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Editorial – Volume 37 (2021) Issue 1

Eureta Rosenberg, Editor-in-Chief

This issue of the *Southern African Journal of Environmental Education* coincides with the start of the 26th United Nations Conference on Climate Change. COP26 in Glasgow is, like its predecessors, a Conference of Parties who will deliberate how to lower global greenhouse emissions and build adaptive capacity so as to reduce the risk and impacts of climate change.

How can this be done? In numerous public demonstrations over the preceding years, youth and wider society have alluded to a solution by calling for "*systems change, not climate change*".

What are the features of the (systems) change necessitated by the climate crisis and other environmental challenges? And, how can such change(s) be achieved? These are questions that scholars in sustainability education aim to answer. Some of the contours of the associated scholarship are reflected in our Special Issue on *Education for Sustainability in a Time of Crises* (Volume 36, 2020) and again in this Issue 1 of Volume 37 (2021). This Editorial points the reader to such contours, with specific reference to the relation between descriptive research and theory building.

One response to the question of what change is needed, is that society must become *aware* of the existence, nature and gravity of environmental issues, and in his paper analysing a survey in Nakuru City, Dr Paul Waititu concludes that social media are not used to raise environmental awareness among communities, even in a media-savvy nation such as Kenya. This study on social media use could build on the research into an 'eco-feedback' application by Calitz, Cullen and Odendaal in Volume 36, and the "shifts to online learning" explored by Tshiningayamwe, Silo and Dirwai in that same issue. However, our engagement with new technology in the service of sustainability and education is very much an under-theorised area of scholarship, simply calling out for stronger theory and more research.

And if there is awareness of climate and related crises and the need for change, what then? As the transitions and systems theory literature explored by Rosenberg and Ramsarup (2020) points out, systems change includes institutional change, and many environment and sustainability educators rightly look to their own institutions, whether these be schools, colleges or universities, to motivate for and enact change.

The transformations required in educational institutions, as described by Professor Godwell Nhamo in this issue, are comprehensive and foundational, involving curriculum and pedagogy, research and community engagement, and campus and resource management. Effecting such fundamental changes is not easy, and Nhamo describes a three-year process at his institution, one of the biggest universities on the African continent, with details of the challenges he experienced as he worked to drive this change. Such descriptive case studies have an important place in scholarship, but only if they are presented and analysed with a view to contributing to theory development in order to guide (further)

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praxis. Nhamo does this by drawing on a selection from the growing number of studies in other universities on the continent and globally, including a study by Dr Wilma van Staden on climate responsive innovation in an agricultural college system, published in SAJEE Volume 36 – thus making a contribution towards theory development in the field of higher education and sustainability.

Universities are important in the response to climate change and other environmental challenges, not only as sites of change, but as potential enablers of change elsewhere, as argued, for example, in relation to agriculture and mining (Rosenberg, Shumba, Ngoma & Cobban, 2021). The second paper in this issue that explores transformation in institutions of higher education draws on a case study from Zimbabwe. In this example of an institutional change process, emerging theory has been used to guide the change process itself, and authors Urenje, Chauraya and Chikunda describe the 'change project approach' that powerfully connects individual awareness-raising and professional development with institutional and wider systems change. The change project approach emerges as a salient model of process worth further application, experimentation and theorising.

The issue of theory is highlighted in this Editorial because in the past two volumes, there has to some extent been a predominance of descriptive papers, understandable perhaps in the face of the pandemic and other challenges that emerged to confront educational settings, and the call for researchers to respond to these. We seem to have arrived at a new cusp of descriptive work, from which we need to build new theory if we are to advance our practice as sustainability education scholars, and the field. In the process, we could profitably also reach for older work, including research and theory in other disciplines, to consider where they may be useful, and where they should be challenged.

In their viewpoint Michael Hammond-Todd and David Monk do just this, reading back over educational theory from John Dewey and David Orr, and forward into the current scholarship on the Anthropocene. They identify anthropogenic forces which include our intelligence as a species, our engineering efforts and our emotions. These can all drive both positive and negative actions. Among the emotions, the authors single out fear, desire and love, and love emerges as the emotion of choice to animate actors with the motivation and energy to address environmental issues like climate change. It remains to be seen to what extent love – for Earth, for all of humanity and other beings – will drive decisions at COP26 in Glasgow.

In the past, the UN Conferences on Climate Change had to contend with dualisms being played off against each other: Nature vs Society, North vs South, West vs East, Ecology vs Economy. The remaining two papers in this issue explore such dualisms as features of neo-liberal thinking and practice. With reference to river management, Dr Mary Murphy explores divergence in the disciplines that need to work together to rescue rivers around the world, and the conundrum of Structure vs Agency: which one holds the most potential for change? Dr Tom Jeffery writes from the context of modern-day museums, where Nature vs Culture and West vs Rest dualisms may be evident in the practice of museum collections, which he argues, prevents museums from being more relevant to latter-day societal crises.

From these two very different contexts, both authors argue for greater relationality, that could be achieved by disrupting dominant dualisms and associated practices. Both authors identify the philosophical framing of dialectical and social critical realism (as evident in the work of Margaret Archer and Roy Bhaskar) as an important passageway to new realities.

A recent Conference on Critical Realism (September 2021) showed that critical realism as both metatheory and methodology is being applied in a growing body of research and scholarship. As the well-supported conference theme of *(Re)Envisaging Emancipatory Research, Science and Practice* showed, critical realism has found application in many change-oriented fields including sustainability education.

There is in fact no shortage of theoretical framings to explore as we research and write in order to deepen our understanding of how best to support – and be – the change the world needs; complexity theory, regenerative systems theory, activity theory, reflexivity, expansive learning, multi-level transitions and just transitions theory, eco-socialism, eco-feminist-socialism, environmental economics and well-being economics are other, often compatible, examples (outlined in Rosenberg & Ramsarup, 2020). Scholars writing for SAJEE are encouraged to cast the net wide, and deep, to inform the role and practice of education and learning in the societal transformations necessitated by climate change and other environmental crises. As COP26 may yet demonstrate, there is a dire need for such guidance. SAJEE authors, reviewers, editors and production teams all strive to make their contribution in this regard.

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Towards an Eco-decolonial Museology: A critical realist analysis of the crises of South African museums

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Abstract

South African museums face multivalent, simultaneous crises. The MELD dialectical framework of critical realist philosophy can be used to explore potential for a deep reimagining of museum theory and practice that may generate a new, relational mode better able than persistent dualist modes to respond to complex, emergent crises. This has been conceived by the author (Jeffery, 2021) as an ecological-decolonial, or eco-decolonial, mode of museology, and is further developed in the present analysis.

At 1M, the MELD analysis surfaces the implicit neoliberal ontology of South African museum work and the emergent paradox of 'emancipatory neoliberalism'. This paradox is generative of a number of constraints on practice and agency, including commodification of heritage, a restrictive form of official memory, and quantitative management practice. These limit potential for museums to respond to complex crises that require relational capabilities.

2E explores the potential negation of these constraints. To disrupt the principle of collection as the grounding ontological activity of museum practice may disrupt the implicit neoliberal ontology. This may contribute to emergent, sophisticated social-ecological trends in museum practice, both in South Africa and internationally.

At 3L, a dialectical view on the concept of cultural landscape offers a relational frame for an eco-decolonial museum practice that may better respond to the crises faced by museums. The practical implications of the eco-decolonial approach are considered at 4D.

Keywords: *museum practice, critical realism, ontology, eco-decolonial, collection, cultural landscape*

Introduction and background

In the South African context, the potential of museums as complex and dynamic learning environments (Kristinsdóttir, 2017, p. 424) is constrained by at least three concurrent and entangled moments of crisis for practice. These are: the global social-ecological crisis; a crisis of identity and relevance that is the subject of decolonial critique and that the analysis below

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will surface as an ontological crisis; and the emergent crisis of the COVID-19 pandemic. These crises illuminate and give insight into the museum as a social structure. What do these crises mean in terms of the agency of museums and museum workers, and the agency they may enable through public programmes of exhibition and learning? What do they mean for the future sustainability of South African museums as educational institutions? What pathways may chart fresh transformational potentials for museum practice?

Forms of museum practice with potential to explore the dynamics of social and ecological processes as interlinked systems are becoming increasingly urgent (Anderies, Janssen & Ostrom, 2004, p. 2; Walker et al., 2004, p. 1). Decolonisation and ecologisation of practice are current museological trends that have particular relevance to this. The ecologisation of museology refers to emergent ways of thinking that disrupt persistent human-nature dualism and emphasise the relationship between humanity and the environment as mutually constructive (Plumwood, 2002; Allen, 2015; Newell, Robin & Wehner, 2017; Phillips, 2019).

Decolonisation can be considered as a process of empowerment of marginalised peoples and demarginalisation of associated knowledge and traditions (Dondolo, 2005; Alonso, 2008; Mdanda, 2016). South African museums continue to focus on amelioration of the depredations of the colonial and apartheid eras, the memorialisation of a difficult heritage, and on inclusivity, representivity and relevance (Corsane, 2004; Mosely, 2007; Bakker & Müller, 2010; Meskell, 2012; Macdonald, 2015). Relational, social-ecological perspectives are largely absent from the primarily social focus of South African decolonial museology (Jeffery, 2017). This is a constraint that limits the decolonial perspective and hinders decolonisation, and for which this article will consider potential resolutions.

Earlier work (Jeffery, 2021) introduced the idea of an ecological-decolonial, or eco-decolonial mode of museology. This is a new form of museum practice that disrupts traditional museological dualism by emphasising the interlinked dynamics of social and ecological processes mentioned above, and with potential to generate a relational mode of museological thinking and practice that is grounded in the entanglement of the decolonial (social) and ecological crises. The eco-decolonial approach to museology will be further developed in the present analysis.

A dialectical critical realist analysis surfaces neoliberalism as the implicit ontology (Bhaskar, 2008) of museum work, that is, as the underlying ontology that drives practice. This ontology is not generally a subject of museological critique. To disrupt the implicit ontology is a vital first step in negotiating museums' crises of identity and relevance and is potentially generative, in the museological context, of the multidisciplinarity Bhaskar (2010) identified as vital to the practice of the social sciences in the context of social-ecological crisis. This ontological work is vital if South African museums, as potentially crucial centres of non-formal education, are to be able to respond more effectively both to rapidly emergent and longer term crises.

For the entirety of their post-apartheid existence, South African museums have been struggling to reinvent themselves for new, diverse audiences and emergent needs. This struggle, within an emergent snarl of crises, and together with the International Council

of Museums' (ICOM) current process of redefinition of the museum (ICOM, 2007), represents a moment of fluidity in which museums may radically reimagine themselves. This reimagining must necessarily have a relational perspective on the entangled social and ecological crises that characterise post-apartheid museums' practice context. Social-ecological relationality is the foundation of the eco-decolonial mode of museology. As was emphasised in previous work, this offers a fresh way of thinking in order to disrupt the persistence of human-nature dualism and to expand museological theory and practice to emphasise the relationship between humanity and the environment as mutually constructive (Jeffery, 2021).

Why dialectical critical realism?

Dialectical critical realism is notoriously complex, but it is very valuable to the understanding of social structures such as museums, and the mechanisms that steer practice in particular directions (Lotz-Sisitka & Price, 2016; Price, 2016). The philosophy of dialectical critical realism (henceforth DCR) offers "explanatory tools and forms of reasoning that allow for making the complexities found in our contexts more visible and open for dialogue, engagement, learning and reflexivity" (Lotz-Sisitka & Price, 2016, p. 5), and therefore has potential to contribute to the emergence of progressive modes of museological theory and practice better able to respond to crisis.

The contemporary museum, with its persistent dualist foundation that separates social from ecological perspectives, is easily perceived as operating separately from the concerns of the world today, focused too much on the past, and "ill-equipped philosophically and ontologically" to face the challenges of a "messy and turbulent world" (Cameron, 2015a, p. 345). The application of critical perspectives to the museum context is vital if museums are to remain socially relevant (Vergo, 1990; Smith, 2014). Vollgraaff's (2018) comprehensive survey of the *South African Museums Association Bulletin* identified an absence of social-ecological themes and concluded that South African perspectives lag behind international museological thinking (also see Levitz & Mathers, 2000; Martin, 2000; Jeffery, 2017; Jeffery, 2021). This implies a need to develop the philosophical and theoretical perspectives that shape South African museum practice. DCR was chosen to act as a philosophical 'underlabourer' for such processes, as elaborated below.

The complexity of DCR is reflected in some of the language that comes with making use of it. The analysis below is hopefully accessible, but the goal of this article is to draw new philosophical and theoretical perspectives into museology's approaches to difficult and complex contexts, and this necessarily comes with new concepts and new language.

DCR, however, potentially removes constraints on transformation and enables progress towards social-ecological justice (Bhaskar, 2008; Lotz-Sisitka, 2016; Mukute, 2016; Schudel, 2017). It can thus be deeply useful for generating practical change in transformative contexts such as that of South African museum practice. If the language is sometimes unfamiliar and challenging, as it was indeed found to be during the research for this and previous articles, it is hoped that the reader will approach this challenge from the

perspective of generating valuable new ways of thinking with the potential to further the vital agenda of social-ecological transformation.

Research methodology

The analysis makes use of abduction and induction as guided by the MELD framework introduced by Bhaskar (2008; also see Hartwig, 2008). Abduction refers to the recontextualisation of existing knowledge (Togo, 2016), and the work here draws in themes or codes from earlier work (Jeffery, 2017; Jeffery, 2021). An initial exploration of post-apartheid South African heritage policy and museum practice (Jeffery, 2017), for instance, identified an absence of ecological issues from museum practice, generated by their absence from the policy framework, and highlighted a need to link ecological and decolonial concerns in order to bring about the emergence of meaningful transformations of museum practice. A deep 1M contextual analysis of the causal mechanisms of restrictions on post-apartheid South African museum policy and practice (Jeffery, 2021) located contemporary South African museology in the context of emergent international museological trends. This is the basis for the 1M analysis conducted here.

Induction refers to the identification of new codes from the data at hand, "a process that … helps us to [move] from a set of observations to a theory" (Sabai, 2016, p. 182) and to "surface general premises that may inform changes to practice" (ibid., p. 183). A review of literature enacts induction of new codes. The progress through the MELD schema in the analysis below moves from abduction of 1M codes from previous work (which are emphasised below because of their importance to the analysis) to the induction of new codes at 2E, 3L and 4D. Through abduction and induction, the analysis explores and develops the practical transformative potential of the eco-decolonial mode of museology as a new, relational approach to the resolution of the crises outlined in the introduction and which are faced by South African as well as international museums.

Philosophical methodology: Dialectical critical realism as underlabourer

Underlabouring can be understood as "the process of clarifying … ontological and epistemological confusions and uncertainties [to support] a transformative research intent" (Bhaskar, 2008, p. 335) or the practice of philosophy for real social-ecological change (see also Bhaskar & Parker, 2010; Price, 2016; Rosenberg, 2020a). DCR specifically looks to the "re-vindication of ontology … the philosophical study of being, as distinct from and irreducible to epistemology" (Bhaskar, 2010, p. 1) and "stresses the crucial role that being (ontology) plays in our … efforts to understand the way things are" (Norrie, 2010, p. 7). As such, it has potential to equip museums to meet the urgent philosophical and ontological challenges to which Cameron refers (2015a), and to further the museological goal of transformation towards the betterment of peoples' lives (Weil, 1999; Ballantyne & Uzzel, 2011). To think of DCR as 'underlabourer' is to think of it as a philosophical support system, a system that enables practical change by offering new ways to understand, critique and change the real conditions of practice.

DCR is here proposed as underlabourer to the development of the emancipatory potentials of museological philosophy, theory and practice. This development relates the South African context to an emergent, and yet tentative, international critique of dualist museological structures (Cameron, 2015a; Cameron, 2015b; Newell et al., 2017; Jeffery, 2017; Wehner, 2017; Jeffery, 2021). DCR offers new potentials to disrupt dualist constraints on practice, that is, to disrupt the entrenched historical museological division between social and ecological perspectives and the restrictions that are generated by this division. This enables progress towards the relational, eco-decolonial mode that may bring greater freedom to "humanity-in-nature" (Moore, 2017, p. 598).

One of the important philosophical contributions of DCR to understanding complex contexts is its stratified or layered approach to reality. DCR initially conceives three ontological domains: the real (that which exists independent of human experience), the actual (the moment at which human experience 'discovers' the real and interacts with it), and the empirical (cultural mediation of the real and the actual) (Bhaskar, 2010; Price, 2016; Rosenberg, 2020a). The epistemic fallacy, which is significant to the analysis below, is the reduction of the domain of the real to the domain of the actual, and the reduction of ontology to epistemology.

The epistemic fallacy is the representation of epistemology (a specific interpretation of the world) as ontology (a state of being, or the real way the world is, and without alternative). This process "functions merely to cover the generation of an implicit ontology" (Bhaskar, 2008, p. 4; Bhaskar, 2010, p. 1), and the epistemic fallacy is thus potentially a manipulation of knowledge to the benefit of restrictive forces. Identifying instances of the epistemic fallacy can focus attention on deep ontological issues, and on the deep causal mechanisms of the restrictions on practice that are of interest in the present analysis. This will be explored below in the context of capitalist dualism and its neoliberal ideology and the ways in which these have come to constitute the implicit ontology of museology (explored in depth in Jeffery (2021), and as outlined above presented abductively here). This ontology has profoundly negative impacts on the transformation of the museum as a social structure and on the ability of museums to offer agency to people.

