectives of territory governance (COGTERs), which are formed by the leaders of social movements of Indigenous, traditional and peasant communities; university students and professors; political and government representatives; and private, state and nonprofit organisations. The aim of this initiative is to empower Indigenous, traditional and peasant communities to carry out interventions to combat environmental impacts and climate change that is happening in their territories. Based on the pedagogy of alternation, a methodological strategy that links educational actions at the university with research and intervention actions in the community or territory, the COGTERs will prioritise the preservation of the Amazon biome and balance development and sustainability in the territories while promoting the emancipation of their communities.

Concluding Remarks

Climate action should occur synergistically with environmental education and ESD, with universities playing an essential role in the production and dissemination of knowledge, especially when it comes to climate change education. The cases presented in this paper show different strategies to incorporate these efforts into universities' structures, educational interventions and community engagement initiatives. Although focused on Brazil, the lessons can potentially be useful for other institutions, particularly those with challenges of student engagement and a demand for interdisciplinary educational training and outreach activities.

On the one hand, the lack of national guidelines for the implementation of climate change education represents a challenge, while on the other, it creates an opportunity for pioneering future policies, recommendations and guidelines. In the case of the Climate-U project and all the cases explored here, an important recommendation refers to the use of participatory methodologies to (i) engage a wider community in climate-related efforts; (ii) promote climate justice while developing transformative changes in educational institutions; and (iii) see climate change education as an opportunity for reciprocal exchange and learning. It is hoped that these initiatives, in different regions of Brazil and using different approaches, can foster discussion about national policy in education for climate change.

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Environmental Initiatives in Indian Higher Education

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Summary
This article explores the work of policymakers, administrators, educators and students in addressing Sustainable Development Goal 13 on climate change in the Indian higher education sector. National players include the Ministry of Education, the University Grants Commission and the National Assessment and Accreditation Council. The article hones in on the environmental initiatives of West Bengal State University.

Keywords
Indian Higher Education
Indian Climate Education
Indian Environmental Education
Indian National Action Plan on Climate Change

Introduction

The well-being of a nation depends on using science and technology effectively in relation to the country's physical resources. There is a perennial tension between environmental protection and societal development. On the one hand, human society is developing rapidly, while on the other hand, that society is responsible for the destruction of physical resources. The health of the Earth is impacted by life-threatening challenges from air, water and soil pollution, depletion of natural resources and climate change. Sustainable development, however, has been a key policy process seeking to unlock less destructive forms of development, protect the Earth while continuing the advancement of humankind. In the Indian context, the population explosion, a broad lack of awareness of the significance of nature and ongoing structural challenges such as poverty and inequality contribute to increased environmental degradation. It is time to address this imminent danger by incorporating environmental studies into the curricula of schools, universities and colleges because education has always been a tool for addressing societal problems through spreading mass awareness (United Nations Education, Scientific and Cultural Organisation [UNESCO], 2019).

However, not much time is allocated to teaching sustainable development in educational institutions. The pedagogy and curricula of schools, colleges and universities should integrate environmental themes (UNESCO, 2021). Several shortfalls exist in the policy recommendations and initiatives of educational administrators. Recognising this, the Indian Ministry of Education is taking the initiative to restructure the higher education curriculum for sustainable futures at all levels. I provide an overview of these below.

Combating Climate Change: National Policies and Programmes in Education

The Constitution of India requires the state to "take measures to protect and improve the environment and to safeguard the forests and wildlife of the country"(Government of India, 2022, p. 24). Following this mandate, different national policies and academic frameworks have been formulated to safeguard the environment through education. The

National Education Policy of 1986, which has been modified several times since its introduction (Government of India, 1998), includes environmental education in schools; now environmental protection is a fundamental area of the curriculum. The National Council of Educational Research and Training, which is under the Ministry of Education, is responsible for reviewing the National Curriculum Framework at regular intervals. India is among the few countries in the world where the teaching and practice of environmental education is compulsory in the formal education system. "Environmental education in school systems was made a subcomponent of the India Environment Management Capacity Building Project, which was undertaken by the Ministry of Environment and Forests and supported by World Bank" (Sharma, 2017, p. 1).

The National Council for Teacher Education has taken positive steps to support the professional development of teachers. This statutory body, which is responsible for the professional development teachers, mandated the methodology of teaching environmental education by providing a manual for preservice teachers during their training. This manual contains the guidelines for student teachers to participate in nature camps, conferences and exposure visits and, thereafter, to use this knowledge and experience in their teaching (Global Environmental Education Partnership, n.d.).

Additionally, the University Grants Commission (the body for monitoring higher education institutions in India) has implemented a six-month compulsory module in environmental studies at all universities and colleges throughout the country (University Grants Commission, 2003). Their aim is twofold: first, to integrate climate change measures into national policies, strategies and planning and, second, to use education and awareness raising for human and institutional capacity development around climate change mitigation, adaptation, impact reduction and early warning systems, thereby ensuring compliance of the curriculum with Sustainable Development Goal 13 on climate action.

In 2018, the Government of India (2018) adopted a National Action Plan on Climate Change. Building mass awareness has been the primary agenda in supporting the implementation of the plan. This is intended to be achieved through media engagement, creating national portals, involving society through different awareness programmes, incorporating the issues into all levels of curricula and recognising distinguished work through awards. The plan includes the intention to set up a National Mission on Strategic Knowledge for Climate Change to encourage research in the higher education sector and to develop advanced technologies to address environmental degradation. This will ensure funding and high-quality research for addressing climate change. Additionally, the National Action Plan seeks to support the establishment of climate change–related academic units in universities and research institutes, and to support collaboration between them.

There is evidence that the endeavours of teachers and receptive students is minimising the gap between the ideal situation and reality while generating mass consciousness about environment protection among the student body. To retain and expand environmental awareness among students, the National Assessment and Accreditation Council (2019) has introduced criteria for "'institutional values and best practices" in higher education institutions. Institutions practicing programmes that restore natural resources qualify for higher grades in their assessment procedure. Some examples of best practices are shared below.

The Case of West Bengal State University

In the context of the above policy, West Bengal State University, a State affiliated University in the province of West Bengal in India, has recently been accredited by the National Assessment and Accreditation Council (NAAC), in accordance to its seven indicators of assessing the quality of higher education institutions. The final indicator is concerned with the "Institutional Values and Best Practices", where institutions are graded as per the innovative practices of the institution regarding different activities performed other than teaching and learning. It is worth mentioning that, West Bengal State University has been acclaimed as one of the key institutes working to protect nature and nurture anti-pollution practices, despite being located in a highly polluted area of extended Kolkata. It has been proposing mass environmental education within the 53 affiliated colleges under its jurisdiction through Seminars, Conferences, Webinars and drives undertaken by students of different departments, as part of their projects assigned in the curriculum. Amongst other activities, they visit villages in the vicinity of the university, helping spread awareness regarding ways to conserve the environment.

The University has been looking forward towards a green campus, as the campus is naturally gifted with a number of water bodies. Authorities undertook a green monitoring of various natural factors such as water consumption, solid waste management, paperless interaction within the premises and outside, as far as practicable. Solid wastes of the University Canteen are exposed to the vermicomposting site, thereby making provisions to transform them into high quality manure. The institution has been showing noticeable footprints in conservation of rainwater in two large tanks within the campus. It is further, self-sufficient in fulfilling the needs of water other than drinking water and electricity. Solar panels installed within the campus are aiming to reduce the electricity cost to great extent. It has been thereby inspiring other institutions of the State in adopting non-conventional energy sources.