Dialectical critical realism and the MELD schema

MELD is "a robust schema for investigating … research contexts concerned with societal transformation," and a means through which normalised practice can be expanded reflexively (Lotz-Sisitka, 2016, p. 318; Schudel, 2017, p. 163). The MELD schema (see Figure 1) structures the analysis below as it looks for potentials to remove constraints on transformation towards social-ecological justice in museology. The character of each moment is outlined at its start. Figure 1 gives an overview of the MELD schema. The bidirectional arrows show the relational nature of the process.

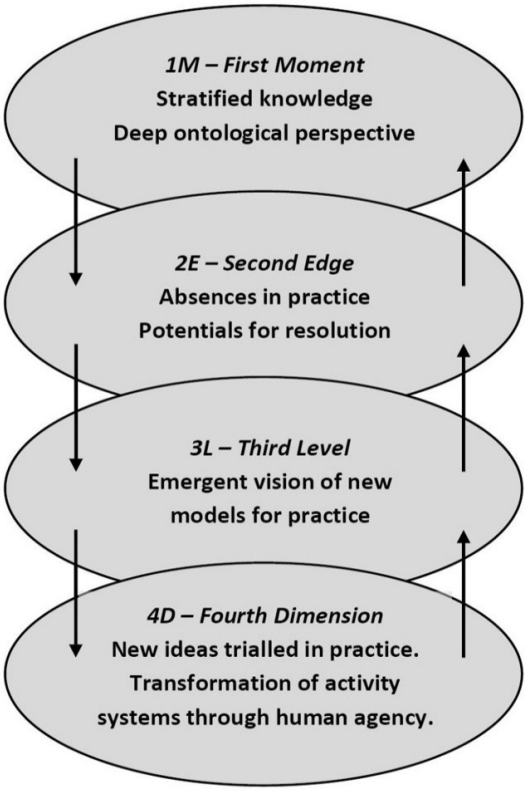

Figure 1: *Overview of the MELD schema (developed by the author)*

1M: Depth ontology

1M enables a deep understanding of the status quo, through "the intrication of a multiplicity of explanatory mechanisms" (Bhaskar, 2008, p. 196; see also Bhaskar, 2010; Fletcher, 2017). DCR views the world as constituted by real, open systems in which phenomena are generated by an array of driving impulses (Bhaskar, 2010). In the stratified DCR perspective on the world, this generative structure is conceived as a lamination of intersecting levels that interact in emergent ways (Bhaskar, 1998; Bhaskar, 2010; Lotz-Sisitka, 2016). The relational 'seven laminations of scale' model tracks emergence through: 1) the cosmological or planetary level, 2) the mega level of civilisations, 3) the macro level of policy and ideology, 4) the meso level of formal practice, 5) the micro level of social interaction, 6) the individual or biographical level, and 7) the sub-individual, psychological level (Bhaskar, 2010; Price, 2016). Each level is emergent from but also influences those previous, a relational perspective on the interconnected nature of the world that helps researchers to avoid relativism and reductive, linear philosophies such as dualism (Cameron, 2015b; Rosenberg, 2020a). This deep, retroductive ontological perspective seems vital in the

context of a crisis-ridden museum practice mired in historical dualism. Figure 2 gives an overview of the seven levels of the 1M moment, and represents the 1M generative complex of restrictions on museum practice.

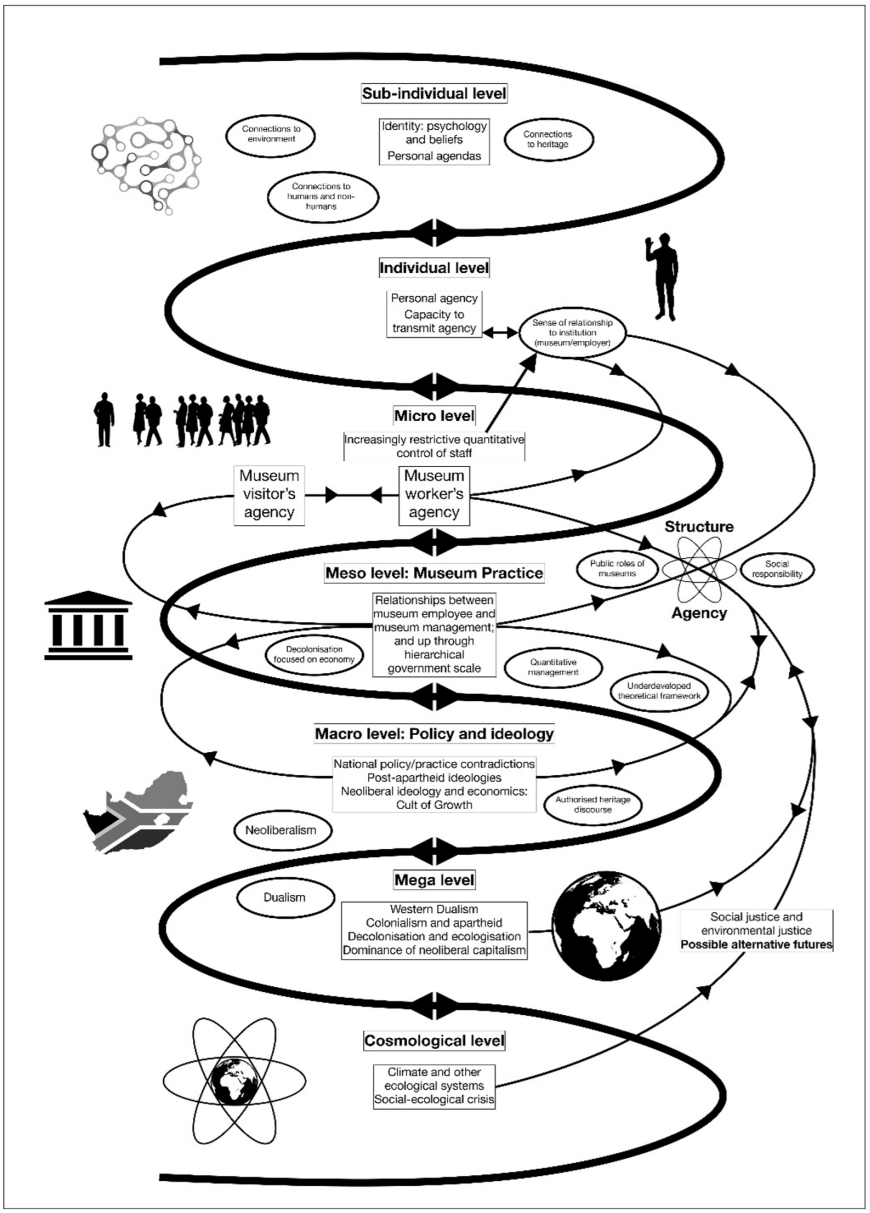

Figure 2: *The seven levels of the 1M moment (developed by the author and reprinted with permission of* Museum and Society*)*

A detailed 1M analysis of the ontological context of museum work has been conducted elsewhere (Jeffery, 2021). In the limited space here, an abductive analysis focuses on the most crucial moments of the 1M emergence of neoliberalism as the implicit ontology of museum practice. This implicit ontology emerges as the most powerful restrictive force on museology (Jeffery, 2021), but is largely unrecognised because of the fundamental levels at which it operates (Jeffery, 2021). The disruption of this restrictive ontology is a primary goal of the eco-decolonial mode of museology, in order to potentially enable the emergence of more progressive and emancipatory forms of practice.

At the **planetary level**, the 'Anthropocene' proposition of humanity as a geological force (Crutzen, 2002) has been valuable in popularising understanding of human impacts on the planet, including in emergent museological approaches (Fox, 2017; Nixon, 2017; Robin et al., 2017). To conceive the present age as the Capitalocene illuminates "a system of power, profit and re/production in the web of life … that not only accumulates capital, but drives extinction" (Moore, 2017, pp. 594-597). The Capitalocene perspective also reveals capitalism's "spaces of vulnerability and contradiction," (Moore, 2017, p. 595), such as the paradox of emancipatory neoliberalism elaborated below.

At the **mega level** (see Figure 2), the Capitalocene perspective surfaces neoliberalism as a global ideology reliant on human-nature dualism in the same ways as colonial capital (see Plumwood (2002, p. 8) on "our current failures and blindspots in relationships with nature"; and Plumwood (2002) and Moore (2015) on cheap nature and labour, and who counts as 'human'). Neoliberalism in the present analysis is considered as the ideology emergent from and supportive of the actual practices and impacts of dualist Capitalism on the real world. A significant facet of this ideology is the construction of 'real abstractions' such as Humanity, Nature, Society, the Economy (Moore, 2017). These can be understood as instances of the epistemic fallacy, which construct human-nature dualism as a given condition of reality (Moore, 2017). De Sousa Santos (2018) wrote that such manipulations reproduce the capitalist "cognitive empire" that elevates its contradictory and violent epistemology to ontology in a process which "take[s] away our ability to imagine or propose anything else without being made out to be wishful and irrational" (Rosenberg, 2020b, p. 2).

This perspective enables a critical view on the historical emergence of museological dualism from colonial capitalist dualism, and expands this critical view with the important understanding that museological dualism is perpetuated in the decolonial context by the contemporary dualism of neoliberal ideology. That is, current inequalities are not only colonial in origin and decolonial practice can be more effective if it has a focus on contemporary structures that are generative of restrictions on equality and freedom. The eco-decolonial perspective is that successive historical manifestations of capitalism thus restrict the emancipatory potentials of the museum and limit the responses of museum practice to crises.

At the **macro level** (see Figure 2), initial post-apartheid progress towards "a more social-democratic and co-ordinated variety of capitalism … floundered as the government

adopted neoliberal macroeconomic policies " (Nattrass, 2014, p. 56). The neoliberal policy framework is plagued by inconsistencies (Nattrass, 2014), and its practice by corruption and nepotism (see, for instance, Lannegren & Ito, 2017; Budhram & Geldenhuys, 2018), the net result of which is to exacerbate unemployment, for example, as Adjor and Kebalo described (2018), rather than to facilitate emancipatory social development.

The flow of neoliberal ideology from the mega to the macro level draws through the abstractions of the epistemic fallacy. Macro level South African policy echoes mega level international commitments to embed heritage within a neoliberal frame as the "cultural and creative industries" (Thomas, 2016, p. 37; Department of Arts and Culture, 2017). 'Optimal performance' is measured in relation to job creation, investment and economic growth as the solutions for social problems (South African Government, 2011; Kamga & Heleba, 2012; South African Cultural Observatory, 2018). Macro level policy upon which decolonialism is premised thus proposes to counter the inequalities and violence of *colonial* dualist capitalism through the inequalities and violence of *contemporary* dualist neoliberalism, as powerfully described by Rob Nixon (2011) in his analysis of today's systematic international inequalities.

This paradoxical position undermines emancipatory practice potentials, and is a key element of the persistence of South African museums' crisis of relevance and their limited responses to social-ecological crisis. This is the crucial moment in which the implicit ontology of museum practice can be seen to be characterised by the emergence of the paradox of emancipatory neoliberalism. The development of relationality in museological philosophy and theory that was initiated in earlier work (Jeffery, 2017; Jeffery, 2021), and which this article further elaborates, is vital in order to disrupt this paradox and the limitations it places on the emancipatory potentials of museum practice.

Neoliberal ideology emerges at the **meso level** (see Figure 2) to govern formal relations between the institution (management) and employees, and determines the degree of agency workers may have to influence practice. These relations flow into the **micro level** to affect the degree of agency museum workers may have in interactions with communities and which they may transfer to communities through learning programmes. The agency of museum workers, as the executors of the museum's social responsibilities, is the agency of the museum itself. The close entanglement of issues of structure and agency (elaborated in more detail in Jeffery, 2021) enables a perspective on the dependence of agency, and thus social sustainability, on the flawed ontological structure of the museum, and shows why it is vital that transformation take place at an ontological level.

South African museum practice historically emerged from colonial western modes of dualist practice (Corsane, 2000; Abungu, 2004; Rall, 2018; Vollgraaff, 2018). Despite the emergent international critique referenced above, and even as ICOM redevelops its definition of the museum in order to better address contemporary challenges, the dualist practice frame remains entrenched (Cameron, 2015b; Jeffery, 2021). The full scope of a museum's meso level activities emerges from the practice of collection, such that collection is the grounding ontological activity of museum work. Collection practice is rooted in historical and neoliberal dualism, but is considered untouchable in the redefinition process:

> The museum definition should retain … the unique, defining and essential unity in museums of the functions of collecting, preserving, documenting, researching, exhibiting and in other ways communicating the collections … The word museum is easily understood in its manifold complexity, with a stable core concept of a collection. (Sandahl, 2018, p. 2; also see Sandahl, 2019)

As noted above, neoliberalism as a global ideology is reliant on human-nature dualism in the same ways as colonial capital. The defence of collection fixes the implicit colonial and neoliberal ontology and its dualist frame in contemporary museum practice and implicates museums in Capitalocene injustice.

Personal psychological agendas defined at the sub-individual level may be expressed at the individual level (Price, 2016; Togo, 2016). The museum workers' sense of their relationship with the institution may be empowering or disempowering, both personally and in relationships with users of the museum. The emergence of social-ecological practice trends and the progressive and nuanced positionalities expressed by South African museum workers (Jeffery, 2021) suggests tension between individual social-ecological positionalities and institutional neoliberal ideology. This may generate potentials for museum workers to resist contradictions and disrupt practice constraints. This and other potentials for transformation are explored in more detail at 2E.

2E: Absences and absenting

2E is "the point of transition or becoming" (Hartwig, 2008, p. xiii), concerned with identifying absences (which can be understood as social ills, untruths, injustice, or other constraints) in practice visible after the initial 1M analysis. DCR conceptualises change in terms of absence, as absence is ontologically prior to presence, which implies that the potential for emancipatory change lies within absences, and that to act with transformative agency can thus be viewed as a reflexive, dialectical act of the absenting (negation) of absences (Bhaskar, 2008). The absenting of absences is an emancipatory movement towards more adequate knowledge and the expansion of normalised practice.

Neoliberal constraint can be identified in the commodification of heritage practice, which constitutes a postcolonial reproduction of colonial hegemonies and restricts sustainability initiatives in favour of profitability (Helland & Lindgren, 2016; Togo, 2016). The close association of heritage with tourism may reinforce and exploit cultural stereotypes as these are transformed into a consumable spectacle, while South African heritage governance structures see museums as tourist sites and not as knowledge-generating institutions (Rassool, 2000; Witz, Rassool & Minkley, 2001; Marschall, 2005; Vollgraaff, 2018).

Several scholars have argued that 'official memory' emerges in the manipulation of meso level practices of memorialisation in relation to the values and material interests of political and economic elites (see for example Abungu, 2004; Shoba, 2005; Bakker & Müller, 2010; Roux, 2018; Zuma, 2018). "Museums in South Africa are under pressure to adhere to a single, authorized narrative of the past and the present" (Vollgraaff, 2018, p. 385), a selective discourse of heroic leaders, of survival, triumph and exemplariness, that

silences and alienates dissonant voices and communities, again noted by several critics (Rassool, 2000; Dubin, 2006; Soudien, 2008; Mngqolo, 2010; Rassool, 2016). The museum is instrumentalised in the construction of a specific identity, which despite the significant presence of the Apartheid Museum, readily absents deeper museological treatments of the "less remembered miseries and celebrations of township life" (Soudien, 2008, p. 211), as well as narratives of contemporary social-ecological injustice (Jeffery, 2021). Official memory can undermine the crucial role of arts and culture in social critique, and potentially discriminates against niche, experimental or radical programmes (Mahony, 2017).

Human creativity and agency are necessary for the achievement of the transformation of practice, and thus perhaps the most significant constraint of neoliberal ideology on museum practice is the strategic focus of museum management on rigid quantitative performance indicators, logistics, administration and Treasury compliance requirements (Vollgraaff, 2004; Dubin, 2006; Vollgraaff, 2018). The demands of compliance and economic measurements overshadow museological functions and effective museum services (Vollgraaff, 2018). Museum and heritage workers are alienated from the management system, and feedback into the system is limited (see De Shuman (2020) for a personal reflection on this structural condition). Potentials for creative worker-driven expansion of museum practice are absented by the limitations of economically correct practice. Neoliberalism generates a worker-institution binary that thus tends to consolidate dualist thinking (see Mahony (2017) on activist interventions against "corporatisation" of the practice of cultural institutions). Political and ideological structures constrain the agency of workers at the meso and micro levels in ways that ensure they are reproductive of structure. That is, neoliberal political and ideological structures prevent transformation even as they claim to champion them.

The stratified DCR perspective on reality shows how the paradox of emancipatory neoliberalism is generated and how it constrains practice so that, like policy, practice becomes an element of the neoliberal architecture. The implicit neoliberal ontology of museology perpetuates the historical injustices (absences) of colonial human-nature dualism, and most crucially, absents the relational social-ecological potentials for theory and practice that hold the most potential to enable transformation.

At least two entangled, practical, transformative pathways (means to absent these absences) surface from the 1M analysis. Firstly, tensions between traditional-institutional and progressive-individual museum workers' positionalities (Jeffery, 2021) generate potential for "interstitial" activism (Mahony, 2017) by museum workers. This is activism from within the ontological formation so that it may be 'opened up' from the inside, and which should be seen "not as an attack on these public institutions for their duplicitous value systems, but as acts of love for what they could be" (Mahony, 2017, p. 132). The sense of limited agency that an individual may feel within an institutional structure rooted in neoliberalism potentially manifests in resistance to its constraints. There is in this sense a personal level, as expressed by De Shuman (2020) above, to the ability or inability of museums to respond to crises. This potential may inform the 3L vision and be explored

in practice at 4D, particularly in terms of the ways in which it may facilitate the second transformative pathway.