The Education Department of the university has been practising No Vehicle Day once in every month to popularize anti-pollution footprints as well as address Carbon consumption, within its limited scope. The Department of Education in the university has been publishing an e-journal every year on environmental awareness, with the view to share knowledge of issues related to climate change among the students. Further, they have been distributing plants to the villagers in the surroundings of the University, sharing knowledge of their utility and medicinal values. These are the ways how West Bengal State University has been creating pathways to mitigate climate change, setting example to other higher education institutions, and local communities alike through their educational efforts. Similar green campus initiatives are been successfully implemented in several universities across India as a response to national sustainable development agenda.

Conclusion

Climate change mitigation and the development of environmental awareness through education is a lifelong affair and is not just restricted to the formal education system. It is still difficult to implement the idea of exploring and practising environmental conservation in daily life among most of the Indian population, despite climate change and environmental degradation. Nonformal education could play a vital role in this respect. The examples of practice at the West Bengal State University, which are influenced by national policies, show that higher education institutions could channel student strengths and knowledge in a positive way, by engaging with communities, thus helping to extend mass awareness and generate practical climate actions.

Higher education institutions can utilise their expertise and infrastructure by collaborating with different agencies and nongovernmental organisations. By doing this, they could contribute to achieving the goals of sustainable development, addressing the SDG 13 of supporting climate action to redress the impacts of climate change and wider environmental degradation. This paper has offered an example of how national policy to address climate action can be translated into practices that influence the education offered in higher education institutions, as well as reaching outwards into communities and society more widely.

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University Course Aiming at Whole Community Transformation in Malaysia

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Summary

The short-term crisis challenges of COVID-19 have forced universities to drastically change their approaches to and content of education. Paradoxically, the longer-term climate crisis has not triggered such changes. In this paper, we deliberate on an education model that showcases how to address these issues. A new course called "Sustainable Development: Issues, Principles and Practices" aspires to be a transformational platform for this purpose

Keywords

Transformative Education
Whole Institution Transformation

Introduction – The Need for a Post-COVID Model for Tertiary Education

The crisis conditions of the COVID-19 pandemic have highlighted the ongoing need for education models that address the longer-term climate change crisis–which is both a challenge and major imperative. The existing mainstream education model only offers courses on climate change as electives, despite the worsening condition of the planet. More than ever, the current university curriculum needs to be drastically and urgently reoriented towards making sustainability issues such as climate change a fundamental and compulsory part of education. The report by the United Nations Educational, Scientific and Cultural Organization (UNESCO; 2020), *Education in a Post-Covid World: Nine Ideas for Public Action,* argues that it is crucial to consider core principles and known strengths as we face unprecedented disruption to economies, societies and education ecosystems in the aftermath of the COVID-19 crisis.

In response to this demand, the International Islamic University, Malaysia (IIUM) has introduced a new compulsory university course called "UNGS 1201: Sustainable Development: Issues, Principles and Practices". UNGS 1201 is a university-wide project that serves as a transformative, transgressive and transdisciplinary platform for post-COVID education. It amalgamates various pedagogical models, as the course is a specialised learning process that includes the delivery of content, behavioural analytics, learning psychology and assessments. These approaches are delivered through a hybrid model that has the flexibility to fit learners' different needs. The authors argue that over the years, the formal curriculum at IIUM has become too focused and "segmented," side-lining the humanistic aspects that shape attitudes and values. To restore and create balance between the technical and human dimensions, the university started to work on transforming learning towards "edu-action with soul". Edu-action is a concept of learning that puts equal emphasis on theories and action. As such, to bring back

the soul of education, IIUM has been experimenting with different approaches to promote more holistic and rigorous sustainability education. The introduction of UNGS 1201 is one such experiment.

As a transformative, university-wide project on post-COVID sustainability education, UNGS 1201 requires close collaboration between universities and communities.

Whole Institution Transformation and Whole Community Transformation

The fundamental premise of UNGS 1201 is that university education must be closely linked to the realities of a post-COVID society, where knowledge must be directly relevant to the changing landscape of communities. Transformation must take place within the university's institution. At IIUM, the transformational change is taking place at two levels: structural change and knowledge management change. Structurally, classroom-based learning needs to reflect the real-world set-up. This is not just applicable to social science subjects, but to all knowledge disciplines. The whole ecosystem of learning on campus must make the community part of the process. Based on this premise, UNGS 1201 is designed to push for transformation within IIUM as a way to deliver transdisciplinary education that transgresses the boundaries between formal and informal learning systems.

Whole institution transformation (WIT) is holistic, integrated and entrepreneurial in nature, covering the spectrum from academic to community engagement, in order to meet the *raison d'être* of IIUM. The WIT approach enables all stakeholders in the university–leadership, academics, learners and administration–to jointly develop a vision and plan to implement education for sustainable development (ESD) in the entire institution. For the purpose of WIT, changes are advocated and carried out at all levels with predesigned stages. The WIT model aims to change the university ecosystem by pushing the university's agenda of serving the community, both systemically and systematically, with other stakeholders, such as government agencies and industry players. IIUM has outlined two clusters of changes initiatives: structural change to break down institutional silos (holacracy) and knowledge management change. The latter focuses on generating and disseminating new knowledge for sustainability through interfaculty interaction. Through these two initiatives, the WIT approach aims to make IIUM a multidimensional enterprise that draws on the full range of human capacities for learning to know, to do, to be and to live together (UNESCO, 1996).

To realise this aspiration of becoming a sustainable university, IIUM has gone through an intensive WIT journey. This journey is outlined in a document called the IIUM roadmap (IIUM, n.d.) The transformation process seeks to operationalise the university's mission statements in the context of present and future scenarios while standing firm on the university's philosophical foundations based on Islam and spirituality. Knowledge imparted at IIUM should include intellectual, spiritual and moral dimensions, and the education process should be values based, in line with *maqasid shariah* (the objectives or purposes of Islamic rulings) and operationalised through the Sustainable Development Goals (SDGs). This transformation ties the religious and spiritual link through Islam with the concept and principles of sustainability in all that the university does–be it education, community development or engagement, or tackling climate change–making their actions more holistic in their impacts.

While WIT is taking shape at IIUM, the university is contributing towards whole community transformation through its roles as the Secretariat for the Regional Centre of Expertise (RCE) on Education for Sustainable Development, Greater Gombak (RCE Greater Gombak, 2021) This is a network of existing formal and informal organisations that facilitate learning towards sustainable development in local and regional communities. The purpose of the RCE is to connect formal education institutions with local stakeholders in their sustainable development efforts. Through this network, IIUM can work with the surrounding community with the goal of becoming a sustainability society, based on the Malaysian concept of sustainable living called *Sejahtera* (well-being).

UNGS 1201 as a Transformative and Transgressive University Course

The process of transformation to sustainability requires IIUM to move away from and transgress the boundaries and dominant narratives that underlie much unsustainable development responsible for maintaining poverty, inequality and ecological degradation. UNGS 1201 is the manifestation of WIT for the sustainability agenda at IIUM, contributing directly to whole community transformation. It is a transformative platform catalysing both levels of change: structural change to allow transgressive education, whereby knowledge is generated and disseminated across the boundaries of conventional disciplines, which can lead to changes in management of the knowledge developed.

The fundamental objective of the UNGS 1201 course is to increase students' knowledge of sustainability and develop the attitudes, values and skills to address sustainable development issues and related challenges in a globalised world. More specifically, this course aims to demonstrate the importance of sustainable development principles and practices, which include the Islamic perspective on sustainable development and local concept of *Sejahtera*. Through multiple case studies, students are expected to understand the challenges and barriers in integrating

sustainable development at the local, national and international levels.

UNGS 1201 targets all new students at IIUM, with the aim of nurturing attitudes, values and skills, while generating hybrid and flexible transformative learning to meet the challenges of a sustainable world. It has a pragmatic focus on developing people who use their heads or cognitive abilities (or to know); their hands or their psychomotor domain for mastering skills (or to do); and their hearts or affective domain to form values and attitudes to be translated into action (or to be). These three components represent parts of a person who learns to live together with others in a harmonious, respectful and peaceful society. This is in line with UNESCO (1996), which emphasises the four pillars of lifelong education: learning to know, learning to do, learning to be and learning to live together.

Most formal education is limited to learning to know (which includes numeracy, literacy and critical thinking) and learning to do (which includes skills and competency). Little emphasis is given to learning to live together, which requires the development of social skills and values, and learning to be, which requires personal development to act with creativity, judgement and responsibility. The head, the hand and the heart must become integrated to realise the goal of learning to live together (Razak, 2019). The IIUM model distinguishes itself from the other teaching and learning models by following five criteria for content and delivery method:

Transdisciplinary and integrated
The course is facilitated by a multidisciplinary teaching team from all faculties in the university so that no single discipline dominates the curriculum. In each classroom, students come from a variety of disciplines, allowing them to contest sustainability issues and reflect on problems from multidisciplinary perspectives.

Formative and summative assessment
UNGS 1201 is designed to have both formative and summative assessments without a final examination. Assessments are spread throughout the semester via quizzes, online questions, reflective journals or blogs and team project proposals.

Responsible research based
As part of the university academic community, students must be trained and exposed to the university's responsible research culture, which emphasises contextualising the research in relation to local needs. Identification of those issues for student project proposals are carried out using suitable research methodologies and empirical processes.

Community engaged
UNGS 1201 is a community-driven course with real-life community engagement. This allows students to appreciate and apply what they have been exposed to in the classroom and *vice versa*. Students are required to analyse those findings acquired on the ground back into their classroom discourse.

Action and solution oriented and transgressive
UNGS 1201 students are trained to use systematic problem-solving perspectives.

The course is transgressive because classes consist of students from different fields and majors. Lecturers come from various fields. This arrangement was designed to ensure multiple perspectives on the environment, sociocultural issues and economics. This leads to the use of transdisciplinary knowledge and skills in project proposals, in the quest for real-world solutions for the challenges faced by both clients and community members.

With such a dynamic set-up, despite being introduced only a year ago and running only two cohorts, the course has already shown significant outcomes. These include:

- The development of 300 student project proposals addressing a wide range of sustainability issues both inside and outside the campus. These proposals are useful databases for the university in the process of becoming a sustainable campus.
- More than 20 newspaper articles written by students voicing their concerns on various SDG-related issues in Malaysia and other countries.
- Hundreds of blogs and individual journals written by students as part of their reflection during the course.
- The adoption of one student proposal at the university. This involves setting up shops on the university campuses where the community can purchase sustainability-certified products.

These outputs are not just for campus sustainability; more importantly, they are part of the whole community transformation plan. They are to be extended to the wider community surrounding the campus within the network of the RCE Greater Gombak, which includes about 20 nongovernmental organisations (NGOs) and local communities.

Another unique transformational feature of the course is that it has attracted 60 lecturers volunteering to be in the teaching team. Additionally, for the first time in the university's history, administrative staff are empowered to teach students.

To further strengthen the impact of the UNGS 1201 course on ESD, two new courses are being designed to expand community engagement in ESD courses at IIUM, named "*Usrah* in Action 1" and "*Usrah* in Action 2". *Usrah* is an Arabic term for "family",

which also implies that everyone works closely together as in one family. Thus, "*Usrah* in Action" requires students to collaborate with community members in addressing shared issues.

As with UNGS 1201, Usrah in Action 1 and 2 will be compulsory for all IIUM students. These new courses will adopt many of the operational approaches of UNGS 1201, such as the use of volunteer lecturers or facilitators and student assessment through formative and summative methods. However, they will have a more concrete and interactive level of community engagement.

Lessons learned and policy recommendations

The UNGS 1201 course provides three core learnings that are critical to share. First, it shows that sustainability is best learned through community engagement in a realistic community set-up. Second, it shows that interdisciplinary learning is crucial for developing impactful skills in the next generation. Third, action speaks loudest in sustainability education, something that is also relevant to the SDG 13 emphasis on climate action. These learnings put pressure on education institutions to change old ways and push boundaries to create a conducive environment for young people in particular to thrive in understanding and taking action for sustainability and in responding to climate change.

As a testimony to the potential of this course, it was recently "Highly Commended" at the International Green Gown Awards 2021, which is administered by the Environmental Association for Universities and Colleges. Established in 2004, the Green Gown Awards recognise exceptional sustainability initiatives undertaken by educational institutions and is considered to be the most prestigious recognition for sustainability best practice in the tertiary education sector. Such an award recognises IIUM's future-focused approach to connecting the dots of sustainability and education through a systematic overhaul of their tertiary education ecosystem. It is also a call-to-action to other education institutions and sustainability-affiliated partners to adopt more experimental approaches to sustainability education, given that time is running out to reduce and reverse the negative impacts of climate change and build sustainable, resilient communities.

For successful implementation of the WIT approach, several policies need to be introduced to encourage universities to work harder at meeting the needs of society rather than the conventional emphasis on research and publications alone. Universities need to be incentivised and rewarded when they work together with members of the community or NGOs.

In conclusion, UNGS 1201 can serve as a catalyst and model for other universities that want to include ESD in their university curricula. UNGS 1201 showcases a whole institution approach and a community transformation approach. It demonstrates the policy changes that may be needed if societies are to address climate change challenges through education.

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Part 8

Inclusive, Responsive Educational Transformations in Service of Sustainable Futures

Botswana Teacher Educators' and Schools' Responses to Climate Change

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Summary
This paper explores how schools and teacher education institutions are responding to climate change challenges in Botswana. The paper proposes transformation within the education system and enhancing teachers' pedagogical skills to respond to climate change. Transformative policy developments should be linked to educational SDGs 12 and 13, which require addressing climate change in national policies and within education.

Keywords
Climate Change Education
Transforming Education Systems
Teacher Education
Botswana Schools

Introduction

Botswana is an upper-middle-income country with a stable socioeconomic environment. However, the country is vulnerable to the impacts of climate change (Akinyemi & Abiodun, 2019). This paper contributes to the transformation of the education system for sustainable futures, with the purpose of exploring how schools and teacher education institutions prepare young people to respond to climate change.

Botswana's Minister of Tertiary Education, Research, Science and Technology stated that "there is a need to come up with adaptive strategies to climate change" (Botswana Government, 2020, p. 5). The minister argued that these need to be integrated into education policies, teacher education and the curriculum at all levels so that learners engage in Education for Sustainable Development (ESD) from an early age. The Botswana education system needs to rethink pedagogical practices (Velempini & Randolph, 2019) and upscale teachers' competencies in integrating climate change in the curriculum. The education system aims to support Education for Sustainable Development (ESD ESD (Ketlhoilwe & Jeremiah, 2010; Schrage, 2015). The Sustainability Starts with Teachers (SST) consultation workshop held in Botswana in 2019 and subsequent capacity building for teacher educators has been key to enhancing ESD in Botswana education systems (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2020).