Neoliberalism is the implicit ontology, and collection is the grounding ontological activity of museum work. While the *methods* of collecting, and of interpreting and exhibiting collections are the focus of critique, reflection, and change (Pearce, 2003; Morgan & Macdonald, 2020), the *principle* of collection is so fundamental to what a museum is conceived to be that it seems to be exterior to processes of formal change intended to reinvent the museum and ensure its future (Sandahl, 2018). This effectively applies a philosophical shield to the deep ontological roots of museological dualism and the ways in which this reflects the colonial hierarchy of culture as superior to nature and cultures themselves as similarly hierarchical (Cameron, 2015b). This hierarchical ordering is equally vital to the implicit neoliberal ontology that underpins post- and decolonial practice and, again, remains as reliant on dualism as was colonial capital (Moore, 2017).

Human-nature dualism thus continues to frame the work that museums do because of the absence of critique directed at the ontological and ideological significance of the practice of collection. "Core museum functions and societal responsibilities are not in competition with each other" (Sandahl, 2019), but the absence of reflexivity directed at the ontological significance of collection, as the core activity of museum work, generates an absence of coherence between the theoretical social-ecological responsibilities and the actual practice of museum work. The ontological alignment between the museological practice of collection and oppressive ideology is why there is a pressing need for new forms of reflexive and disruptive social-ecological relationality in theory and practice, such as the eco-decolonial mode of museology (as proposed in Jeffery, 2021). Rather than being hidden and protected, collections may be positioned at the heart of the 'ideological faultline' of tensions between traditionalist and progressive museologies (Adams, 2019a; Adams, 2019b). The ways in which the eco-decolonial mode of museology may disrupt the untouchable position of the principle and practice of collection may thus contribute to resolution of the fundamental ontological paradox of emancipatory neoliberalism.

This moment of multiple crises and potentials for their resolution is one in which museum practice might be reimagined, and this will be the focus of the 3L analysis.

3L: A vision for museum practice

3L develops the emergent vision of the open system that is being studied, "the inner truth or pulse of things and the spot from which we must act" (Bhaskar, 2008, p. 8; see also Schudel, 2017). 3L is about exploring possibilities in the newly understood context, and initiates a vision for the world in which social-ecological justice predominates (Schudel, 2017). A relational point of view is emphasised as new models for practice are imagined (Bhaskar, 2008; Norrie, 2010; Mukute, 2016), in this instance the relationality of the eco-decolonial mode of museology with its social-ecological foundation.

The fundamental shift envisioned in the development of the eco-decolonial approach is an ontological transformation across Adams' 'ideological faultline' (2019a; 2019b) from

traditionalist human-nature dualism to a progressive human-nature dialectic. The idea of cultural landscape offers a suitable theoretical frame for this ontological shift, as it is one with which the heritage sector is familiar and which demonstrates emergent relational, social-ecological potentials.

Perspectives on cultural landscape have a presence in various ICOM documents (see Garlandini (2016) for a summary of the broad ICOM position on cultural landscape). Most institutional conceptions of cultural landscape are routinely instrumental, dualist, even gendered, 'nature and man' perspectives in which environmentalism is subaltern to overarching 'cultural forces' (UNESCO, 1972; Luengo, 2015; UNESCO, 2017). In the South African context, however, a more progressive perspective on cultural landscape is to be found in the 'Declaration on Museums and Cultural Landscape' (ICOM-SA and ICOMOS-SA, 2016), which conceives a complex layering of cultural meanings associated with landscape. This encourages a relational perspective. The eco-decolonial approach develops this perspective to reimagine cultural landscape as a culture-landscape dialectic, which is a form of social-ecological dialectic. The eco-decolonial is thus a dialectical rather than a dualist mode of museum practice.

To reframe museological thinking and practice within a dialectic of culture-landscape opens potentials for emerging scholarship around relationality between culture and landscape (see, for instance, Crouch 2010) to disrupt human-nature dualism, the opposition at the heart of museology's ontological crisis. A perspective on situated knowledge of social-ecological crisis, that is, the knowledge of affected communities in affected sites (Haraway, 1988; Leino & Peltomaa, 2012), emerges with potential to disrupt collection as the grounding ontological activity of museum practice. That is, there is potential for the eco-decolonial to be a situated form of practice and for this situated turn to disrupt the implicit museological ontology. This situated turn, which is discussed further at 4D, may focus museum theory and practice on the ways in which the amelioration of the colonial depredations of the past, and the resolution of museums' crises of identity and relevance, is entangled with the amelioration of the social-ecological crises of the present. The legitimacy of the eco-decolonial mode is dependent on such historical depth in its relational perspective.

Though dualist museology historically privileges the tangible, the intangible values associated with sites are always present and inseparable from material culture (Ntsoane, 2002; Department of Arts & Culture, 2009; Sodano, 2017). In the post-colonial moment, the intangible is emphasised because of the urgent need for the demarginalisation of indigenous knowledge (Mungwini, 2013). This historic opposition can never be erased, but a dialectical eco-decolonial mode of practice may enable emergence of "a complex, co-embedded, constellational relationship" (Norrie, 2010, p. 170) through which marginalised and dominant epistemologies may combine in new and interesting ways. The dialectical softening of the calcified distinctions between tangible and intangible, indigenous and colonial-scientific, between community memory (heritage, past) and community need (present and future), offers a logic for practice grounded in humanity's immersion in

ecological systems and a spiritual communion with nature as source of life. This historical-immersive logic is conceived as 'humanity-in-nature' in the eco-decolonial approach (adapting Moore's use of the term, 2017, p. 598). This adds further nuance to the eco-decolonial relationality that may facilitate a more progressive museological stance on the relationship between people and the environment, and enable greater potential to inform emancipatory learning and development.

Eco-decolonial relationality may be further deepened by nuanced Education for Sustainable Development (ESD) perspectives on intergenerational knowledge and learning around biodiversity loss:

> Biodiversity loss as a global concern … has shaped education imperatives towards learning-led … social-ecological change and intergenerational learning … that might better situate indigenous peoples on their intergenerational lands in reflexive learning within a rich mix of ancient and modern scientific ideas and ideals. (O'Donoghue, Sandoval-Rivera & Payyappallimana, 2019, p. 1)

The culture-landscape dialectic may draw on this to relate biodiversity loss as a global social-ecological concern to decolonial impulses focused on situated intergenerational knowledge. This emphasises that "the depth of historical wisdom and its intergenerational custodians must enter the sustainability game as key players towards attaining more just and sustainable futures" (O'Donoghue et al., 2019, p. 2). Rosenberg (2020b, p. 3), too, noted that "charting the way forward may … require us to look back, to consider the almost-forgotten wisdom from earlier times". There is eco-decolonial museological potential for intergenerational narratives of social relations to biodiversity to be co-curated by museums and communities into learning opportunities.

A dialectic of culture-landscape thus potentially offers an interdisciplinary practice frame that may deepen the emergent decolonial and ecological strands of museum practice and help bring them together into the relational eco-decolonial mode. From this fresh and progressive perspective may emerge patterns of reflexive and expansive learning that make available a new "ecology of knowledges" (De Sousa Santos, Arriscado & Meneses, 2008, p. xx) through which museums may surface means to address their ontological crisis and thus to engage more deeply with the social-ecological crisis.

An eco-decolonial museum practice drawing on this ecology of knowledges may focus on "supporting and curating networks of related things and their significance, rather than delivering knowledge from a single vantage point" (Newell et al., 2017, p. 2). The curated network, however, could focus on people as complex social-ecological entities and on their stories, rather than on 'things'. Progressive moves towards "collaborative ways of interpreting and relating to collections" (ibid.) could become a focus on collaborative ways of relating to people rather than objects, so that the grounding ontological activity becomes collaborative storytelling and the curation of community narratives. This may be facilitated by interesting tangible things, *but the collection of things, even as the basis for narratives, is not necessarily the definitive operational focus of museum work*.

In the eco-decolonial mode the focus of museum work expands to include people and their stories and the culture-landscape in which they live and narrate as humanity-in-nature. The vision of an eco-decolonial museum practice is thus to disrupt traditional dualist practice through intergenerational story sharing within a dialectic of culture-landscape, and thus to disrupt the implicit neoliberal ontology.

4D: Potentials for change in context

4D is about "active and reflexive engagement within the world" (Bhaskar, 2008, p. 8). At 4D, new ideas may be trialled in practice in order to bring real change to social structures through transformative human agency, which is how the eco-decolonial will move towards greater justice and the active resolution of social ills (Bhaskar, 2008; Hartwig, 2008; Schudel, 2017). 4D is the moment of real change in the practice context, through "the exercising of intentional and ethical human agency" (Mukute, 2016, p. 196). Interstitial activism, surfaced above as a transformative pathway for museum practice, may be exercised at 4D within the eco-decolonial culture-landscape dialectical practice frame imagined at 3L. Dualist museology may be disrupted by museum workers who, using the 1M understanding of its causal mechanisms, may assume the agency to become 4D agents for emancipatory change and locate themselves and their practice *outside* the neutralising paradox of emancipatory neoliberalism.

Interstitial activism may actively shift the focus of the grounding ontological activity of museum work towards a practice that includes the curation of situated social-ecological knowledge, "a movement … towards interactive curatorial practices across physical and digital archives" (Hamer, 2019, p. 392). Physical archives are understood to transcend museums' storerooms to include land and landscape, natural ecological systems and natural heritage, the world-as-record and the human record of living in the world. Such physical archives are in the first instance real (in the DCR sense of that which exists independent of human experience) and prior to human interpretation. In the second instance, in the domain of the actual (the moment at which human experience 'discovers' the real and interacts with it), such physical archives are potentially generative of narratives that draw on intergenerational memory as a discursive practice. The persistent perception of museums as places of dead things and the dust of history (Thomas, 2016) is an element of South African museums' crisis of relevance. This may begin to be resolved through *in situ* active and practical engagements with peoples' living memories and perceptions of social-ecological change, that is, through situated knowledge expressed in *situated narratives*.

3L surfaced potential for the emergence of a situated turn for eco-decolonial museology. In the 4D practical development of the situated turn, multidisciplinary scholarship in the culture-landscape dialectic may be brought into contact with actual, lived experiences. Situated knowledge may emerge in co-produced situated narratives of social-ecological crisis. The facilitation of situated narratives, to which Rogage et al. (2021, p. 2) refer using the evocative term "memoryscapes", is a means through which to generate meaning from experience (Philpott, 2014). This is also a means through which the eco-decolonial

potentially shifts the museological ontology from a foundation in collections alone towards a foundation that draws in lived experiences of social-ecological reality.

"Museums … are founded on positivist notions of certainty" (Cameron, 2015a, p. 348), and like Education for Sustainable Development (see, for instance, O'Donoghue et al., 2019), the eco-decolonial seeks to generate relationality between the historical divisions that have been set up by positivism and empirical realism. Museology, like ESD, can benefit from a relational perspective on western and intergenerational perspectives on place, ecological change and biodiversity, and the eco-decolonial mode can potentially accomplish this through engagements with situated knowledge. As noted at 3L, the eco-decolonial offers potential for marginalised and dominant epistemologies to combine in new and interesting ways.

A co-productive focus on facilitating the narration of the lived experience of people as complex social-ecological entities potentially enables museum practice to have greater relevance and sustainability than has been the norm in the dualist practice frame (Cameron, 2015b). The traditional focus of museology on expressing authoritative historical narratives can come into a dialectical relationship with contemporary contexts and experience in the co-production of emergent narratives in exhibition and learning programmes, which yet remain historically conscious.

More specifically, in the eco-decolonial mode of museology, the practice of collecting enters into a dialectical relationship with social-ecological reality (situated knowledge) and the practice of facilitating situated narratives. That is, eco-decolonial museum practice emerges from a dialectical relationship between collections and situated knowledge and narratives. Practice in effect becomes a dialectical act, the dialectic in action. This is a way to reimagine the dualist museum by reimagining the relationship between collections and society. Collection is the grounding ontological activity of museology, as elaborated above, and collection must thus be part of the new relational, dialectical ontology for museology, if collection is not to become part of a new dualism of collection versus situated narratives, or collection versus the eco-decolonial.

The emergence of this practice will be explored in more detail in forthcoming work, but it will focus on collaborative storytelling towards the co-production of exhibition and learning programmes in which the museum shares authority with the community. The traditional practice of collection and interpretation of objects is expanded by the situated narrative approach, an "expansion of normalised practice" (Lotz-Sisitka, 2016, p. 319) through which the eco-decolonial draws in a focus on people and their personal stories to disrupt the authority of the traditional museological focus on the interpretation of 'things'.

Situated narratives which emerge during fieldwork may be co-curated by the museum and narrators as evidence for the necessity of structural change in response to social-ecological crisis. The eco-decolonial mode thus works towards the active resolution of museums' crises of identity and relevance while, at the same time, it works towards the amelioration of the social-ecological crises of the present, and carries out this work with awareness of historical contexts. Workers may thus disrupt the dualism of the implicit

neoliberal ideology of museum work. This may revitalise the agency of museum workers and thus of museums, and consequently revitalise museums' capacity to enable agency for communities.

This practical mode of relating to collecting and to collected things is necessarily simultaneously cultural and ecological, and disruptive of dualism in that it requires multidisciplinary strategies for practice that bridge cultural and ecological studies, the humanities and the sciences. This represents the eco-decolonial operationalisation of a humanity-in-nature perspective for museum practice so that it is simultaneously and inseparably decolonial and ecological in impulse. That is, the decolonial and the ecological are not and cannot be separated.

Future work

Future work will develop the 4D moment. It will explore the practical potentials of the eco-decolonial mode in more detail and lay a path towards implementation. An important element of the development of the eco-decolonial mode of museology is the development of a multi- and interdisciplinary network of actors, as this is a vital catalyst for emergent social-ecological practices (Bhaskar, 2010). Actors in this network will share the transformative agenda and the focus on thinking outside normalised ontology and practice. It is crucial to seek constructive relationships that may help in the generation of the eco-decolonial mode and that, most particularly, may offer constructive collaboration in learning to work in new ways and with new patterns of thinking. Cultural Historical Activity Theory will be employed during this process (see, for instance, Engeström, 2015).

This kind of multi- and interdisciplinary development may be understood as the development of a transformative knowledge network with transgressive learning capacities, a form of networking for learning that is potentially an important driver of change towards more sustainable practice (see, for instance, www.transgressivelearning.org for an overview of such networked potentials; also see Lotz-Sisitka et al., 2015; Lotz-Sisitka et al., 2016). Future work will make use of a constellational approach to the generation of a network of theoretical potentials that may contribute to the practical emergence of the eco-decolonial, and will explore potentials for the emergence of transgressive and expansive learning for sustainable museological practice.

Conclusion

A Dialectical Critical Realist MELD analysis surfaced neoliberalism as the implicit ontology of museum practice (1M), and considered potentials for ontological rejuvenation through disruption of the grounding ontological activity of museum practice, collection (2E). A dialectic of culture-landscape was envisioned as a fresh practice frame for museum work (3L), in which persistent human-nature dualism may be replaced by relational perspectives. Interstitial activism by museum workers (4D), moving practice activities away from collection alone and drawing in the curation of situated knowledge, may contribute towards

the potentials surfaced in the analysis for emancipatory change towards a relational eco-decolonial approach to museological practice.

To treat culture-landscape as dialectic may enable revitalised ontological potentials for museological theory and practice. Museums may use the dialectic to reinterpret their relation to physical and cultural spaces and explore the layers of meaning attached to people, sites, and ecologies. The dialectic may disrupt the philosophical shield around collection and undermine the dualist neoliberal ontology. A culture-landscape dialectical frame for museum practice may expand the emancipatory capacities of museums in the Capitalocene.

The dialectic may embrace the idea of "co-engaged meaning making" emergent in Education for Sustainable Development (O'Donoghue et al., 2019, p. 4), which may be expressed in co-curation and co-creation of exhibitions and learning programmes with the narrators of situated knowledge. Such co-creative processes focused on social-ecological learning potentials may be vitalised through museums' character as storytellers (Bedford, 2001; Ciasnocha, Ollson & Shermis, 2006). Museums may deploy their skills of storytelling and pedagogy (exhibition and learning programmes) in such a way that they become not only collectors and memorialists, but facilitators of oral histories and of active, activist, social-ecological knowledge. Curation as an act of storytelling may be creative and collaborative and offers opportunities for museums to become 'story incubators' for people conceived as complex social-ecological entities, members of humanity-in-nature.

In this co-created practice, it is the communities' own narratives that form the backbone of the learning opportunities. The museum acts as facilitator of emergent, situated social-ecological narratives, rather than only as a collector (consumer) of things. The museum together with the community may co-create a knowledge commons with points of access for the community, the museum, and the museum's (hopefully) growing community base. Price (2016) has outlined how climate denialists exploit the inability of the scientific method to prove that complex, entangled social-ecological and biophysical processes, such as climate change, are responsible for observed changes in natural systems. The formal scientific method cannot relate evidence at the level of the empirical to the real occurrence of anthropogenic climate change, for instance. Social structures such as museums, however, may facilitate and foreground situated knowledge and evidence for social-ecological crises such as climate change, and thus potentially motivate the cultural and political change that the scientific method cannot.

In practical terms, the situated narrative approach will entail museum curators working in the field to facilitate the emergence of narratives of peoples' relations to culture-landscape. The eco-decolonial situated narrative approach differs from traditional museological approaches in that it is not primarily historical; it is not focused on the past alone, although it has a vital perspective on historical context; and it is not primarily archival. It is an activist and interventionist approach, a mode of knowledge co-production in which the museum is a facilitator of the emergence of new forms of knowledge through, for instance, mediating interactions between intergenerational and scientific knowledge.

The emancipatory ontological effect of the disruption of collection as an ontological activity thus drives the practical focus of the eco-decolonial mode, in which the primary aim of the situated narrative approach is to generate new knowledge and perspectives on urgent social-ecological issues. The narratives are the core of an active process of knowledge co-production that potentially offers the custodians of intergenerational knowledge active agency in a context, social-ecological crisis, that is normally, or normatively, the preserve of ecological science.

The ontological shift towards a culture-landscape dialectical practice frame may focus museology on a deep engagement with situated social-ecological relationships. Museums may enable agency and empowerment for communities through co-development of projects, which constitute a public voice. This work may emphasise the embeddedness of that voice in a culture-landscape shared with a diversity of living things, and the dialectic may thus expand museological practice so that, to adapt Fiona Cameron's (2015) post-humanist vision,[1] it invites previously invisible human and non-human social collectives into the civic life of the museum which allows their Capitalocene stories to be told. In this way, the eco-decolonial mode of museology may begin to address museums' crises of relevance and identity.

Notes on Contributor

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Endnotes

1 Cameron framed her post-humanist perspective as a means to move beyond Cartesian rationality, which is the foundation of museological dualism and emphasises humans as hierarchically superior to nature and non-human beings. She reframes museology in a terms of relational connections that "compose different museum worlds, in respect to alternative ways we can entangle ourselves with places [and] nonhumans" (2015b, p. 24). The post-human vision decentres humanity in the ontology of ecology. Most significantly, Cameron envisions non-human beings as entities with rights of citizenship, which is a means to ensure the non-human right to justice.

Creating Community Based Environmental Awareness with Social Media: A Kenyan perspective

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Abstract

One of the roles of community education is keeping citizens more informed on the need to conserve their environment. However, for this to be effective in the digital era, the use of modern communication tools is required to keep pace with current technological developments. One of these tools is social media, which is enormously popular and is used by both individuals and organisations for online communication. This paper analyses the role of social media in community-based organisations (CBOs) in creating environmental awareness through community education in Kenya. A non-probability sample comprising nine CBOs in Nakuru City was used to explore activities focused on environmental issues. Data were collected and analysed from a total of 98 respondents who participated in an online survey. It was concluded that the use of social media for environmental awareness in CBOs was minimal, but there is potential in its use as a social learning environment for creating environmental awareness. The study recommends capacity building and open online communication as a means of promoting the use of social media in creating environmental awareness through community education programmes.

Keywords: *environmental management, environmental awareness, community based organisation (CBO), community education, social media*

Introduction

Recent theoretical developments have suggested that complex issues can often easily be resolved at the local level through community initiatives (Hidayat & Stoecker, 2018). This brings to the fore the critical role played by community based organisations (CBOs) in addressing problems facing their communities. CBOs have been at the forefront in driving agendas for addressing various issues that are unique to specific communities at the grassroots level, thus the focus on CBOs in this survey. CBOs are entities that are constituted by local community members to address issues that affect them at the local level. Various CBOs focus their activities in the field of environment. These organisations endeavour to promote environmental conservation through community education and to protest against any act or omission that may facilitate environmental degradation.

More and more countries are striving to upgrade their industrial capacities to meet the market demand, resulting in high levels of environmental pollution. Ironically,

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industrialisation and its proceeds have mainly been used as the yardstick for measuring the level of a country's economic development (Nazeer, Tabassum & Alam, 2016). Proponents of environmental management have used CBOs as vehicles for environmental activism, community education and political engagement. Through environmental activism and community education, citizens are able to take to task the authorities concerned and demand accountability from various environmental polluters. CBOs are often used as forums to regulate pollutants emanating from industries, though attempts to thwart their efforts are frequent.

Environmental activism is described by Zhang and Skoric (2018, p. 832) as "social movement-type activities, such as getting involved in fundraising campaigns, signing petitions, and writing letters to policy makers". Environmental management is often controversial (Hidayat & Stoecker, 2018). In the context of this study, community education can be considered as activities that empower community members to deal with various emerging environmental concerns by providing the necessary knowledge, skills and attitudes, while at the same time utilising the available community resources, such as local manpower and technologies (Saepudin & Mulyono, 2019; Calitz, Cullen & Odendaal, 2020).

There is a growing body of literature that recognises the importance of social media in promoting community education and creating environmental awareness (Rahim & Jalaladeen, 2016; Roshandel, Labafi & Robati, 2016; Hidayat & Stoecker, 2018; Zhang & Skoric, 2018; Lopez, Magliocca & Crooks, 2019; Saepudin & Mulyono, 2019; Severo et al., 2019; Bramwell-Lalor et al., 2020). However, despite the wide use of social media, research on its role in communicating concerns threatening environmental sustainability in the context of the local communities in Kenya is minimal. Moreover, the role of social media as an ideal social learning environment for creating awareness and communicating ideas on environmental management by CBOs is not well covered (Du et al., 2018; Hidayat & Stoecker, 2018). To address this gap in the literature, this study attempted to explore the use of social media to enhance environmental management awareness in the context of CBOs in Kenya.

The paper is structured as follows: the theoretical background, research methodology and study findings are presented, followed by a discussion and conclusions.

Literature review

Social networking theory

This research draws insights from social network theory, which emphasises social interactions (Granovetter, 1973; Granovetter, 1983; Tsai, 2012). As argued in various studies (Kane et al., 2014; Chung & Crawford, 2016), social networks can help to gauge online social relationships, through social media platforms and their influence on creating a suitable social learning environment for environmental awareness. Online social networks facilitate users to interact and create relationships through various online networking tools, in addition to sharing information (Kane et al., 2014). Therefore, online social

networks can be considered a learning environment in addressing various factors, such as perceptions, behaviours and attitudes, which are important for enhancing environmental awareness potential.

Environmental pollution from industrialised nations

Unknown to most citizens in undeveloped countries, 78% of global environmental pollutants emanates from only a handful of powerful industrialised nations (United Nations Environmental Programme, 2019). Unfortunately, the same nations are mandated to set the agendas and policies on environmental protection and sustainability. Despite the United Nations Environmental Programme (UNEP) headquarters being based in Kenya, most of its financial obligations and key decisions are made by developed nations, who are also the main environmental polluters. Moreover, most international and regional environmental watchdogs receive their funding from the same nations (Zhang & Skoric, 2018). This is why most international treaties and policies on environmental sustainability are either skewed or overlooked in favour of environmentally polluting investments and innovations. Moreover, some of the industrialised nations are unwilling to ratify or fully support efforts to promote environmental sustainability if it involves drastic reduction of industrial emissions or safe waste disposal.

With the enactment of stringent legislation on environmental protection in some parts of America and Europe, following aggressive environmental activism, some of these countries have devised ways of shipping out and dumping their hazardous waste in developing countries in Asia and Africa, who welcome these deadly imports due to poverty, lack of political will and weak environmental regulations (Nazeer et al., 2016). The waste is classified either as donations of used goods, refurbished equipment or materials for dubious offshore recycling trade (Ferronato & Torretta, 2019; Sembiring, 2019).

Environmental pollution from developing nations

Apart from the pollution attributed to the developed world, developing countries are not entirely blameless. The level of air, water and ground pollution in those countries is growing exponentially, with little or no control (Nazeer et al., 2016; Mannucci & Franchini, 2017). The legislation and environmental watchdogs in these countries have insufficient capacity to deal with this pollution. It is rare to find a body of clean water in Africa, as so many have been turned into disposal sites for huge volumes of solid and liquid waste. A recent study by Nazeer et al. (2016) revealed that many water bodies can no longer support any aquatic life due to high toxic levels from domestic, industrial, agricultural and other waste. Moreover, ground and rain water are no longer safe sources for drinking water due to the high level of pollution. Such information can be shared though robust and participatory community education programmes based at the local level.

The role of CBOs in environmental awareness

Recent studies (Rahim & Jalaladeen, 2016; UNEP, 2019) reveal that the world community is now more concerned about the nature and extent of the present state of environmental degradation and its impact on future generations. To address this concern, several community-based pressure groups and organisations have developed community education programmes to advocate awareness on the need to live in a clean, healthy and sustainable environment, by highlighting pollution effects such as global warming and other hazards (Hidayat & Stoecker, 2018; Kaur & Chahal, 2018; Saepudin & Mulyono, 2019; Severo et al., 2019). Some of these entities advocate for environmental consumerism programmes which target community behaviour. According to Zhang and Skoric (2018), environmental consumerism refers to those common and daily behaviours adopted by individuals who have become more conscious of their environment. Advocates of environmental consumerism, for example Zhang and Skoric (2018), have argued that this can increase and extend the level of environmental awareness. Environmental awareness has been defined by Du et al. (2018, p. 3) as "the ability of an individual to understand the connection existing between: (a) human activities, (b) the current status of environmental quality, and (c) his/her willingness to take part in environment activities". However, a study by Severo et al. (2019) showed that despite efforts to promote awareness, community involvement in solving various environmental issues is not always evident. Environmental awareness and involvement allows individuals and communities to gain insight into the fragility of the environment and the need to maintain sound ecosystems, protect them from degradation and adopt sustainability policies and practices.

According to some scholars (Du et al., 2018; Kaur & Chahal, 2018; Lopez et al., 2019), people who do not understand their environmental issues may not see the importance of addressing environmental concerns, hence the need to strengthen community education on environmental awareness at all levels in the community. Importantly, citizens who are conscious of their environment are likely to modify their behaviours in support of sustainability efforts for future generations. Moreover, community members may develop positive attitudes towards environmental sustainability that may evoke emotional responses towards environmental concerns. Subsequently, this may trigger favourable perceptions and actions suitable for improving environmental management. Thus, CBOs dealing with environmental issues have a critical role to play in educating citizens (particularly those at the local level) regarding environmental sustainability through community based mobilisation and training. Additionally, equipping local communities with enough knowledge and awareness can motivate positive behavioural change and create 'conservation ambassadors' (Saepudin & Mulyono, 2019).

The use of social media in environmental awareness

A recent study by Kaur and Chahal (2018) indicated that creating environmental awareness through the sharing of knowledge requires various offline or online tools of communication. The internet is becoming increasingly popular, offering a diversity of communication

opportunities cutting across various topics and issues. Notably, Kaur and Chahal (2018) specified that prevailing lifestyles, technological advancement and educational changes can be credited to unprecedented growth in the use of the internet and its allied social networking tools and platforms. Of interest to this study is the social media phenomenon, which incorporates various synchronous and asynchronous online tools. Social media is described by Omar, Dahalana and Yusoff (2016), Rahim and Jalaladeen (2016), Kaur and Chahal (2018) and Murungi (2018) as a powerful technological tool that allows users to create content, share ideas, express opinions, disseminate information, share knowledge and exchange user-generated content.

Social media has now become an important new element of mass media and is being used to disseminate information within a very short time or in real time to a global audience (Mansell & Hwa, 2015; Roshandel et al., 2016; Hamid et al., 2017; Kaur & Chahal, 2018; Lopez et al., 2019). It provides user-friendly tools for knowledge sharing, enabling users to create, edit and add online contents without any professional training. It is now possible to create, edit, add and share multimedia content through videos, photos and other formats through instantaneous posts.

The focus of this study is the role played by social media in enhancing environmental awareness through CBOs in Kenya. This follows the argument by Murungi (2018) that the use of social media to share environmental issues at the community level is not common in Kenya. However, due to the multiple social networks provided by various social media tools and platforms, social media provides an ideal strategy for facilitating the sharing of knowledge and information in diverse audiences, societies and communities. Studies by Thomas and Van Dijck (2015), Rahim and Jalaladeen (2016); Roshandel et al. (2016), Murungi (2018), Severo et al. (2019) and Tsatsou (2018) posited that some of the social media sites that are popular with numerous users across the globe include Facebook, Twitter, WhatsApp, Instagram, Telegram and Flickr. Indeed, social media can play a crucial role in raising awareness on environmental issues (Roshandel et al., 2016; Du et al., 2018; Crooks et al., 2019; Lopez et al., 2019), either at the global, regional, national or even at the community level. As more people become aware of how a clean environment can influence their standard of life, the issue of conservation becomes increasingly important and can motivate them to agitate for sustainability of the environment in their communities.

Social media tools can be used to report on pollution, to create awareness, share ideas and to address queries on environmental issues. Social media networking sites can also be used as forums for activism to demand better environmental management or to seek advice for adopting sustainable environmental practices (Zhang & Skoric, 2018).

In terms of social media activism, several studies (Thomas & Van Dijck, 2015; Mansell & Hwa, 2015, Murthy, 2018; Tsatsou, 2018) have looked at the role of social media in contemporary online activism and how this can be applied by CBOs in their activities. These studies demonstrated how social media activism has been used to build up and rally for community support in advocating or fighting for various causes around the world. Activists have intensified their efforts to consolidate various sources of information and

perspectives on environmental issues in numerous social platforms. Evidently, those platforms provide an alternative forum from the main media channels, due to their ability for speedy and spontaneous reporting of environmental infringements. For them to have a wider reach, activists can employ a myriad of contemporary multimedia platforms such as blogs, micro blogging, social networking sites, instant messaging tools, video online discussion forums and email lists to communicate information. In summary, social media can be adopted by CBOs as a community education tool to raise awareness and campaign against environmental degradation (Hidayat & Stoecker, 2018). In addition, governments, local authorities and other concerned entities can be engaged through the use of social media to outline their policies, campaigns and agendas in the context of environmental management.

Kenya is not an exception in the use of social media and according to the Media Council of Kenya (2016), its usage is considered high compared to some other developing countries. A recent study by Kamwaria et al. (2015) identified Facebook, Twitter and WhatsApp as the social media networking platforms mostly used in Kenya. Their high usage can be attributed to low internet costs, extensive internet connectivity coverage, upgrading of the broadband cellular network technology to 4G and recently to 5G, and the affordability of web enabled electronic mobile devices.

The increase and availability of social media tools provide activists and other CBO members with an online space, which facilitates open interaction through various social networking sites (Rahim and Jalaladeen, 2016; Kaur & Chahal, 2018). Hence, it can be used to increase environmental awareness among the local Kenyan public and provide a channel for activists in CBOs to raise their issues for the attention of national and county governments, environmental watchdogs and other concerned agencies. In addition, awareness of environmental concerns can lead to change in citizens' behaviour and practices, motivating them to report on environmental degradation activities to relevant organisations through social media networking sites and other available online tools and platforms.

Objective of this study

This study focuses on the role social media can play as a community education tool in creating environmental awareness through several CBOs in Nakuru City in Kenya. The aim of this research is to explore the use of social media in creating environmental awareness by members of these CBOs.

To achieve this objective, the following research questions were investigated:

- What is the extent of social media usage among members of the local CBOs?
- What is local CBO members' level of awareness on environmental concerns resulting from the use of social media?
- How do local CBO members use social media to highlight environmental concerns?

Methodology

A non-probability (purposive sampling) method was used in this study. Primary data were collected from members of CBOs in Nakuru. Firstly, nine CBOs focused on environmental management, were purposively selected resulting in an accessible sample of 370 respondents. A study sample of 126 individual members was then selected. In each CBO, 14 members were purposively selected based on their consistent use of social media. The sample targeted individuals between the ages of 18-50 years who were deemed to be active users of social media. These individuals formed the unit of analysis for this study.

To analyse the research questions, the Google Forms platform was used to create an online self-administered questionnaire, which was accessible through a link in an email sent to the respondents. The questionnaire was divided into four parts and consisted of closed-ended structured statements. The items in the first part contained general socio-demographic questions such as age, gender, education qualification, and the most preferred social media tools, among others. For the other three parts, the respondents were asked to express their opinions on a five-point Likert scale. The second part was designed to evaluate the respondents' level of social media usage. In the third part, respondents were asked to assess their level of awareness on environmental concerns. The last part considered respondents' practices in highlighting environmental concerns through social media.

The questionnaire was pre-tested in a pilot study involving 30 participants from a different setting but with similar characteristics to the study population. The questionnaire was then amended before being administered in the main study. Participants were required to voluntarily give their informed consent before taking part in the survey. Of 126 emails sent out, 98 questionnaires were completed and returned, giving the study a response rate of 77.8%. Data were analysed using SPSS version 25.0 to develop descriptive and inferential statistics, which are presented in a graph and tables below.

Results

Results from the survey are presented below and describe the use of social media as a communication tool for creating environmental awareness by members of nine CBOs in Nakuru City.

Respondents' demographic profile

The distribution of the 98 members in terms of gender indicates that slightly more females (53%, n=52) than males (47%, n=46) were involved in the study. The majority of the respondents were aged between 21-29 years (29%, n=28), 30-39 years (30%, n=29), 40-49 years (25%, n=24). Those who were aged 20 years and below were 6.1% (n=6), 50-59 years were 9.2% (n=9) and aged 60 and above were 2% (n=2). In terms of the level of education, 40.8% (n=41) had been educated up to secondary school level, while 38% (n=39) had at least mid-level college education. A number of the respondents (14%, n=14) had a university education (Bachelor's degree), 5% (n=5) were post-graduates and only 2% (n=2) had only

primary level education. Of the respondents, 68% (n=67) affirmed that they had been using social media for five years or more, 29% (n=28) had used social media for 2-4 years and only 3% (n=3) had used social media for less than one year.