Impacts of Climate Change in Botswana

Botswana has an arid to semiarid climate with high intra- and interseasonal rainfall variability (McGill et al., 2019). The highest mean monthly maximum values range between 32°C and 35°C, but daily maximums can be as high as 43ºC, particularly between September and March (Moses &

Gondwe, 2019). High temperatures worsen droughts, leading to low agricultural production. Biodiversity and wildlife movement are also negatively affected (Akinyemi, 2017). Botswana schools, particularly in rural areas, experience water scarcity, which affects sanitation and learning. Hambira et al. (2020) call for active learning processes that focus on climate change implications, arguing that this may lead to better adaptation strategies. Strategic responses would ensure awareness of the effects of warming temperatures and devastating effects on human livelihoods and health (Nhamo & Shava, 2015). The present paper responds to this call for active learning processes in climate change education in Botswana because this is crucial for promoting and ensuring climate resilience. Schools should be responsive to changes in curriculum policies facilitating climate change education because this would build human capacity for adaptation in the face of climate change challenges. Climate change education can contribute to Sustainable Development Goal (SDG) 12, which promotes sustainable consumption and production. Indeed, there is a need for urgent action around the sustainable consumption of scarce resources such as water in schools in Botswana.

Policies on Climate Change Education

The enactment of a national response policy to address existing and potential climate impacts (United Nations Development Programme, 2019) has been necessitated by the persistent impacts of climate change in Botswana. Botswana's climate change policy could facilitate the introduction of climate change education into the curriculum. The policy aims to ensure that the country is resilient to rising temperatures and changing patterns of rainfall that threaten food security. This creates space for research and engagement with local knowledge in tackling climate change. Framing climate change in terms of national climate security, public health and social justice (Darst & Dawson, 2019) could encourage responsible behaviours and lifestyles. Botswana's climate change policy policy promotes development compatible with the SDGs to ensure climate change resilience (Ketlhoilwe, 2019). The Revised National Policy on Education (RNPE) was the first policy initiative to incorporate environmental education into the school curriculum (Botswana Government, 1994), albeit with no emphasis on climate change education. The RNPE, coupled with Botswana's recently adopted outcome-based education (OBE) approach, supports the introduction of multiple pathways in schools (Botswana Government, 2015). This could enable learners to respond to climate change and its socioecological impacts; it has led to the rapid implementation of education reforms under the Education and Training Sector Strategic Plan (Botswana Government, 2015), with a view to promote a competence-based curriculum to provide added opportunity to infuse climate elements into the curriculum.

Climate Change Education, ESD Initiatives and Botswana Schools

Water shortages, sanitation and waste management are major challenges for Botswana schools. In response to these issues, some schools have been undertaking clean-up campaigns and water harvesting. Pedagogies in Botswana schools have continued to prioritise conservation, and environmental management discourse, based on interpretations of environmental education in the RNPE (Ketlhoilwe, 2007). Water conservation activities include using watering cans in gardening. Some schools have upscaled their responses; for example, Phuthisutlha Primary school, which is located in southern Botswana, has constructed an underground reservoir to support a vegetable garden. However, these initiatives and responses have not been fully utilised because of a lack of resources.

Although these are noble efforts to respond to climate-related challenges, pedagogical shifts have not made their way into the mainstream curriculum, through, for example, the whole-school approach. This transformative pedagogy could change learners into competent participants in environmental education (Silo, 2017). Ketlhoilwe (2007) argues that environmental education has been incorporated into existing school culture, with learners following instructions from teachers to manage environmental challenges. Teachers' classroom practice and ability to implement policy around social learning, meaningful change, systems thinking and place-based learning is constrained (Ketlhoilwe, 2007). Attempts by teachers to implement policy through the prescription of rules and ascribing roles to learners in environmental activities can create tensions (Silo, 2011).

Learners want to generate their own visions for solving environmental problems, yet the teacher organises the activity based on their own conception of the problems. The purpose of the learners' participation in these activities is not clear in terms of how their participation addresses challenges such as water scarcity and waste management. The ability of teachers to teach practical action around climate change related challenges is constrained.

Climate Change Education, ESD Initiatives and Teacher Education

In Botswana, one catalyst for new forms of learning has been ESD change projects in teacher education institutions initiated by the SST programme (UNESCO, 2020), which have created opportunities to build capacity in teacher education for project-based learning (PBL). This approach is appropriate for transformative ESD and should cascade into schools through teachers who graduate from teacher education institutions (Ketlhoilwe & Silo, 2016). A whole-school approach is adopted, hence promoting environmental and sustainability education with collective, experiential and

solution-focused change projects (UNESCO, 2020; Ketlhoilwe & Silo, 2016). The positive outcome of these change projects indicates that PBL is indeed an appropriate transformative pedagogy for ESD in teacher education. PBL is recommended for teacher training institutions in Botswana to facilitate sustainability skills and agency among student teachers.

Using a change project approach allows young student teachers to participate in real problems with real consequences in their institutions through whole institution planning and reflecting on institutional capacity, thus embedding ESD in the curriculum. Change projects have addressed water scarcity at the Molepolole College of Education and Francistown College of Education, where grey water was channelled to gardens. At the Serowe College of Education and Molepolole College of Education, waste recycling was linked to resource material development for early childhood education. Students' business skills were developed at the Gaborone Technical College and Francistown College of Vocational and Technical Education, where community service learning also took place (Ketlhoilwe & Silo, 2016; UNESCO, 2020). The ideas for the change projects emerged from teacher educators and student teachers who collectively assessed the main environmental issue at the colleges.

The University of Botswana reviewed their environmental education courses for teachers to emphasise sustainability and climate change education (Ketlhoilwe et al., 2020). Giving teachers and teacher educators first-hand experience of PBL approaches helps strengthen their agency for more responsive approaches to climate change education, here with a view to addressing the problem of the "elusive object" of participation described above.

Discussion

Although schools are clearly responding to climate change challenges, the resourcing of climate change education in Botswana has not been a priority since the introduction of the 1994 RNPE (Ketlhoilwe, 2007; Silo, 2011). Since the 1994 RNPE, environmental education in schools has been based on teachers' notions of how it should be conceptualised and practiced, without consulting those the policy is meant to serve: the learners (Silo, 2011). This impedes the effective and meaningful implementation of climate change education.

To effectively implement climate change education in schools, there is a need to work with learning theories that address social transformation and consider the learning implications of climate change (Lotz-Sisitka & Lupele, 2017). Cultural-historical activity theory (CHAT), for example, is a framework that addresses the above concerns through analysis of human interactions within all subjects and between various stakeholders, such as learners, to achieve their objectives by using tools such as existing policies (Engeström, 2001). CHAT analysis reveals rules and regulations that restrict policy implementation, and it explores the contradictions in the histories of the systems under which schools operate (Engeström, 2001). The CHAT framework of analysis provides opportunities for new tools like the SST change projects (UNESCO, 2020; Ketlhoilwe & Silo, 2016). These lead to collaborative forms of expansive learning in colleges and schools, where the community is expanded to include curriculum developers, teacher educators and researchers and to create space for collaboration with teachers and learners, hence ensuring their effective and meaningful participation in climate action.