Table 1 shows the respondents' demographic information.

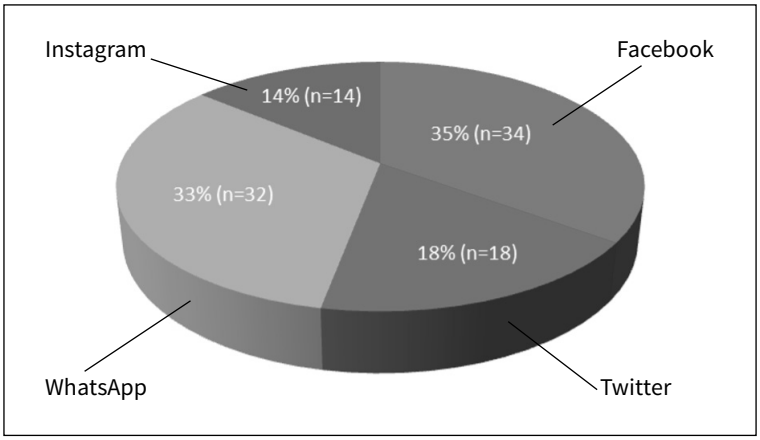
Table 1: *Demographic profile of respondents (N=98)*

Category	Parameter	Number of respondents	Percentage (%)
Gender	Male	46	47
	Female	52	53
Age	20 and below	6	6
	21-29	28	29
	30-39	29	30
	40-49	25	25
	50-59	9	9
	60 and above	2	2
Level of education	Primary	2	2
	Secondary	40	41
	Middle level college	37	38
	University undergraduate	14	14
	University postgraduate	5	5
Years of social media use	1 year and below	3	3
	2-4	28	29
	5 and above	67	68

Popularity of various social media platforms

Various social media platforms were popular among CBO members. Facebook followed by WhatsApp were the most popular social media platforms used by members of the CBOs. These were followed by Twitter and the least used was Instagram. Figure 1 shows the usage of social media platforms.

Figure 1: *Popularity of social media platforms (N=98)*



Respondents' perceptions on the use of social media

Overall, 35% (n=34) of the respondents agreed with the research statements on social media usage. A further 27% (n=27) strongly agreed (see Table 2). In particular, the majority indicated that social media formed part of their daily routine/activity and in addition, most (72%, n=71) enjoyed using social media. Most respondents were signed up to various social media networking sites, with Facebook being the most popular as shown in Table 2. It can be inferred from the findings that due to its popularity, social media forms an ideal social learning environment for environmental awareness.

Table 2: *Social media usage (N=98)*

No.	Factor	Mean	S.D	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
6.a	Social media is part of my everyday activity	3.57	1.377	13	12	8	37	30
6.b	I enjoy using various social media platforms	3.68	1.198	8	11	9	47	25
6.c	I feel out of touch when I haven't logged on to social media platforms for a while	3.34	1.347	14	14	16	35	21
6.d	I would be upset if social media platforms shut down	3.28	1.398	16	15	15	31	23
6.e	I am a member of multiple social networking sites	3.53	1.356	9	18	15	25	33
6.f	I feel I am part of the online community	3.6	1.298	10	12	13	36	29

No.	Factor	Mean	S.D	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
6.g	Social media has had a positive impact on society	3.66	1.192	8	7	22	36	28
	Average	**3.52**	**1.31**	**11**	**13**	**14**	**35**	**27**

Respondents' awareness on environmental concerns

Most respondents (42%, n=41) agreed with the statements on level of awareness on environmental concerns. In particular, respondents agreed that human activity presents a problem for the environment, and the issue of deforestation was highlighted. However, 40% (n=39) of the respondents indicated that the problem of environmental pollution was beyond their control. As shown from the findings (Table 3), a sizable number of respondents (n=70) had high levels of environmental awareness which could be shared through social media.

Table 3: *Respondents' level of awareness on environment concerns (N=98)*

No.	Factor	Mean	S.D	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
7.a	I do find environmental conservation important	3.93	0.79	2	4	16	58	20
7.b	Industries must treat the waste products before discharging them into the environment	3.92	0.96	2	5	22	40	31
7.c	Burning of fossil fuels is one of the causes of air pollution	3.84	1.072	2	10	24	31	34
7.d	Saving the environment is important	4.06	0.972	3	5	10	46	36
7.e	Deforestation has adverse effects on the environment	4	0.862	0	7	15	48	30
7.f	Pollution through human activities presents a problem for the environment	3.98	0.952	3	5	12	50	30
7.g	The problem of environmental pollution is beyond control so we can't do anything now	2.85	1.556	30	19	11	19	21
	Average	**3.80**	**1.02**	**6**	**8**	**16**	**42**	**29**

Frequency of engaging in activities of environmental concerns

The average level of frequency of using social media platforms on matters that deal with environmental concerns revealed that the respondents were neutral at 3.63 and leaning towards seldom. A total of 34% (n=33) indicated that they seldom used social media platforms for addressing environmental concerns and 27% (n=26) indicated 'never'. To a lesser extent, the findings showed that social media is sometimes used for advice on environmental improvement, as a tool for information sharing and for commenting on various environmental issues, as shown in Table 4. Based on the findings, it can be deduced that social media was rarely used for sharing environmental issues by members of CBOs.

Table 4: *Frequency of engaging in activities of environmental concerns (N=98)*

No.	Factor	Mean	S.D	Never	Seldom	Sometimes	Very Often	Always
8.a	Advising on how to improve the environment in my town	3.7	1.364	41	20	19	10	10
8.b	Reporting on environmental pollution	3.77	1.217	35	29	24	5	8
8.c	Reading on how environmental degradation can be solved	3.68	1.051	22	42	21	12	3
8.d	Sharing information on environmental issues	3.52	1.186	21	37	23	11	8
8.e	Commenting on various environmental issues	3.62	1.256	27	38	18	6	11
8.f	Posting issues of environmental concern	3.56	1.131	21	36	28	8	7
8.g	Engaging in discussions on environmental issues	3.56	1.149	21	37	27	7	8
	Average	**3.63**	**1.19**	**27**	**34**	**23**	**8**	**8**

Correlations between the main variables

The findings also showed a positive correlation between level of awareness and social media use with a correlation coefficient value of r= .282. This implies that a positive change in increase or decrease in social media use would be correlated with a 28.2% change in level of awareness. On the other hand, there was a negative correlation between frequency of engaging in activities of environmental concerns and social media use as well as that of level of awareness and frequency of engaging in activities of environmental concerns. See Table 5 for a summary of correlation levels. This implies that social media can be used to effectively enhance environmental awareness in CBOs.

Table 5: *Correlations between variables*

Correlations		Social Media Use	Awareness Level	Frequency of Engaging
Social Media Use	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	98		
Awareness Level	Pearson Correlation	.110	1	
	Sig. (2-tailed)	.282		
	N	98	98	
Frequency of Engaging	Pearson Correlation	-.413**	-.273**	1
	Sig. (2-tailed)	.000	.007	
	N	98	98	98

** Correlation is significant at the 0.01 level (2-tailed)

Discussion of findings

The study sought to establish the use of social media in creating environmental awareness in local CBOs. In terms of the first research question, it was established from the findings that the use of social media among the sampled CBO members is high and many respondents used social media in their daily activities. This implies that social media played a major role in the members' communications and hence could be used as a community education tool to create and enhance environmental awareness within the CBOs and by extension to the communities that they serve. Similar arguments have been advanced in the works of several scholars (Roshandel et al., 2016; Du et al., 2018; Kaur & Chahal, 2018; Crooks et al., 2019; Lopez et al., 2019) who have argued that organisations need to adopt modern communication tools to create, disseminate and share environmental knowledge. Furthermore, the findings also concur with a study by Kamwaria et al. (2015) that Facebook, Twitter and WhatsApp are vibrant social networking platforms that could be used for creating environmental awareness in Kenya.

The level of awareness on environmental concerns among the respondents was high. This implies that the potential to share environmental knowledge among members of those CBOs is great. This potential can have an even greater impact if the use of social media is enhanced. The findings highlighted the need for people at all levels to understand environmental concerns affecting their communities to be able to advocate adequately for environmental mitigation and sustainability as acknowledged by a number of studies (see Du et al., 2018; Kaur & Chahal, 2018; Lopez et al., 2019).

The study established that social media platforms are not commonly used for highlighting environmental concerns in Nakuru City. The findings also established that CBO members do not regularly use social media to share environmental information or report environmental concerns. This implies that only a small number of CBO members appreciate the potential of using social media in sharing matters pertaining to environmental management. This also infers that social media is not considered an essential community education tool for sharing environmental information and for bridging the knowledge gaps needed to address environmental concerns in Nakuru City. The findings support the argument by Murungi (2018) that although social media was popular in discussing various issues in Kenya, it was not frequently used with regard to sharing environmental issues.

Additionally, the study revealed that social media use significantly enhanced the level of awareness on environmental awareness in the CBOs since it statistically exhibited a positive relationship with the dependent variable. This infers that social media usage is an important factor that can be used to enhance environmental awareness

Conclusions and implications

This study investigated the role of social media in creating environmental awareness at the community level in Kenya, by focusing on several CBOs. Quantitative data were collected through a survey by administering a structured questionnaire to members of the CBOs to consider their perceptions and experiences on the use of social media as a community education tool in addressing environmental concerns. This paper shows that the use of social media and the level of awareness on environmental issues are high within the CBOs, thus making it easier to develop associated environmental communication and social learning measures. Moreover, this may be supported by the positive correlation between the level of awareness and social media use.

This study has theoretical and practical implications. Its unique contribution is that it gives an insight into the use of social media as a social learning environment in creating community based environmental awareness at the local level. Findings revealed that most of the CBO members were consumers of social media besides having high levels of awareness on environmental issues. However, this situation did not translate to high usage of social media to communicate on environmental concerns. Thus, it could be concluded that despite its popularity as an interaction channel in Kenya, social media is not commonly used for sharing environmental issues at the community level. As for the practical implications, for CBOs and other similar organisations intending to enhance the use of social media for environmental education and communication, there is relevance in promoting its use in initiatives related to environmental conservation and sustainability at the community level.

This study also suggests the need to collaborate with other organisations dealing with environmental issues to train and motivate the CBO members on the use of social media tools in addressing environmental issues. Thus, each CBO should develop unique community education programmes on the use of social media as a driver for amplifying sustainable environment and put in place mitigation measures should any members lag

behind. However, the study had its limitations. Firstly, the scope of this study was limited to local CBOs dealing with environmental issues in Nakuru City, Kenya. Secondly, only a small non-probability sample was used to represent CBOs in Kenya, hence the need to include a larger sample before a final supposition is drawn.

In conclusion, the study recommends the promotion of social media as a community education tool in addressing environmental concerns in CBOs through capacity building such as mentorship, training and other interaction forums. Finally, the study recommends the enhancement of open sharing of knowledge on environmental issues through increased participation of CBO members in online environmental activities. For further research, a comparative study is recommended to compare the use of social media as community education tool in different categories of organisations dealing with environmental issues to validate whether the findings can be generalised to other organisations.

Notes on Contributor

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THINK PIECE

A Critical Realist's Reflections on Coupling the Hydrological and Social Systems during a Global Crisis

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Abstract

Hydro-sociology is a recent field of study that aims to couple the human and water systems. It appears to be a response to dualistic thinking within hydrology and sociology that is also reflected in theoretical debates about structure and agency. Reflections about how specific rivers have ignited personal agency and define some of our political and economic structures are shared. Critical realists like Margaret Archer argue that reflexivity is a mediating tool between structure and agency. But what mediating tool is/can be used to mediate between the hydrological and sociological fields and related thinking? This think piece is a reflection on how a critical realist approach to structure and agency may deepen the connection and understanding of hydro-sociology.

Keywords: *critical realism, hydro-sociology, duality, water, structure and agency*

Introduction

As a critical realist, my ultimate concern is to "remove the rubbish that prevents us knowing the world" (Bhaskar, 2017, p. 7). Within the context of hydro-sociology, one of the challenges with increasing water body degeneration is finding a way to look under the surface beyond the literal rubbish which absorbs so much agency. In this paper I wish to consider the advice given by critical realists, Danermark, Ekström and Karlson, regarding the emergence and interplay between social structures and human agency and extend this to the emergent field of hydro-sociology. This methodological advice is to "keep structure and agency apart in order not to reduce one to the other and study the links between them over time" (Danermark & Ekström, 2019, p. 93).

This think piece arises from the author's start as an academic and activist in Northern Ireland in the early nineties and through direct experiences with rivers that helped shape her identity as a social activist and coincided with her emergence as a critical realist.

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Structural awakening

My first reading of Gidden's theory of structuration (Giddens, 1984), in the nineties, indicated that the study of society is in fact the study of structure and agency. During a period of residency in Northern Ireland my activism at times merged with, and within, the academic and community structures that surrounded me and seemed to mirror the embedded conflation in Giddens' structuration theory. I could not find a way to separate my agency from the structure(s) I was in, let alone attempt to stratify and differentiate this into recognisable components defined geopolitically, through identity, politics and justice. That ability to approach structure and agency as a dualism rather than a duality, or a conflation, came later during my doctoral work at Rhodes University, South Africa, where I 'became' a critical realist. I started to see and agree with Archer that structure and agency are mutually dependent phenomena but are also quite different kinds of phenomena (Danermark & Ekström, 2019).

My philosophical connection to critical realism (CR) was deepened when Roy Bhaskar highlighted that CR is basically "about standing the world right way up" (2012). That claim resonated with my commitment to social and environmental justice.

Reflexive deliberation

I applied Margaret Archer's 'internal conversation' (Archer, 2003) in my doctoral work. I am now at the early stages of approaching the emerging field of hydro-sociology through the Connecting Water to Global Citizenship Via Education for Sustainable Development (CW2GC)[1] project at the Faculty of Education, University of Cambridge as a critical realist with a focus on structure and agency. This paper explores some of the potential impediments, questions and opportunities in using a CR lens within the field of hydro-sociology, in a time that is currently also defined by a global pandemic.

The impact of the COVID-19 pandemic on our structure and agency is enormous; it dominates our language, our media and our thinking. It is not simply our health, societies and economic systems that are at risk, but the stratified and differentiated thinking we need now more than ever is at risk of further deterioration by the power of 'The Pandemic' on our discourse. All crises exacerbate injustice. Within this pandemic are other crises that are hidden from view. Even though water surrounds and defines our individual and environmental health, its degradation is often subsumed.

Hydro-climatic variability is now a key driver in human displacement with the following four extreme water effects documented by Nidhi Nagabhatla and Aidin Niamir[2] (2017):

1. An estimated 50-120 million will be affected in Bangladesh.
2. In 2007 one flood alone along the Zambezi river displaced more than 100 000 people in Mozambique.
3. More than 1 350 square miles of Nigeria's land is now desert. Over 70% of the Nigerian population depend on land for agriculture.
4. Flooding in 2012 displaced more than 2 million and affected more than 7 million people in Nigeria.

Water quality has been identified as a key driver for people to relocate thereby exacerbating the human displacement challenge. Migration is fast becoming a survival strategy to the water and wider environmental crisis (Nagabhatla & Niamir, 2017).

There is an ongoing struggle to find a balance between human and environmental needs that often leads to a dividing line with emphasis on one or the other depending on perception, power, and societal position. As Nagabhatla and Niamir (2017) have illustrated, water is often at the heart of social justice and can clearly indicate the inequities in our social system. The field of hydro-sociology reflects dualistic debates that continue to define how water flows through our political economic and social systems. But it may also provide an opportunity to close the gap allowing new ways to discuss the human-environment interaction and interconnection. Archer's analytical dualism may offer a model with which to study those interconnections.[3] Early reflections show some cross-disciplinary themes between the hydro-sociology field and the methodological frameworks in CR's structure and agency.

Hydro-sociology is an emerging field of study. Sivapalan, Savenije and Blöschl (2012) defined socio-hydrology as a new "science of people and water…that aims at understanding the dynamics and co-evolution of coupled human water systems" (p. 1271). Hydro-sociologists acknowledge that it is no longer possible, and indeed never was, for natural scientists to study the hydrological system as if humans were mere observers of that system. "In socio-hydrology, humans and their actions are considered part and parcel of water cycle dynamics, and the aim is to predict the dynamics of both" (Sivapalan et al., 2012, p. 1271). The focus on dynamic and integrated prediction of human actions on the hydrological system appear to echo the principles of emergence, time, differing powers and characteristics, and the interplay between structure and agency which are conceptually embedded in Bhaskar's (1998) and Archer's (1995) theory of structure and agency. As Archer highlighted, "the consideration of emergence introduces a time dimension in the analysis. The interplay between social structure and agency takes place over time; emergence is a process" (Danermark & Ekström, 2019, p. 79).

There is consensus within and beyond the field of hydro-sociology that human activities are rivalling geologic-scale forces. Manifestations of the hydrology-human link include declining snowpacks, shrinking aquifer storages, distorted river flow, altered groundwater recharge, freshwater degradation, and "increasing structural and physical scarcity of water across the globe" (Zeitouin & Warner, 2006, p. 435). The United Nations University Institute for Water highlighted in the Global Risk Report in 2016 how "the water crisis and water-based shocks, including migration is presenting new risk and vulnerability scenarios for the sustainability and human development agenda" (cited in Nagabhatla & Niamir, 2017). The sustainability crisis is further compounded by the power and significance of our oceans as over 70% of the Earth's surface is ocean with many developing countries already dependent on ocean resources for food, work and livelihoods. Because of these impacts, Thorsten et al. have argued that we "need profound changes to the science because hydrologic and human systems are now intrinsically coupled" (cited in Wagener et al., 2010, p. 5).

Wagener et al. (2010) have historically mirrored the call by Sivapalan et al. (2012) for a paradigmatic shift where hydrological research produces cross-disciplinary integration that catalyses new research and new teaching methods. If we are to avoid repeating the duality and conflation of past theories of structure and agency evidenced in the fact paradigm (where structure conflates downward on agency), the action paradigm (where agency conflates upward on structure) and the central conflation in Gidden's structuration theory (Danermark & Ekström, 2019, pp. 74-79), then we need to adopt a morphogenetic approach, which describes the process of transformation "derived from those processes that tend to elaborate or change a system given form, structure or state" (Archer, 2012, p. 5).

Hydro-sociology is a field of study that by its coupled name acknowledges, or at least encourages, the interconnectedness of the hydrological system with the human system. This presents an ontological and hermeneutic challenge integrating the theory of structure and agency within the emerging field of hydro-sociology. One of the first challenges was identified by Ertsen et al. (2014): "when simulating social action in modelling efforts, as in socio-hydrology, an issue of obvious importance is how to ensure that social action by human agents is well-represented in the analysis and the model" (p. 1369).

Ertsen et al. (2014) have alerted us to some apparent challenges[4] in connecting the hydrology and human systems:

1. How do we connect two dynamic systems that despite influencing each other also work independently?
2. How can socio-hydrology models represent human agency particularly when human agency and systems are constantly changing?

One way to overcome some of the challenges of studying agency within the field Ertsen et al. (2014) suggested is to "face human agency squarely" (p. 1370) and direct modelling approaches to the individual which is at the lowest possible scale that can still be considered 'social'. Borrowing from Latour's 'actor-network' concept, they explored how a "focus on the short term, small-scale interactions among people with(in) their environment can be developed" (p. 1370). In recognition of the scale of the hydrological and social sciences, it is argued that contributions to the field would benefit through research that occurs on a scale that situates research subjects as individuals that are directly connected to specific water bodies in their immediate environment. This would need to involve applying ethnographic tools in data collection, reflexivity in data analysis and awareness of structure and agency as separate but within an individual's specific hydro-sociological context.

Hydrological structures that educate and define

My agency as a researcher within the hydro-sociological field was shaped by four rivers: the **Barrow**, the **Foyle**, the **Liesbeek** and the **Jukskei**. These rivers shaped my identity, my politics, my awareness and inspired and activated my agency.

1. The River **Barrow** is part of a river system in Ireland known as the Three Sisters, the others being the River Nuir and the River Suir. The River Barrow is the second

largest river in Ireland and traverses three counties spanning the mid-East to the South East coast of Ireland. It flows through the town of Athy where I was born. Athy or Baile Átha Í ('the town of Ae's ford') is named after a 2nd century Celtic chieftain, Ae, who is said to have been killed crossing the River Barrow thus giving the town its name. I grew up beside the river; it was a place where I swam, walked, fished and built reed huts for contemplation. Proximity to the river also suggested a socio-economic status in the town where I grew up as houses close to the river were usually an indication of a middle-class position. From a very early age I became aware of the social significance of the privilege of access to a river and how it shaped my identity and was instrumental in my initial learning about nature.

2. Whereas the river from my childhood was instrumental in my environmental education, the politics of rivers was awakened when I moved to Northern Ireland. The divisions and polarisation of Northern Ireland were reflected and represented on many levels. For example, the way the city where I lived was referred to, often erroneously, signified the political divide. Referring to the city as *Derry* supposedly signified a Nationalist or Republican association or identification, whereas reference to it as *Londonderry* marked a person politically affiliated to Unionism or Loyalism. The River **Foyle** was seen as a line that emphasised the segregation of communities during the Troubles[5] where Protestants predominantly moved to the east side of the river, whereas the majority of Catholics remained on the city side or west bank of the river. In 2011 the Peace Bridge was built on the River Foyle as a symbol of unity between the two communities. Living near the River Foyle was the first time I became aware of what it meant to describe a community as living on the 'other' side of the river.

3. Given my historical association with rivers as places of play and fun, education and political awakening, my first interaction with the **Liesbeek** River in Cape Town, South Africa, awakened my environmental agency. During an internship studying gang violence in 1991, I lived across the street from the lower catchment of this 9 km urban river. My focus on social justice and rivers as political metaphors had flowed with me to Cape Town so it was with this lens that I first engaged with the River Liesbeek. I saw it symbolically as the structural division of the middle-class urban edge of Cape Town and the townships that held the real lived experience of Apartheid's destruction.[6] What I had not expected, or had ever witnessed, was a river clogged by both visible and invisible pollution. It was my first experience of the destructive impact of humans on the hydrological system and through retrospective reflection, I recognise how it ignited another layer of my activism that became channelled in focused work to regenerate the river. My agency slowly started to encompass the more than human world. I joined as a volunteer with a community-based organisation, the Friends of Liesbeek (FoL) that focused on keeping the river free of rubbish. The work of this non-profit organisation is

ongoing as the human impact on the river continues to take its toll. How the river is structured into the upper catchment, middle and lower catchments reflects the inequalities in Cape Town. The river starts its course in the upper catchments and flows through affluent suburbs. It meanders through a commercial area of the city in its middle catchment and then in its lower catchments merges with the Black River before joining the sea. Close to the confluence and pathways of these two rivers is an urban area known as the Cape Flats that is defined by poverty and gang war. For some young people living on the Cape Flats, gang violence is a social phenomenon that must be negotiated daily. Navigating opportunities in education and careers often means crossing rivers that cut them off from wider social inclusion.[7]

4. The **Jukskei** River in South Africa's capital, Johannesburg, starts its journey buried under concrete. The river's path illustrates the stark contrast between rich and poor. During my work for the World Summit for Sustainable Development 2002, I led a group of commercial philanthropists, governmental representatives, social activists and environmental organisations down part of the river's course that runs through the impoverished area of Alexandra township and the affluent suburb of Sandton. At the time of the visit, the river was graded Class F, considered a dead river, because rubbish, hazardous waste and pathogens made it unsafe. I had not until then experienced a river in such a degraded state. It increased my commitment and dedication to environmental and social justice. It also clearly illustrated that rivers connect us and carry symbols of destruction and inequality. Those who were living informally on its banks experienced the most exposure to any river hazards.

What is evident from the rivers that have flowed through my awareness and reflections is a reminder of our globalised world and how interactions and work on/with/upon rivers connect us to and influence the wider world. Rivers are one aspect of the hydrological system. The hydrological or water system refers to the continuous movement of water above, on and below the Earth. Through its dynamic and constant cyclical regenerative movement, I propose that this system shares some of the characteristics of Archer's morphogenetic cycle.

Reflexivity, critical realism and the morphogenetic society

To 'stand the world right way up' (Bhaskar, 2012) requires an engagement, study and understanding of the social world within which we live. We engage with structure as agents, Margaret Archer argued, through reflexivity. At its heart, reflexivity refers to the ability to think about our thinking. Margaret Archer (2003) formulated a theory of reflexivity which she called the internal conversation.[8] She argued that the internal conversation is a mediating process between structure and agency.

Through the mediating process of the internal conversation, agents[9] engage in internal deliberation in relation to structure whereby they become the authors of their own projects. Archer linked the causal relationship between structure and agency in what she called the 'morphogenetic cycle'. By reflecting on what we know, our world is transformed; new shapes emerge. To identify one's self, one must compare to an exterior reality. Through a process of moving deeper within, or engaging in Archer's internal conversation, we transform the exterior reality. This process of reflexivity leads to change: "there is only one story because we make our lives, at least in part, by deliberating upon all contexts in which we find ourselves, often involuntarily" (Archer, 2003, p. 52). Archer described how the 'morphogenetic society' is built in her theory of the morphogenetic cycle: "structural conditioning (which is temporally prior, relatively autonomous yet possessing causal powers) conditions social interaction, which in turn generates structural elaboration. [This] scheme of **Structural Conditioning → Social Interaction → Structural Elaboration** … crucially is stretched out over time" (Archer, 1995, p. 157).

But our deliberations about the world are not linear as suggested by this depiction of structural elaboration. We present our thoughts in linear planes and use numeric, alphabetical and graphic devices to indicate a linear order in texts. Our agency as writers is defined within a structure. But the process that gets the words to line up is cyclical and often fragmented. Similarly, morphogenesis is a cyclical process whereby the agent, through a process of reflexivity, deliberates on the structure that surrounds her and then acts upon the world in a cyclical and ever-expanding process that either results in morphogenesis or contracts to morphostasis. Circularity is conceptually enshrined in the morphogenetic cycle. Circularity is also a defining feature of the hydrological system. If we are to heed the methodological advice highlighted by Danermark (and cited earlier in this think piece) to keep structure and agency separate and study the links between them over time, we would also need to manage the circularity within both the hydrological and social systems. I suggest that critical reflexivity has potential methodological application for the emerging field of hydro-sociology.

Hydro-sociology – Water as structural metaphor

Water is difficult to define geopolitically. Ownership can be claimed over certain water bodies like dams, but claims on rivers are more difficult, because they move; it is their fluidity that cuts across and through local, regional, national and social boundaries. Hydro-sociology therefore connects to the related field of hydro-hegemony which combines concepts of power, hegemony and intensity of conflict to facilitate analysis of water conflict. Zeitoun and Warner (2006) argued that all water conflict occurs within a broader international political context, weakness of law and ever-changing attitudes and alliances, and therefore cannot be viewed without this context. Zeitoun and Warner's work looks at intensities of dozens of destructive, but largely silent water conflicts that lie somewhere between 'water wars' (feared but non-existing according to the authors) and the much lauded examples of trans-boundary water 'cooperation'. It is difficult to ignore what Ersten described as wider

dynamics especially as it is the "context within which human agency is acted out" (Ertsen et al., 2014, p. 1369).

Zeitoun and Warner (2006) highlighted a shared view of how increasing structural and physical scarcity of water needs deeper analysis of transboundary conflicts. For example, the authors noted that despite the Oslo II accords where Israel recognised Palestine's water rights, 90% of the Jordan River resources are controlled by Israel in comparison to 10% under Palestinian control (p. 453). They argued that the ability to shift to cooperation over domination is beset by the problem of an absence of international water law (p. 455).

Cape Town is the site of two sites of ongoing research with CW2GC. Known globally as Day Zero, the city experienced a drought considered officially the worst on record without historical precedent. Day Zero refers to a date where the City of Cape Town feared they would literally be in a situation where available potable water would run dry. The response by its near 4 million citizens is a remarkable example and story of how communities worked together to avert a catastrophe. Is this an example of Margaret Archers's reflexive society, in this case where agency was activated to address a structural crisis in the hydrological and social systems?

Hydro-sociology shows that the hydrological system cannot be viewed as a separate system but is rather coupled to (Sivapalan et al., 2012) or interlinked with (Koutsoyiannis, 2011) the human system. But rising environmental protestors and climate activists are threatening 'disruption to stop the system' (like Extinction Rebellion, 2021). What then is the human 'system' that will be disrupted and potentially destroyed? Does the term 'human system' suggest homogeneity? Can we suggest there is a human system when we as humans continue to define ourselves in dualistic terms evidenced in how we communicate and define each other? What system will take 'its' place, what research and action can be taken while the revolution we see on our streets make these declared changes? Ultimately, will hydro-sociological agents help turn the world right side up in such a way that the flow of water remains accessible to all?

What seems to be absent in the implied interdisciplinary nature of hydro-sociology research is an active framing of the interconnections of these systems within theories of structure and agency. As Archer claimed, "modernity is slowly ceding place to a 'morphogenetic society' as meta-reflexivity now begins to predominate, at least amongst educated young people" (2012, foreword). What is absent from the claim is a fundamental discussion about justice, rights and access to education within the globalised system. As Bourdieu reminded us, "education is complicit in the reproduction of the social division of the labour of domination" (cited in Nash, 1999, p. 3). Delivering education that enables, encourages and develops critical and reflexive thinkers may activate agency, but the reproduction of the socio-economic divisions will persist without righting the structures of the world. I believe learning about how humans are changing the hydrological structure may make visible a crisis that threatens to further divide us.

Notes on Contributor

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Endnotes

1 When completed, data gathered through CW2GC research will be used in additional papers to add further discussion to the hydro-sociology field. The research focuses on community based water regeneration projects.

2 Nagabhatla and Niamir divided water related migration into three broad categories: Water Quality; Water Quantity and Water Extreme. A few 'water extreme' examples are presented to highlight and frame water-caused-migration within the context of the larger climatic debates.

3 A more detailed discussion of how Archer's analytical dualism may assist in coupling the human-water systems is under development.

4 Some additional theoretical and methodological challenges include studying a system that pre-exists and extends beyond our knowledge of it; only appears in our social ontology through our need for it; is studied through agential and structural lenses that are diverse and conflicting in terms of our manipulation and protection of the hydrological system.

5 The Troubles, also known as the Northern Irish Conflict, referred to a period of low-level war from the late 1960s to its symbolic end with the signing of the Good Friday Agreement in 1998.

6 This occurred within the early days of my first visit to South Africa where my understanding of the socio-economic and political history of the country was blunt and reflected very clear dualistic thinking. I later realised that my thinking was also polarised. This concern with dualities continues in my personal, academic and political reflections.

7 Many of those structural impediments that I observed on the Cape Flats during my ethnographic work as an Honours student in 1991 still exist. See Murphy, M. (1993). Gang Interpretations of Violence in South Africa and in the International Community, and the Relationship between the Two. Unpublished Honours dissertation (Peace Studies), University of Ulster, Derry.

8 See Archer (2003) and Archer (2012)

9 The term 'agent' is used as Bhaskar does to mean "anything which is capable of bringing about a change in something (including itself)" (Bhaskar, 2008, p. 109).

THINK PIECE

Embracing Love as an Educational Force in the Anthropocene

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Abstract

In the past decade, an increasing number of geologists and other scientific researchers have presented evidence that we have entered a new geologic epoch called the Anthropocene. The primary characteristic of the Anthropocene, researchers argue, revolves around the combination of an emerging and measurable sedimentary layer of increasing human artifacts (mostly plastics) in combination with significant and negative transformations within the Earth's biodiversity and climate systems. In this article, the researchers were interested in exploring how anthropogenic events will likely affect educational systems and institutions through multi-decade environmental audits and educational planning that are more closely linked to addressing the world's major anthropogenic problems such as climate change and a global loss of biodiversity related to human development and activity. This article concludes by exploring how anthropogenic forces might be redirected as human catalysts for a more positive environmental and geologic legacy.

Keywords: *Anthropocene, anthropogenic force, environmental education, educational catalysts, emotion*

The Earth, according to an increasingly diverse group of scientists, is definitively in a new geological epoch called the Anthropocene. Waters et al. (2016) documented the widespread traceable deposition of 'technofossils' within the Geologic Time Scale. This has been confirmed by researchers in Asia (Dong et al., 2020) and Africa (Odada et al., 2020). The geologic evidence in these and other studies is not as charismatic as fossils like *Tyrannosaurus rex* that demarcated the Jurassic period. Most of these technofossils consist of manmade plastics and concrete aggregates, sooty layers of carbonised fossil fuels, and the increased acidification of the world's ocean. These technofossils illuminate a significant history of diverse and complex anthropogenic events currently raging across the planet and include the negative effects associated with climatic change such as global rises in ocean and atmospheric temperatures, deforestation/desertification, extreme weather, and a global rise in the world's major oceans (IPPC, 2014). The impact on the planet's biodiversity is enormous. Recent studies have indicated that 10-25% of the Earth's species may be

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threatened or extinct by 2050 (Thomas et al., 2004; Barnosky et al., 2011). Whether or not we are in an extinction event that will equal or exceed the previous five mass extinction events is debatable (see Kolbert, 2014). However, the sad legacy of this new epoch is an increasing awareness that many of the world's increasingly rare and endangered species are failing to evolve rapidly enough to survive the significant challenges brought on by these anthropogenic events and altered ecosystems.

According to the Merriam-Webster Dictionary, 'anthropogenic' is defined as "of, relating to, or resulting from the influence of human beings on nature" (2016). The geologic research of Odada et al. noted that "widespread modification of the landscape and environment has brought humans to the fore as a formidable force of nature" (2020, 1). While this can be considered as a geologic force, it is important to interrogate the human legacy of destruction labelled as the Anthropocene. In addition to its definition as a geologic term, the Anthropocene can also be framed within other cultural, historical and social contexts. As such, the contemporary usage of this term must acknowledge the disparate influence of humans within industrial, economic and neo-colonial contexts whereby former (and current) colonial, industrial and economic powers exerted a greater negative anthropogenic force than the people they exploited and marginalised. The result of this environmental degradation is another form of racism, colonialism and compounded intersectional injustice.

As Table 1 indicates, both climate change and the increasing threat to the world's biodiversity are influenced by *anthropogenic catalysts* and *anthropogenic forces*. Within this context, the primary anthropogenic catalysts revolve around overall population of our species and its associated levels of human industry and development. Rising populations and increasing levels of industry and development are likely to influence natural systems in more significant ways than decreasing populations and vice versa. Anthropogenic forces too, within the context of this article's desire to spawn debate, can have an impact on the environmental rates at which anthropogenic catalysts effect anthropogenic events such as climate change and loss of biodiversity. These anthropogenic forces – intelligence, engineering, and emotion (fear, desire and love) – will be discussed in the rest of this article.