Thus, we suggest that a PBL approach to SST change projects in teacher education can be a starting point for addressing the policy–practice gap, helping teachers go beyond normalised top-down discourses to adequately incorporate learners' views and community contributions for resolving environmental concerns in schools. The PBL approach also helps consolidate existing initiatives in schools for teachers who do not know about climate change education within the ESD framework. SST projects demonstrate different types of knowledge and can present climate change problems as the focus of ESD (O'Donoghue, 2017). With adequate translation, local climate change concerns such as water scarcity and waste management can be related to patterns of practice and possibilities of change in pedagogical processes (O'Donoghue, 2017; Silo, 2011). Capacity building through SST change projects seems to have strengthened responses to climate change impacts in a potentially meaningful way. In view of this, there is a need for all stakeholders such as policy makers, curriculum developers, teacher educators, and researchers to create partnership with teachers, so that teachers can engage more effectively and collaboratively with learners in the implementation of climate action at both school and community level. This requires dialogue and participation in activities that have meaning for the learners, teachers, and community alike (Silo, 2017).

Conclusion

Future policy development processes and associated teacher education initiatives must take greater account of the complex day-to-day climate change issues that affect schools and pedagogical processes. A comprehensive implementation plan with monitoring, evaluation, and assessment frameworks in place should be a necessary component of policy development, in order to support climate change education. However, such policies and strategies have little meaning if teacher educators and teachers are not competent to integrate climate change education into their teaching. PBL, when implemented as contextually meaningful through collaboratively developed change projects, has the potential to address the problem of the top-down normalisation of policy imperatives that fail to provide adequate contextualisation or room for learners' contributions and

participation. Because Botswana education reforms call for learner-centred pedagogy, CHAT and PBL approaches that focus on meaningful activity and problem-solving processes can promote dialogue between policymakers and teacher educators, teachers, learners and communities, breaking the existing internal boundaries between teacher education and schools, and also between teachers and learners. Evaluation and monitoring focusing on breaking down these dualisms should become key in curriculum implementation so that a shared participation object (Engeström, 2001) to address climate change challenges through education can come into focus in Botswana's education system.

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Faculties of Education as Innovation Brokers

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Summary
Transforming education faculties and colleges (EFCs) is a step forward in ensuring the necessary transformation of education because educators often sit at the point where multiple systems intersect. In this article, we envision EFCs as "innovation brokers" that create and influence contexts in ways that facilitate learning, collective action and innovation for transdisciplinary collaboration. Two examples are presented to illustrate our imaginaries.

Keywords
Higher Education
Teacher Education
Social Learning
System Change
Transformation

Introduction

After decades of the Education for Sustainable Development (ESD) movement, there is now broad consensus that simply teaching about environmental problems is insufficient for reversing humanity's unsustainable path (Reid et al., 2021). A whole-of-sector approach to transforming education systems is needed to create learning conditions where teachers and pupils are empowered to "become change agents for sustainable development" (UNESCO, 2021, para. 4).

Educators[1], especially those at higher education institutions (HEIs) in North America, are in a unique position to enable system changes because they often sit at the critical points of defining the direction of education policy, research and practice. That is, education faculties and colleges (EFCs) are generally embedded in two education systems (Labaree, 2018): first, they serve the K-12 school system, and second, educators prepare teachers and personnel at all levels. If educational institutions are to take a whole-of-school approach to ESD, as recommended by UNESCO, EFCs have a pivotal role to play; yet they themselves must undergo a process of transformation to "practice what they teach" (UNESCO, 2005, p. 71). Second, educators are part of the higher education system, engaging in research. In this role, educators can mobilise university resources and stakeholder networks to influence ESD implementation in areas ranging from national policy to local enactment. Thus, EFCs have become a confluence zone where ESD ideas, action and knowledge are developed, nourished and tested in practice. For educators to engage in a whole-of-sector approach to ESD, transforming both the K-12 and higher education systems simultaneously is necessary.

Education Faculties and Colleges (EFCs) as Catalysts for Whole-sector Change

Although educators at HEIs are well positioned to contribute to the Sustainable Development Goals (SDGs), structural constraints challenge their capacity to confront the complex sustainability issues we currently face. For example, in the authors' own work, the interdisciplinary nature of the SDGs sits directly at odds with EFCs' organisational structures, which are largely based on subject-centred curriculum (e.g., arts or science education). Consequently, the ways that we prepare future teachers can contradict our own research agendas, which emphasise integrated, interdisciplinary approaches to ESD.

There is also a need to rethink the norms, practices and processes of working with diverse stakeholders at EFCs. Content-driven instruction is neither sufficient in preparing future teachers and students to cope with the unknown (Holfelder, 2019), nor is it effective in empowering them to become change agents. This is because our knowledge of sustainable development is often incomplete and uncertain and, therefore, constantly evolving. The core function of teachers in ESD is shifting from knowledge transmitters to "learning facilitators" (UNESCO, 2014, p. 35) who support self-directed and collaborative learning, encourage transformative action-taking and promote empathy and reflection on ways of creating a just and sustainable future. Based on a systems perspective, we take a step further to argue that a whole-of-sector approach to ESD requires learning facilitators to see ESD pedagogy beyond the active engagement of individual learners. Rather, ESD pedagogy needs to also include facilitating collective learning processes at the institution and system levels. One critical role of learning facilitators is to create social learning spaces and steer societal transformation in a sustainable direction.

Learning Facilitators as Innovation Brokers

To better understand the distinction between educators as *knowledge transmitters* and *learning facilitators*, we find it useful to draw on past thinking on knowledge mobilisation and knowledge brokering, which lays out a range of strategies for promoting the uptake of new knowledge into use across a wide range of contexts. The knowledge brokering spectrum (Shaxson et al., 2012) can be understood as ranging from one-directional knowledge transmission to deeply interactive coproduction and colearning. The authors describe four functions on this spectrum:

- Information intermediary: informing, compiling and aggregating information
- Knowledge translator: disseminating, translating and communicating
- Knowledge broker: matchmaking, bridging, networking and facilitating active engagement between stakeholders
- Innovation broker: operating at the institutional level, building capacity, negotiating, collaborating and establishing organisational functions

Education holds space for all four functions. We may play an *information intermediary* or *knowledge translator* role when, for example, synthesising knowledge of an SDG for students. In this instance, direct teaching can be effective in enabling other aspects of learning activities. In other cases, fostering professional connections between preservice teachers and partnered schools may be required to develop student teachers' competencies in designing real-world sustainability projects (e.g., Bürgener & Barth, 2018). In our view, this is an example where educators have played a knowledge brokering role in connecting diverse stakeholders for learners in ESD.

A whole-of-sector approach to ESD, as we have argued earlier, requires educators to expand the commonly held conception of "learners" beyond K-12 students. Learning to be change agents requires everyone engaging in ESD to become a learner (Wenger-Trayner & Wenger-Trayner, 2020). We need to collectively learn to engage in transdisciplinary settings, to listen to each other, and to develop a shared understanding of diverse contexts while cocreating inclusive ways of working together and taking stock of our experience moving forward. This form of mutual and reflexive learning must not be overlooked because although sustainability challenges such as climate change are prevalent across the world, they manifest differently and raise unique challenges for different people. As a result, the role of educators as *learning facilitators* more closely reflects the function of innovation brokers who create learning conditions that enable new ideas, curricula, pedagogies, partnerships and processes of working together. Importantly, innovation brokering supports learners in challenging the established norms of practice for alternative ways of thinking and working to emerge. We illustrate our conceptualisation using the below practical examples of our work.