Events & Effects	**Catalysts**	**Anthropogenic-Forces**
Climate change: As a dynamic process the effects of climate change over time will vary around the world. Some of the most important effects that are likely to impact life on Earth include: ■ Global temperature ■ Rising oceans ■ Extreme weather ■ Desertification	*Human population:* While humans have shaped local environments since the evolution of our species, evidence would suggest that the rapid rise of the human population, from one billion in 1800 to more than seven billion today, exerts change on an increasingly global level.	*Intelligence:* Our ability to think, imagine, plan and solve problems is perhaps the most important element of our success as a species. As Orr (1994, 2011) and other scholars have argued, intelligence may lead to our undoing as well. *Engineering:* From the earliest tools to the most modern inventions, human engineering has not only shaped us as a species, but increasingly changed many parts of the world as well.

Events & Effects	Catalysts	Anthropogenic-Forces
Loss of biodiversity: There have been at least five major extinction events in Earth's history. Many scientists believe we are on the cusp of the sixth great extinction due to rapidly decreasing populations of plants and animals around the world. Reasons for these population declines include: ■ Exploitation ■ Habitat change ■ Development	*Human industry and development:* While we may be the last remaining tool-using hominid on the planet, *Homo sapiens* is also the most inventive and productive member of this family. We have invented a diverse range tools, chemicals and technologies that have benefitted countless millions of people. Unfortunately, many of these have an increasingly deleterious effect on the environment. Our ability to transform the surface of Earth through human development is best observed from the International Space Station.	*Emotion:* Human emotion in combination with intelligence and engineering can exert a powerful influence on individuals, society and the environment. ■ *Fear* – In an environmental context, fear may act as a barrier to problem solving and/or anxieties about change. ■ *Desire* – Greed may drive us towards actions that are contrary to our environmental well-being while hope may offer motivation to bring about change. ■ *Love* – Within an environmental view, love fosters connections to nature and may inspire us towards empathy and stewardship.

Table 1: *Anthropogenic events, catalysts and forces*

While some may consider it hubris to label a new geologic era after a single species when compared to large scale natural events and extinctions such as the Cretaceous Impact and/or Ordovician eruption, 65 and 450 million years ago respectively, the increasing deposition of technofossils throughout the planet and their lasting geological and environmental impacts are worth considering in more detail. What does this new epoch mean for educators? If the purpose of our formal system of K-12 education is, as the British Columbia Ministry of Education (2016) states, to enable students "to develop their individual potential and to acquire the knowledge, skills and abilities needed to contribute to a healthy society and a prosperous and sustainable economy" then perhaps, as the nominated species of this period of geologic history, we need to dramatically rethink what our educational systems, institutions, and learning processes are doing within the context of anthropogenic events. However, before pushing the reset button upon our educational systems and processes, it might be instructive to revisit its failures a century ago.

In 1916 the world was immersed in a great war with itself and nature when two well-known educators were cementing their legacies in Canada and the United States. John Dewey would publish his most famous work *Democracy and Education: An introduction to the philosophy of education* while teaching at the University of Chicago in Illinois. In British Columbia, Donald MacLaurin was preparing to take over the fledgling Normal School programme initiated by his successor William Burns. More than a century later, both educators continue to have a profound impact on the educational landscape and institutions around the world. Yet, for environmental educators today, the work of these important

scholars and the systems they sought to influence in 1916, illuminated a profound gap within educational systems and the natural environments around them evident to this day. This is exemplified by the mission statement from Ministry of Education in British Columbia above and the vast majority of other similar educational mandates and mission statements by states and provinces throughout Canada, the United States and other members of the Commonwealth.

Consider the educational experiences and events teachers would have experienced in a 30-year career starting in 1916. Over the course of their work, these educators and their students would have experienced the boom/bust economic and environmental cycles of the Roaring Twenties and Great Depression. Chief factors influencing environmental change during this period would have been the rapid mechanisation of fishing and timber industries and the large-scale construction of British Columbia's hydroelectric dams which also stored water for agricultural purposes. All these large scale industrial and agricultural projects would have significantly impacted the local environment as evidenced in declining salmon populations, old growth forests, and related conversion of sagebrush and other lowland habitats for agricultural production. Although the most well-known environmental catastrophe during this period, the Dust Bowl, occured farther to the south, significant environmental degradation emergedenvironmental degradation emerged in the Pacific Northwest in the decline of fisheries, loss of habitat, and sedimentation of spawning sites due to the relatively uncontrolled clear cutting within this region. The Second World War would have ended the career of any retiring teachers from the original 1916 class.

While an awareness of humanity's impact on global climate systems was still decades away during this time, there was plenty of evidence pointing to rapidly deteriorating populations of terrestrial and aquatic species and the habitats they relied on. It is interesting to note that the roots of outdoor/wilderness education, conservation biology, natural resource management and early climate discoveries all emerged during this same period. Little was done, however, to infuse these areas of knowledge within formal educational systems outside of generalised nature studies and walks, where accessible, from schools. Indeed, in concluding his doctoral thesis in 1936, MacLaurin wrote, "There has been little that has been spectacular. Slow but certain evolution, not revolution, has marked the events of the years. Revolutionary idealism has been held in check constantly by conservative sagacity." (p. 354).

It is evident that (and perhaps most interesting), when looking back from a historical perspective, both these educators failed to recognise what indigenous knowledge could have contributed towards the creation of environmental ethics and curricula to address the issue of habitat loss and biodiversity. While Dewey noted the importance of outdoor education and experiences earlier in his career from both a pragmatic and utilitarian perspective, in a later speech entitled *Freedom* (1938), he expressed his concern to conserve nature: "We have a somewhat congested population and we have much less accessibility of natural resources, partially because in those earlier days we wasted so much of our patrimony; we failed to conserve it, thinking our opportunities would remain boundless…" In Canada,

MacLaurin (1936) seemed to dismiss local knowledge existing prior to conquest and the infusion of Western scientific ideas into education as well:

> The beginning of anything almost always provides a peculiar interest. That period in the history of any land when the dawn of scientific discovery begins to dispel the dusk of mythical legend presents a magnetic attraction. … The middle of the eighteenth century leaves the northwest coast of America still in the dusk of mythical legend. (p. 1)

As devout Christians, both men would have been culturally encapsulated in the dominant religious views of the time that envisioned wilderness and uncontrolled nature as something that was foreboding and dangerous. Famed environmental historian, Roderick Nash, wrote that European settlers and their descendants imported deeply held views on "wilderness as a fact and symbol permeated the Judeo-Christian tradition" (1982, p. 8). Nature, according to the new citizens of the time, should bow to the wills of men and provide an endless bounty of gold, timber, salmon and other wealth which was rapidly being exploited during this period. It was only later in life that Dewey would begin to see the folly of this worldview and argue for more careful management of the commons (public lands), as noted above.

Walking and learning in educational buildings a hundred years later, we seem to be in an entirely different era. But looks can be deceiving. Despite the rapid emergence and evolution of environmental science, policy, and education since the sixties, the educational gap described earlier largely remains in place. Educational systems continue to be oriented towards society, industry and economic interests to the exclusion of environment and natural systems. Reflecting back on the cultural and environmental experiences of our predecessors teaching a century ago, it is evident that educational systems need to realign their programmes to meet new realities of life in the Anthropocene. What is needed in this new epoch are educational programmes and processes that not only acknowledge the extraordinary period we live in, but also which assist in reshaping the anthropogenic forces underlying them: intelligence, engineering, and emotion.

Intelligence

In a series of landmark essays, noted author and environmental educator, David Orr, explored the problem of education and intelligence. It is not possible to comprehensively examine the diverse academic views on intelligence in the limited space here. However, as Orr noted, it is possible to describe intelligence in ecological and environmental contexts. To Orr, there was a fundamental difference between intelligence and cleverness. He wrote:

> Cleverness would have us advance a narrowly defined, short-termed, and anemic self-interest at all costs and at all risks. But cleverness, pure intellect, is just not intelligent enough. Its final destination is madness. Intelligence would lead us, on the contrary, to protect biological diversity, but for reasons that go beyond the calculation of self-interest. The surest sign of the maturity of intelligence is the evolution of biocentric wisdom, by which we mean the capacity to nurture and shelter life – a fitting standard for a species calling itself *Homo sapiens*. (2011/1992, p. 250)

Intelligence on a global scale exhibits itself very differently from intelligence on an individual level. For the purpose of this article and our discussion, intelligence is a powerful anthropogenic force capable of influencing human populations and their actions in profoundly significant ways.

Engineering

Engineering is a second anthropogenic force and here too the work of David Orr is significant. In an essay comparing the work and contributions of Aldo Leopold and Albert Speer, Orr (1994) noted how unchecked industrial engineering can lead towards tremendous human suffering as Speer's talents in this area for the Third Reich significantly extended the horrific suffering that occurred during the Second World War. Engineering within an anthropogenic context refers to the impacts, both known and unknown, that human industry and development exert upon natural systems. A good example of this would be the early development of refrigeration and its effects on the ozone layer. In this case, the initial development of a highly desired and useful technology by society had unintended and long-term environmental consequences that persist, despite policy and technological changes in this industry. Like intelligence, engineering in this context primarily is measured at a global scale rather than at the individual or community level. In many ways as an anthropogenic force, engineering is the fulfillment of intelligence and emotion.

Emotion

The final anthropogenic force discussed here is a messy one: human emotions. For the purpose of this discussion, we will focus on three: fear, desire, and love. Again, the work of David Orr and other scholars such as Richard Louv and David Sobel are pivotal as each of these writers explored important aspects of emotion as they relate to education. Like intelligence and human engineering, each emotion is multifaceted and not easy to describe. We can begin with fear.

Within an anthropogenic context, fear is a powerful emotion capable of arousing cautious awareness and anxieties about different issues that may spawn individuals and/or communities into action on behalf of the environment and there is a tremendous body of work supporting this. Consider the emotion and concern underlying Rachel's Carson's *Silent Spring* (1962) or, more recently, Richard Louv's *Last Child in the Woods* (2004). These and other works illuminate how personal and professional fears about the plight of birds, other species, the climate, pollution, and the lives of children today are forged into a call for environmental action and educational reform. Fear can also lead to environmental inactivity and become a barrier to substantive action as it might force individuals and communities into making changes despite their impact on the environment.

Desire is the emotional reserve from which both environmental greed and hope can be drawn. As a selfish act, greed from an anthropogenic standpoint, ignores the needs of others, including nature. Orr wrote, "In the conquest of nature and of other men, the rhythm changed to those of the business cycle, the product cycle, the electoral cycle, the seasons

of fashion and style … the rhythms of commerce, greed, power, and violence" (2011/1992, p. 42). However, in this context, desire is also linked to hope which, when combined with environmental wisdom and engineering, allows for the possibility of an environmental re-awakening to the possibilities that may overcome our fear of inaction. For Orr, hope is fundamentally different to environmental optimism: "Authentic hope is made of sterner stuff than optimism. It must be rooted in the truth as best we can see it, knowing that our vision is always partial. Hope requires the courage to reach farther, dig deeper, confront our limits and those of nature, work harder, and dream dreams." (2011/1992, p. 326)

For the purpose of this article, we are left with the most powerful environmental force: love. As an educator, David Sobel was aware of the power of love as it relates to children and nature. In an essay on the problems of ecophobia and environmental fear in education, he noted:

> If we want children to flourish, to become truly empowered, then let us allow them to love the Earth before we ask them to save it. Perhaps this is what Thoreau had in mind when he said, 'the more slowly trees grow at first, the sounder they are at the core, and we think the same is true of human beings'. (1998, sec. 8)

Orr challenged us as educators as well:

> Why is it so hard to talk about love, the most powerful of human emotions, in relation to science, the most powerful and far-reaching of human activities? And why is this so for textbooks written to introduce the young to the disciplined study of life and life processes? An introduction would appear to be a good point at which to say a few words about love, awe, and mystery and perhaps a caution or two about the responsibilities that go with knowledge. This might even be a good place to discuss emotions in relation to intellect and how best to join the two, because they are joined in one way or another. (2011/1992, p. 31)

Like our young teachers graduating in 1916, we cannot fully predict or prepare future educators for the next three decades. But unlike them, we have access to tools, technology and information that would be the envy of any teacher preparing to work a century ago. Yet, despite all our advances and environmental awareness, educators must overcome the historical disconnect still existing between educational systems and the natural world. This is a significant problem as many post-secondary programmes define environmental education as both a profession and field that can be encapsulated within the context of individual tenured positions (when funded) and optional electives rather than integrating deeper and more meaningful change within the institutional culture itself. If we are to empower human populations and industry with the intelligence, engineering, love and hope that our planet requires, then perhaps we need to start by changing the educational institution itself. While many environmental educators such as Sobel (1998) and Louv (2004) are in tune with the power that emotional forces may convey as it relates to the aesthetics and feelings we want students to develop with nature, it is important to couple these experience with the environmental intelligence Orr has written about, and the

ability, as young engineers, to build this. In the next 30 years, our students will live in an increasingly technologically autonomous and digitally connected world which is likely to contain at least two billion more people than today. What will they need to know as it relates to anthropogenic knowledge and the human forces and emotions underlying it?

Note: In writing this article it became evident that the issues of hubris and cultural bias weave themselves throughout this topic. Regarding hubris, it is our belief that while humanity as a whole may exert both a force and increasing impact on this world, nature, as exemplified in the 2020-21 Pandemic, has a way of humbling life on this planet. In terms of cultural bias, the term 'Anthropocene Epoch' and the environmental damage/evidence that presently identifies it was primarily created by the most developed and industrialised nations at the expense of many cultures and societies whose contribution to these environmental problems would be negligible within a geologic time scale. As briefly noted in this article, this is an event that can be culturally pinpointed but more work needs to explore different cultural effects within geologic time. We hope that these interrelated errant dispositions against people and the planet can be realigned through a different paradigm of education as explored in this article. Anthropocene then, while representing a negative destructive force, for us is a hope that these errant humans can be brought back into the fold of humanity and a more sustainable Earth.

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Percentage contribution

Areas of contribution	Author	Percentage contribution
Conception or design of the paper, theory or key argument	Hammond-Todd	50 %
	Monk	50 %
Data collection	Hammond-Todd	50 %
	Monk	50 %
Analysis and interpretation	Hammond-Todd	50 %
	Monk	50 %
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Localisation of SDGs in Higher Education: Unisa's whole institution, all goals and entire sector approach

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Abstract

This paper documents the processes leading to the hosting of the University of South Africa (Unisa) Sustainable Development Goals (SDGs) Localisation Indaba[1] in November 2019. Of interest is how the programming, which started as a purely in-reach community engagement project, ultimately embraced the whole institution, all SDGs and the South African higher education sector. Data was generated via two platforms, namely participatory action research and a survey evaluating the Indaba. The following cycles emerged: the development of a Unisa Management Policy Brief calling for the SDGs Localisation Indaba in 2017 (Cycle 1); the development of an SDGs for Society Research Stream as part of the Unisa Annual Interdisciplinary Academy and Summer School in 2018 (Cycle 2); and the SDGs Localisation Indaba in 2019 (Cycle 3). The Indaba led to the SDGs Localisation Declaration which resulted in the formation of the SDGs Liaison Committee. Several agreements were made to expand SDGs localisation at Unisa. Finally, the Indaba attracted many participants from outside Unisa, especially from other institutions of higher education. However, it took almost three years to realise the SDGs localisation dream at Unisa. The key recommendation is thus that those championing SDGs localisation should be prepared to continue moving forward despite delays due to management changes and processes.

Keywords: *Higher education, sustainable development goals, domestication, localisation of the SDGs*

Introduction

One positive outcome of the 2030 Agenda for Sustainable Development (AfSD) (United Nations, 2015) was a separate Sustainable Development Goal (SDG 4) focusing on quality education within the 17 SDGs (Nhamo, 2017). Institutions of higher education remain platforms to catalyse the implementation of all SDGs (Nhamo & Mjimba, 2020). The mainstreaming of SDGs in institutions of higher education must involve management education. To this end, during the 2015 Global Forum for Responsible Management Education held in New York, the United Nations Principles for Responsible Management

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Education (PRME) signatories reaffirmed their support for the SDGs agenda (Parkes, Buono & Howaidy, 2017).

Institutions of higher education have started localising the SDGs, including mainstreaming them in the traditional spaces of teaching and learning, community service and research, development and innovation. Other new areas of mainstreaming SDGs are emerging such as integrating SDGs into university strategies, mission statements and operations (Fleaca, Fleaca & Maiduc, 2018; Paletta et al., 2020) and into what Filho et al. (2019) have termed the 'third mission', that is, mainstreaming into external stakeholder and society engagement platforms. Of importance is that there are obstacles to extending the implementation of the SDGs in institutions of higher education and many universities are lagging behind. A study involving 3 495 academic staff from nine universities in southern Nigeria revealed that awareness of sustainability matters was the most critical stumbling block (Ukenna, Idoko & Ogbari, 2018). With a student population of over 350 000 and staff complement close to 5 000 (Nhamo, 2020), Unisa needed to start raising awareness of and localising the SDGs.

Vladimirova and Le Blanc (2016) have explored the links between education and the SDGs in 37 flagship United Nations reports. They found that all but SDG 14 (oceans) had a link to education. However, if institutions of higher education are to play a central role in the implementation of the SDGs, some factors are critical. These include increasing publicly funded research and the development of a regional higher education SDGs partnership. The issue of partnerships is discussed later in this paper. Another shortcoming observed was the ad hoc manner in which the SDGs are being addressed in institutions of higher education. According to Franco et al. (2019, p. 161), the initiatives are "scattered and isolated" and cannot be implemented on the basis of a generic approach. Various regions in the world have different needs and are at different levels of engaging with the global goals agenda. El-Jardali, Ataya and Fadlallah (2018) suggested that a huge challenge lies ahead. They argued that the context in which universities currently operate has changed with the proclamation of the 2030 Agenda for Sustainable Development. This Agenda demands "a change in mind-sets and culture in both academia and government" in order to cope with the global challenge (El-Jardali et al., 2018, p. 2).