Case 1: University Course on Environmental and Sustainability Education (ESE)

This Faculty of Education course was offered to students across McGill University, ranging from undergraduate to doctoral levels, in order to promote interdisciplinary collaboration on ESE. It was part of a wider initiative to strengthen links between preservice teachers and nonformal settings where ESE is being taught. Twenty students were matched with 10 community partner organisations, ranging from international initiatives like the Climate Reality Project, to a student-led online climate camp and several school-based ESE initiatives. This intentional design was meant to facilitate "unusual learning encounters" with students working in partnerships spanning differences in discipline, level of studies, formal and nonformal learning settings and more.

Not only were students excited to learn from such a different set of classmates, but the community partners were also very keen to learn about each other. This resulted in a lot of borrowing of ideas and sharing of strategies across these

different axes. By working outside of some of the conventions of our departmental culture, we created a space where innovations could emerge. One student wrote:

> *[My project partner] had the appropriate background knowledge and resource pool to find the information we needed, and I was able to put it together in a way that would be ideal for teachers and the high school classroom. In the future, I would certainly recommend creating the groups in the same way. Had I been given the choice, I would have been inclined to partner with someone from my department. Now that I have completed the project, I see how helpful it was to be paired with someone outside of my department.*

Drawing on the knowledge brokering framework, the course lecturer moved away from the information intermediary or knowledge translator roles of passing on information about community-based ESE initiatives to students. Instead, the lecturer positioned himself as an innovation broker across multiple educational systems; he focused on facilitating mutual learning and connecting like-minded partners and organisations to stimulate out-of-the-box thinking and transdisciplinary exchange for ESD.

Case 2: Faculty Garden as an Agora[2] for ESD

McGill's Faculty of Education garden has been used since 2015 as a space for raising awareness of ESD, which, in our view, had limited its focus to individual knowledge acquisition. After several seasons of observing how and when the garden space was and not used, we partnered with LEARN (Leading English Education and Resource Network), a nonprofit educational organisation, to cohost the School–Community Garden Institute (SCGI) in the summer of 2019 (Harvey et al., 2020). The goal was to move beyond the traditional professional development model where in-service teachers were "informed" how to incorporate ESD. Rather, we aimed to strengthen teachers' collaborative capacity, agency and leadership in initiating ESD projects and learning communities. To this end, the summer SCGI brought together over 40 teachers, educational support workers, researchers, and professionals from nonprofits and businesses in Montréal to share knowledge and resources on how to establish and sustain a garden. The participants engaged in peer-to-peer problem solving and curriculum cocreating through a series of activities, such as the following:

- ESD pedagogy by subject, such as creative writing for arts and language education and scientific inquiry in the garden
- ESD pedagogy by theme, such as youth engagement and empowerment and food security and climate change
- A joint exercise of community asset and curriculum mapping
- Capacity strengthening through writing partnership grants

We see initiatives such as SCGI providing a model of how EFCs can serve as a community meeting place to convene diverse sources of knowledge and experience to catalyse collective action–the innovation broker in the spectrum. The same participants gathered at the faculty garden for the harvest SCGI in the fall of 2019 to reflect on what had worked, what had not, what conventions needed to be changed and how to bring their collective knowledge to bear on real-world challenges. The SCGIs have since continued, and additional gatherings have been hosted at our faculty garden as extensions of the initiative. The educators at our faculty used the garden to engage not only university students, but also wider society, in learning about, for and as ESD. During the current pandemic, due to demand from participants, the SCGI was repeated, but hosted online. Thus, the garden serves an organisational function of bridging communication gaps between diverse actors of formal, nonformal and informal educational systems.

Concluding Thoughts

Within the field of ESD, the last decade has witnessed some paradigm shifts, from content to problem and solution orientation (Barth, 2014); from sustainability literacy to competency-based curricula; and from a behavioural focus toward a pluralistic view of learning (e.g., Lotz-Sisitka et al., 2015). In the current article, we build on these developments and argue that a whole-of-sector approach to ESD requires educators to think beyond their individual level teaching and research, moving towards facilitating learning and change at the institution and system levels. To this end, we borrow the conceptual framing of knowledge brokering (Shaxson et al, 2012), and call for shifts in ESD to exhibit the following features of innovation brokering:

- From one-way teaching to networked exchange of information and ideas
- From instructor to learner-directed curriculum development
- From learning prescriptive knowledge to experiential knowledge
- From creating bounded to unbounded learning environments
- From output to process and learning-oriented university–school–community partnerships

The infrastructure of many EFCs is not set up to accommodate these shifts. The summer course on ESE, for example, required a summer intern, a motivated PhD student and a faculty member to set up the conditions for the course. Thus, we can see a serious need to rethink the policies (e.g., student placement rules), organisational structures (e.g., proximity of the internships office to other community-connected offices) and core functions of EFCs in society. Based on our experience, we propose the following actions to begin the shift:

- Support educators in integrating their dynamic roles as practitioners, researchers and learning facilitators in society
- Build greater flexibility and responsiveness into

professional competency frameworks to allow for out-of-the-box approaches to teaching and learning for ESD
- Expand the concept of learning for ESD and current understanding of learners at EFCs
- Work alongside community partners by valuing their knowledge, talents, interests, resources and capacities
- Encourage risk-taking and boundary-crossing by promoting inter-, multi- and transdisciplinary learning, collaboration and action for ESD.

Endnotes

1. In this article, we adopt a common distinction between teacher educators and teachers in the field of education research. Our use of the term educators refers to instructors, mentors and/or researchers in teacher education programmes in higher education institutions (HEIs). Teachers are understood as school teachers who are certified to teach at K-12 levels.
2. An agora was a public open space used for assemblies and markets in ancient Greece.

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Incubating TVET Policies in Uganda

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Summary

This paper draws on research in Uganda about technical and vocational education and training (TVET) and sustainable livelihoods, arguing for a shift in TVET policy and practice to include solutions for climate resilience and incubate sustainable entrepreneurial solutions that can drive Uganda's employment and sustainable and inclusive economic development.

Keywords

Climate Change
Tvet Policy
Sustainability
Training

Introduction

It is widely accepted that climate change education build collective climate consciousness and resilience as climate change intensifies the pressure on livelihoods and the world of work. The International Centre for Technical and Vocational Education and Training (UNEVOC, 2017) proposes that countries, including Uganda, mainstream climate change education into technical and vocational education and training (TVET). According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), this would boost TVET's potential to provide adaptive capacities by skilling learners and upskilling professionals to facilitate the development of green sectors (UNEVOC, 2017). Uganda is already experiencing climate change impacts, and it has limited capacity to cope with this crisis (National Planning Authority, 2013). These effects are projected to be devastating to priority sectors, especially agriculture, where 80% of the country's rural population is directly or indirectly engaged (Food and Agricultural Organisation, 2020).

UNESCO's (2016) TVET strategy hinges on three pillars: 1) youth entrepreneurship and employability, 2) equity and gender equality and 3) facilitating the transition to a green economy. These could support developing countries, including Uganda, build resilience to climate change in pursuit of their individual national development goals. However, the last pillar diverges significantly from Uganda's TVET policy implementation guidelines (Ministry of Education and Sports, 2019). Uganda's TVET policy is not in line with UNESCO because it makes no mention of climate change. Except for the mission and vision, which refers to the environment, climate change is not mentioned in the main policy. Instead, it focuses on job creation, innovation, business and entrepreneurship as the priorities of TVET in Uganda (Ministry of Education and Sports, 2019).

Climate change education is also missing in the national plans that could inform Uganda's TVET policy. For instance, Uganda's Vision 2040 (NPA, 2013) recognises the climate change crisis, yet there is no mention of mainstreaming climate change in TVET or in formal education. Instead, it mentions mainstreaming Information Communication Technologies in education and harnessing TVET to equip the young population with hands-on skills for local and global competitiveness (NPA, 2013). Like the TVET policy, Vision 2040 (NPA, 2013) focuses on boosting employment and growing the economy into middle-income status with a very narrow focus on climate education in TVET. Furthermore, the updated Ugandan biennial report on climate change (Ministry of Water and Environment, 2019) to the United Nations Framework for Climate Change Communication (UNFCCC) does not mention TVET among those that the Ministry of Education is working closely with when it comes to mainstreaming climate change in the learning and training. The biennial report attributes this failure in mainstreaming climate change into education and training in higher learning institutions to the lack of financial and technical capacity.

Making the Case for a Policy Connection to TVET

Uganda has set ambitious goals for development, as seen in its Vision 2040 (NPA, 2013), in which the country intends to create a green economy and increase employment to achieve middle-income status. According to the International Institute for Sustainable Development (IISD, 2018), through its Nationally Determined Contribution (NDC) on climate mitigation and adaptation, Uganda aims to reduce greenhouse emissions by 22% by 2030, and this includes gender-responsive policy for climate governance. On the other hand, Uganda depends on TVET to supply a skilled and competent workforce that is globally competitive, responsive to national needs and able to support sustainable development (Ministry of Education and Sports, 2019).

It will be challenging for Uganda to realise most of these ambitious plans unless climate change responsiveness or action becomes central to education, particularly within TVET. TVET is essential for developing practical skills and knowledge for sustainable development and climate action. UNESCO (2012), for instance, suggests that a combination of Education for Sustainable Development (ESD) and TVET is uniquely positioned to provide skills and knowledge for sustainable economic growth and development. The UNESCO (2016) strategy for TVET focuses on the environment, emphasising sustainable development, decent work, entrepreneurship and lifelong learning. Regarding priority sectors like agriculture, there is a need to incorporate climate education and action in TVET agricultural curricula because TVET graduates (such as agricultural extension officers) play a significant role in supporting farmers. Supporting the acquisition of sustainability and climate action skills and knowledge will help farmers build climate resilience. The International Labour Organisation (2018) proposes that Uganda develops green skills for jobs in agriculture, construction, energy and transport and waste management, among other sectors of the economy. Most of these skills are produced in TVET institutions, hence the need to integrate climate education into Uganda's TVET.

Greening TVET More Inclusively

Uganda could borrow ideas from the literature that has emerged regarding strategic planning for TVET greening in countries such as Kenya and South Africa. In the South African context, Ramsarup and Lotz-Sisitka describe boundaryless careers and transitions through a focus on transferable skills training. In their workbook on developing and implementing green skills in the labour market, they argue that "skills development plays a crucial role in seizing opportunities and unlocking the potential of green jobs" (2017, p. 15). In this context, green jobs are more than just a response to climate change: they are the drivers of future development. If governments like Uganda capitalised on this, transformed vocational education and training (VET) could play an essential role in transforming the country. Of course, there are also the genuine considerations about preventing catastrophic climate change as well, here through climate actions such as mitigation and adaptation.

We conducted extensive interviews and curricular reviews with formal and informal TVET institutions in Gulu in Northern Uganda as part of the VET Africa 4.0 Collective research (McGrath et al., 2020; VET Africa 4.0 Collective, in press). We have found that youth in the informal space recognise the dangers of climate change for their futures and see climate action as an opportunity for doing things differently through entrepreneurship and innovation. We can see the emergence of youth learning networks of innovation in the TVET sector (McGrath et al., 2022).

An excellent example of this is Takataka plastics, a small-scale but growing company that has designed a prototype for transforming plastic into floor tiles. Using their vocational (welding and engineering) skills, the founders developed and built their own 3D printers, which use recycled plastic. There is now a broad network of youth not only scouring the streets for plastic but conducting education about recycling. As a further component of our research, we partnered with Takataka to pilot a TVET innovation programme with eight interns to develop business solutions to waste management in Gulu. We took the interns to on-site visits and taught prototyping and basic business skills including registering a company, introducing them to potential mentors or investors. All of their business ideas received start-up funding. We think this is a strong indicator that there is the potential for creative solutions that develop livelihoods in the present and sustain

them for the future. Such training could easily be included in TVET curricula; it would help transform the overly theoretical and static curricula into an agentic process of lifelong learning that develops critical thinkers and designers of the future.

The African Union Environmental Education and Training Action Plan, 2015–2025 (Lotz-Sisitka et al., 2016) suggests that schools and vocational training institutions need to lead a paradigm shift by developing green learning–centred models and include environmental procurement processes. They should expand partnerships with businesses; train TVET developers (policymakers, administrators, curriculum designers and instructors), add an element of ranking institutions according to environmental practice, standardise green competency-based models, provide green career guidance and counselling, train government officials and decision makers and study and increase investments in green facilities. This can be made possible by expanding practices such as those briefly outlined above via our VET 4.0 research.

Policy Recommendations

This brief article has suggested that the government of Uganda, through the Ministry of Education and Sports, should incorporate climate change into national TVET policy by first introducing climate change into the curriculum (including into teacher education) and, second, by challenging and rewarding students and vocational technical institutes to innovate green solutions to local problems. This could include power alternatives, which would also lower costs and overcome unreliable power supply at training institutes. Third, they could facilitate partnerships between research institutions, such as universities, vocational technical institutes, private sector innovators (such as Takataka plastics), community-based organisations and the youth-driven informal economy, which is doing much of this work already.

Conclusion

TVET remains in the grip of colonial era, supply-driven training that is largely disconnected from the market, and also from the needs of society, the environment and young people, and it is slow to adopt new technologies and technical innovation processes. We suggest that a government-led paradigm shift in TVET towards a green economy has enormous potential to usher in a period of innovation, development and economic growth. This could also provide routes to enterprise development, such as in the examples above. Such a paradigm shift goes beyond skills training to teaching flexibility, adaptability, creativity and lifelong learning (boundaryless careers) in order to engage with fast-changing technology, entrepreneurship and innovation, which are needed for climate action and sustainable development. The goal we advocate for is also to facilitate a paradigm shift around the TVET approach by strengthening and professionalising it within a framework that takes into account society and the environment, as well as the economy. As indicated above, we see the informal sector already charging ahead with such a paradigm shift because new opportunities for livelihoods open up within a sustainable development paradigm. It remains to be seen whether the Ugandan and other governments elsewhere can capitalise on such movements to develop relevant TVET programmes that meet the needs of the future.

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Planning for the Educational Impacts of Internal Displacement

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Summary
The scale of displacement linked with climate change is unknown, but 30.7 million new displacements were recorded in 2020 as a result of disasters alone. Since children represent about 40% of all internally displaced people, and their education is often affected, planning for the educational impacts of displacement linked with climate change is becoming urgent.

Keywords
Climate Change
Disasters
Education
Children
Displacement

Introduction

The slow-onset effects of climate change, such as desertification, glacial retreat, increasing temperatures, land and forest degradation, loss of biodiversity, ocean acidification, salinisation and sea level rise will likely have an increasing impact in the future (Warsaw International Mechanism, 2018). These events can force people to flee their homes by reducing their access to food, water, land or livelihoods while heightening the risk of disasters such as storms, floods or droughts (Internal Displacement Monitoring Centre [IDMC], 2018a).

Internal displacement associated with climate change is particularly difficult to monitor (IDMC, 2020). This type of displacement results from a combination of factors, many of which are shaped by human action and decision making, blurring the line between forced displacement and voluntary migration. In addition, displacement in the context of climate change may only become visible when the situation has transformed into a significant crisis or when it occurs as a result of exceptional weather-related events.

As of today, the scale of this phenomenon is unknown, though it is expected to result in the displacement of millions of people worldwide in the coming decades. The 30.7 million new displacements recorded in 2020 as a result of disasters alone may only be the tip of the iceberg (IDMC, 2021a). Children under the age of 18 represent over 40% of all internally displaced persons (IDMC, 2019). It is estimated that nearly 160 million children live in areas of extreme or high-risk drought and 500 million children live in areas of high-risk flooding (United Nations Children's Fund [UNICEF], 2020). Displacement can affect the security, health and well-being of these children, as well as their education. As the effects of climate change and the subsequent displacement of children are expected to increase in the years and decades to come, planning for education support and policies that include internally displaced children is becoming urgent.

Displacement's Impacts on Education

Internal displacement can affect a child's education in many ways (IDMC, 2019). In the context of climate change, girls and children from already marginalised groups, including from indigenous, rural or pastoralist communities, are especially at risk. One of the most immediate risks is associated with a reduction in their families' financial resources, but displacement's repercussions on physical and mental health can also limit children's ability to learn (UNICEF & IDMC, 2019). Other obstacles to education include the lack of teachers because of displacement, lack of physical safety on the way to school, loss of documentation, language barriers and stigmatisation. There may be no school nearby, schools may be overcrowded, or their schools may be being used as emergency shelters, as is sometimes the case in disaster settings (IDMC, 2018b).

Lower enrolment rates for displaced children compared with non-displaced children are reported frequently, particularly in cases of protracted displacement. Even if they are not displaced themselves, children from host communities may also feel the impact of displacement on their education. In the case of mass displacement, overcrowding in classrooms in the area of refuge can lead to a deterioration in the quality of education for all children.

Although some of these impacts are recurrent in situations of displacement linked with disasters and climate change, each case is unique, and planning adequate educational support requires better understanding of these impacts. Collecting more comprehensive and inclusive data on children in internal displacement and on their access to quality education is essential for planning ahead.

While the responsibility for supporting internally displaced people falls on their national government (United Nations Office for the Coordination of Humanitarian Affairs [OCHA], 1998), States faced with severe displacement crises do not always have the resources to prioritise data collection. Much of the data available on internal displacement have been collected by aid providers to help them plan for emergency, life-saving interventions. More rarely, they may also include information on the longer-term consequences of displacement on education. Data on internal displacement in the context of climate change are even harder to come by than data on displacement linked to conflicts or sudden-onset disasters. This is a result of limited resources and methodological challenges (IDMC, 2021b).

Education in Displacement: Illustrative Findings from Somalia and Ethiopia

The Internal Displacement Monitoring Centre is a Geneva-based nongovernmental organisation working under the mandate of the United Nations General Assembly to produce and analyse data on internal displacement linked with conflicts, violence and disasters around the world. We started collecting data on the education of affected children in over 10 countries. The primary data collection exercises include specific questions on the educational impacts of displacement on displaced children and children in their host communities. In the first months of 2021, impact assessments were conducted in the city of Liaanmo, Ethiopia (IDMC, 2021c), and in Beledweyne, Somalia (IDMC, 2021d). The former is affected by drought-related displacement and the latter by recurring flood-related displacement.

This section highlights some of the similarities and differences between the two case studies as a way to demonstrate the range of factors at play and how they may differ across contexts. Analysis points to the recurring impacts of displacement that should be considered by aid providers and national and local governments in their plans to prevent and respond to future crises, while calling for more context-specific data to be collected so that support can be tailored to the varying needs of affected children.

In both locations, displaced children's education was interrupted as a result of displacement, often for several months. In Beledweyne, 70% of the displaced students were out of school for one to three months. The parents mentioned that in some cases, there were no schools in the areas on the outskirts of town where the family found shelter. Others mentioned that the schools were flooded or the roads to the nearby school were inaccessible. In Liaanmo, children displaced by drought could register for school as soon as they arrived in their host area, but many did not do so. Nearly 42% experienced a break in their education. For 46% of them, the break was between one and three months. Here, 15% stayed out of school for 9 to 12 months, another 15% for one to two years and 23% for more than two years. Their families reportedly focused on more urgent issues, such as finding shelter and food upon arriving in the new city.

In both locations, families' loss of financial resources as a result of displacement was a clear barrier to their children's education. Although public schools were free in both situations, their quality is reportedly low, and many families prefer to send their children to private schools, for which they must pay. In addition, all children must buy school supplies and uniforms, and their families must provide them with meals for their day at school while ensuring their transportation. Since displaced families often live further away from educational facilities, their transportation costs were higher than for non-displaced families. In Liaanmo, 50% of the displaced respondents whose children were not going to school gave the indirect costs of education as the reason why they did not go to school.

In both cases, the health impacts of internal displacement also stood out as a barrier to education. In Beledweyne, people displaced by floods find refuge on the outskirts of town, that is, in areas which are overcrowded and lack water, sanitation and hygiene facilities. Many internally displaced people live in makeshift shelters, and water-borne and communicable diseases spread quickly in times of displacement, especially among children. In Liaanmo, the inability of many pastoralist families to secure sufficient food after they lost their cattle in the drought has been reported to alter their health and that of their children. Weak, hungry and sick children are unable to go to class or learn as they should.

Some findings also differed between sites. In Liaanmo, children who left their rural home to find refuge in the city found better access to schools there. As a result, they are more often enrolled in school now than they were in their area of origin: here, 69% used to go to school before and 91% were subsequently in school. In Beledweyne, however, although most displaced students managed to get back to school after they returned home, some reportedly dropped out. Most of their parents said they were less satisfied with their children's education in times of displacement, whereas in Beledweyne, 57% said they were more satisfied.

This type of information can help national governments and their partners, as well as local authorities or other aid providers, design more tailored, inclusive, comprehensive and effective solutions to mitigate the negative repercussions that internal displacement has on children's education and to seize the rare opportunities it can also present.

Towards More Inclusive Educational Policies and Programmes

Displacement associated with climate change evolves slowly. Because of this, governments and aid providers have time to plan ahead and ensure the continuity of education, even when displacement cannot be avoided. Improving data and projections on the location and scale of future displacement can allow them to prepare years in advance, giving them enough time to mobilise the necessary resources.

Better estimates of the number of children displaced in the context of climate change are essential to raise awareness of the need to address the phenomenon. These estimates are needed to spur the investment of greater resources in adequate educational support. However, they will not be enough to inform the design of this support. More data on the specific impacts of displacement on education in various contexts are also needed.

Data are still lacking, and awareness of the risk of displacement linked with climate change is insufficient. Other more immediate issues frequently take precedence over climate change and education. Nonetheless, there is a growing body of evidence from displacement situations worldwide that should soon allow for a better understanding of the issue and the identification of successful responses and preventative measures. More information is needed to present governments and education specialists with a list of options they can use, depending on the displacement situation they face.

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