Based on the preceding discussion, universities across the globe (including Unisa) are becoming increasingly aware of the SDGs agenda and starting to take action, including the hosting of platforms and events aimed at raising awareness and making proclamations of commitment to the global development goals. The aim of this paper was to document the processes leading to the hosting of an SDGs Localisation Indaba at Unisa. The intention was to describe the lobbying and championing that took place during a three-year cycle from 2017 to November 2019, which resulted in the Unisa SDGs Localisation Declaration. Opportunities and challenges that emerged from the processes provide the basis for reflections and recommendations to potentially inform change initiatives in other contexts.

Literature survey

More research is increasingly being conducted in the mainstream regarding the localisation of the SDGs in higher education institutions. Korhonen-Kurki et al. (2020) examined how the University of Helsinki was realising SDGs localisation and discovered that SDG 4 (Quality Education) was clearly significant for all the new initiatives in the core mandates of any university namely research, teaching, engaged scholarship and own operations. Other SDGs of importance to the University were SDG 17 (Partnerships) and SDG 3 (Health and Wellbeing). The SDGs that did not feature prominently were SDG 1 (No Poverty), SDG 6 (Clean Water and Sanitation) and SDG 5 (Gender Equality). In their conclusion, Korhonen-Kurki et al. (2020) expressed concern that the omission of some of the SDGs could result in the questioning of the University's commitment to global goals. The view was that the SDGs in the periphery should form part of the new strategic planning of the University of Helsinki for a global impact.

According to Bartlett, Popov and Ruppert (2020), when the curriculum focuses on sustainability competencies and searches for best practices, this is better addressed by teaching the SDGs. SDGs case studies were deemed to be a method to connect all the dots, thereby promoting an understanding of the complex sustainability challenges facing the world today. One typical challenge is climate and global change. African scholars Zhou et al. (2020) mentioned the dimension of raising awareness among key university stakeholders, including academic and non-academic staff, students and labour movements. The authors then highlighted that universities will also require learning hubs that focus specifically on SDG activities. Faculties and departments were challenged to review their curricula aimed at mainstreaming aspects of the SDGs in both under- and postgraduate programmes. According to Zhou et al. (2020), such curriculum reform should be part of the broader agenda of African universities to transform higher education teaching and research. When SDGs are an integral element of the curriculum, this promotes "interdisciplinary and transdisciplinary work, positively transform[ing] their moral and ethical path in life and research agenda to inform policy and practice" (Ketlhoilwe, Silo & Velempini, 2020, p. 124). In a review of 60 articles focusing on higher education for sustainable development across the world, Franco et al. (2019) identified the targeted SDGs and those with gaps. The findings are summarised in Table 1 below.

Table 1: *Higher education and SDG coverage*

Coverage/Region	Americas	Asia and the Pacific	Africa	Europe
Targeted SDGs	2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16 and 17	1, 4, 5, 6, 7, 8, 11, 12, 13, 14, 15, 17	4, 5, 7, 11, 12 and 15	4, 6, 7, 9, 11, 12, 13, 14, 15, 16 and 17
SDGs with gaps	1, 5 and 14	2, 3, 9, 10 and 16	1, 2, 3, 6, 8, 9, 10, 13, 14, 16 and 17	1, 2, 3, 5, 8 and 10

Source: Author, based on Franco et al. (2019, pp. 1632-1635)

The data in Table 1 underscores the earlier observation that there is diversity in the manner in which higher education institutions are approaching the SDGs across the world. SDGs 4 (Quality Education), 7 (Sustainable Energy), 11 (Sustainable Settlements), 12 (Sustainable Consumption and Production) and 15 (Biodiversity) are commonly targeted by higher education institutions across the regions (Franco et al., 2019). There are gaps in addressing SDGs 1 (Ending Poverty), 2 (Sustainable Agriculture), 3 (Sustainable Health) and 10 (Reducing Inequality). Only three SDGs, namely 1 (Ending Poverty), 5 (Gender) and 14 (Oceans), were perceived as gaps in the Americas.

In order to transfer the reform agenda of the SDGs to the university space, Ketlhoilwe et al. (2020) highlighted workshops and seminars as excellent conduits. Projects should also be identified; Stellenbosch University in South Africa has identified 254 potential projects for implementation in line with the 17 global goals. Zhou et al. (2020) highlighted the dimension of collaboration between various higher education institutions from the developed northern hemisphere and the developing southern hemisphere. Such collaborative partnerships are believed to harness collective intelligence, resulting in shared problem solving (Ketlhoilwe et al., 2020). Kupika, Mbereko and Chinokwetu (2020) extended the debate by describing how Chinhoyi University of Technology in Zimbabwe was addressing Climate Action (SDG 13). Their findings were as follows: "Despite its wide efforts, the university still needs to introduce optional modules, extra qualifications, and additional learning course[s] which can be taken by both students and staff to understand climate change across all disciplines" (p. 108). Paul (2020, p. 131) introduced the concept of university 'environmental hackathons' aimed at furthering the SDGs, particularly SDG 13. Hackathons are defined as "time-intensive events focused on solving real-world problems". The implementation of an SDG 13-focused hackathon revealed that students have the potential to develop technology and ideas for climate change adaptation and mitigation.

Universities are potentially agents of change and social impact, particularly in the communities in which they work (Villa et al., 2020). To this end, as universities localise SDGs, they should not neglect their role in engaging the communities. According to Mataix et al. (2020), this is an element that has emerged clearly in fostering urban innovation in the city of Madrid, Spain. The approach jointly identifies the challenges and needs of the city and then tests them using university facilities. On the basis of this, prototypes are developed and pilot-tested in the city. In the Madrid project, the authors learnt several lessons, including the importance of the creation of both an online and offline space for collaboration, building relationships between stakeholders that promote an enabling environment for active participation and engagement with citizens, and incorporating cultural dimensions. The inclusion of citizen science links collaborative projects, which the SDG space requires, given the demand for Big Data use (DITOS Consortium, 2017; Ketlhoilwe et al., 2020).

Weybrecht (2017) has focused on the PRME space occupied by business schools. The author sees challenges and opportunities presented to management education by the SDGs. Business schools were viewed as not having reached their full potential in moving the

SDGs forward. Business schools were challenged to make choices and decide if they would "do nothing and risk disappearing or being replaced" (Weybrecht, 2017, p. 92). They were challenged to assume the responsibility and embrace the SDGs jointly as faculty members and students. This should transform management education positively into a path towards and powerful tool for reaching the SDGs and producing future business leaders who can make the world a better place. Integrating SDGs into the business school curriculum has started. One Brazilian business school achieved this by acknowledging that a considerable mind-set shift would be needed for sustainability leadership (De Paula Arruda Filho, Hino & Beuter, 2019). Along similar lines, Kopnina (2018) reviewed the teaching of SDGS in The Netherlands in vocational colleges, and at both under- and postgraduate university level. The results showed how curricula aimed at raising awareness of SDGs guided students towards developing "a certain degree of critical, imaginative, and innovative thinking about sustainable development in general and the SDGs in particular" (p. 1268).

Rogers (2019) focused on the role of second-generation non-formal education and how this may be utilised to operationalise the SDGs through community learning centres. The author's argument is that adult learning targets that are evident throughout all 17 SDGS cannot be reached through formal learning programmes alone. To this end, an expanded non-formal education programme is needed, and institutions of higher learning remain relevant in this space.

The next section focuses on the methodology used to generate and analyse data for this paper.

Methodology

Participatory action research and a survey were used to generate data for this research. Participatory action research in community engagement and/or engaged scholarship research in higher education institutions is certainly not new (see, for example, Nhamo, 2012; McAteer & Wood, 2018; Ryan & Squires, 2019; Wood, 2019; Nhamo, 2020). It involves the researcher engaging with the researched phenomena, with a view to finding practical solutions to emerging problems (Nhamo, 2012). This usually comes in continuous cycles that may take several years. The overall objective was to determine and document the processes leading to and including the Unisa SDGs Localisation Indaba and Declaration. Participants were given a survey both on site during the Unisa Indaba on 29 November 2019, and off-site following the Indaba. Three distinctive phases of problem identification and solving relating to the global SDGs emerged. The cycles were as follows: the development of a Unisa Management Policy Brief calling for an SDGs Localisation Indaba in 2017 (Cycle 1); the development of an SDGs for Society research stream for the Unisa Annual Interdisciplinary Academy and Summer School in 2018 (Cycle 2); and the hosting of the SDGs Localisation Indaba in 2019 (Cycle 3).

In the survey, participants were asked to comment on several key matters. These included ranking parts of the SDGs Localisation Indaba programme including Unisa's Vice Chancellor and Principal presenting the welcome and opening speech; the launch of the

books, *The Green Building Evolution and Sustainable Development Goals and Institutions of Higher Education*; a panel discussion on the localisation of the SDGs; SDGs localisation in IHE main talk; the breakaway sessions in general; the plenary feedback session; and Unisa management's reading of the Unisa SDGs Localisation Declaration. Other survey questions requested participants to express their views on whether the concept of SDGs localisation in higher education was one that all universities in South Africa and worldwide should implement; whether the participants' institutions (higher education or not) had localised the SDGs; the participants' familiarity with the United Nations document *Transforming our World: The 2030 Agenda for Sustainable Development*, prior to attending the Unisa Indaba; the number of SDGs Localisation workshops, seminars, conferences, symposiums and/or platforms attended prior to the Unisa Indaba; the source of attraction to participate in the Indaba; and rating on a scale of 1 (not achieved) to 10 (achieved) whether the participants' expectations and objectives of the Indaba had been met. The use of surveys is common in research of this kind (see, for example, Simsekoglu & Klöckner, 2019; Wu et al., 2019). In total, 150 people attended the Indaba. Of these, 72 (48%) completed the survey. The demographics and other general details of the respondents are presented in Figures 1 and 2 below.

Figure 1: *Demographics of the respondents (n = 72). Source: Author*

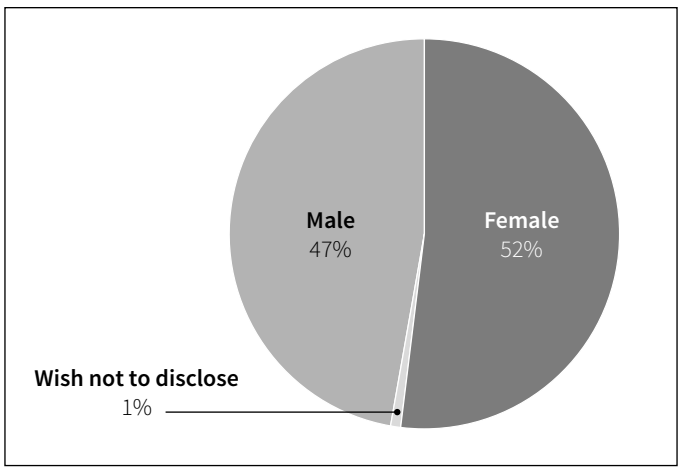
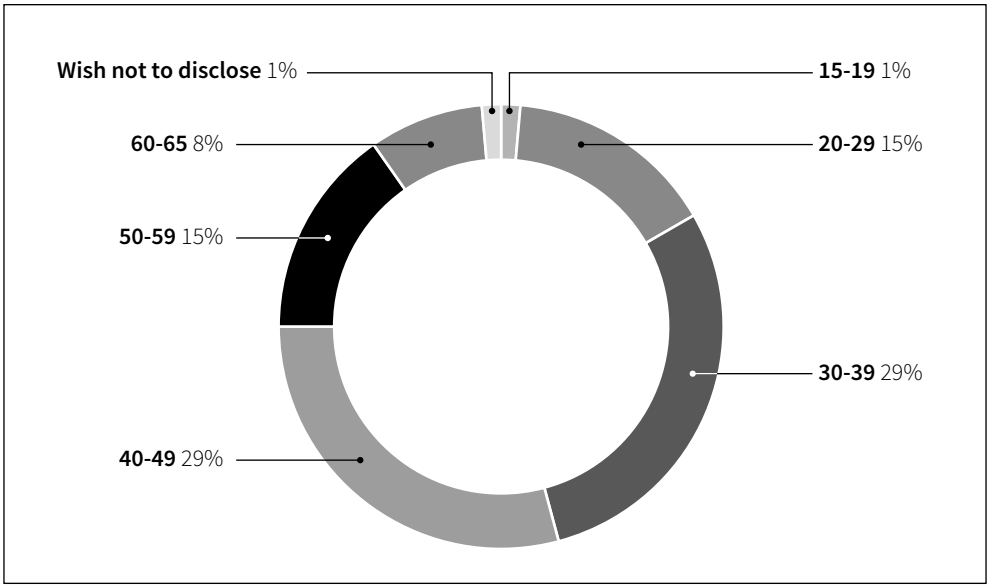


Figure 2: *Respondents' age groups (n = 72). Source: Author*



The details of the key findings from both the participatory action research and the survey are discussed in the next section. Conclusions are then drawn and recommendations made.

Presentation and discussion of findings

This section is divided into the various previously identified cycles in the participatory action research cycles.

Cycle 1: Development of a policy brief on the SDGs Localisation Indaba

On 15 April 2017, the researcher emailed the Unisa Vice Chancellor and Principal, Professor Mandla Makhanya, copying three other officials according to protocol, regarding a proposal for a one-day Indaba on SDGs domestication at Unisa and sharing a draft of a short policy brief. The Vice Chancellor had supported efforts on sustainability since 2011 (Nhamo, 2020) and his response was encouraging. The entry point of a policy brief mirrors Van Staden's (2020) observation of the need for actors to initiate micro innovations, which unlock value in macro innovations within institutions when addressing sustainability matters. Such innovations would also look back to when higher education institutions committed to embrace sustainable development during the Copernicus Declaration of 1994 (Farinha, Caeiro & Azeiteiro, 2019).

Several issues were raised regarding the two-page policy brief of 15 April 2017. In the preamble, the policy brief indicated that it sought to work with Unisa MANCOM and requested approval to host a one-day Indaba on the Domestication and Localisation of SDGs

in Higher Education, with the aim of kick starting Unisa in this endeavour. The broader goal was to continue supporting Unisa's vision to be "the African university shaping futures in the service of humanity". In addition, it was highlighted that embarking on a systematic domestication and localisation of SDGs at Unisa would elevate Unisa to the position of a national, and possibly continental, trailblazer in implementing the 2030 Agenda for Sustainable Development and its 17 SDGs from both an administrative and academic perspective. Rephrasing the 2030 Agenda's battle cry, the policy brief proposed Unisa's rallying point as "UNISA must NOT BE LEFT BEHIND" (upper case used for emphasis).

The rationale for the SDGs Domestication and Localisation Indaba was also spelled out in the policy brief. This included highlights on emerging global trends that were shaping how higher education ought to respond to the SDGs in order to remain relevant to their communities in general, and development agendas in the 21st century, specifically. The following agendas were highlighted: the 2030 Agenda for Sustainable Development of 2015, the Global Reporting Initiative's Sustainability Standards of 2016 and the Paris (Climate Change) Agreement of 2015.

The policy brief further provided background on the SDGs, indicating that they had come into effect in January 2016 as an expanded global development agenda for all countries. It noted that the 17 SDGs and 169 targets were to be cascaded from the global, to the continental, subcontinental and national levels (domestication), and to state/province, local government, higher education, the corporate sector and many other spatial scales for implementation (localisation). To this end, Unisa had to understand the various ways in which the SDGs and their targets are or can be implemented at an institutional level. The policy brief further highlighted that linked to the domestication and localisation of the SDGs was the implementation of other global, continental and national agendas. On the continental and national scales, institutions like Unisa were to be responsive to the Africa Agenda 2063 finalised by the African Union in 2014 and South Africa's National Development Plan (NDP) Vision 2030, which was finalised in 2012. The policy brief made it clear that both Agenda 2063 and the NDP were mirrored in the 2030 Agenda for Sustainable Development, making it essential for all higher education work in the next 14 years and beyond to urgently respond to the 2030 Agenda as a proxy for other continental and national visions.

The purpose of the Indaba was set out in the policy brief: to map the way forward to domesticate and localise the 2030 Agenda for Sustainable Development at Unisa in the context of other supporting and competing programmes. The objectives were to:

- Raise greater awareness across Unisa about the 2030 Agenda, especially the 17 SDGs, related targets and indicators, as well as the role of higher education (specifically Unisa) in their implementation;
- Allocate institutional roles and responsibilities to both the administrative (non-academic) and academic structures in engaging with the 17 SDGs as Unisa;

- Galvanise Unisa to be part of the global drive to implement the 2030 Agenda, including assisting communities to measure, report and verify progress towards meeting the objectives of this global agenda; and
- Explore ways to assist other institutions of higher learning in engaging with the 2030 Agenda for Sustainable Development.

The programme for the day included presentations and breakaway sessions. Topics for discussion are indicated in Box 1 below.

Box 1: *SDGs Domestication and Localisation Indaba Programme. Source: Author*

- The role of higher education in the 2030 Agenda for Sustainable Development (Vice Chancellor and Principal, Unisa)
- Understanding the 2030 Agenda for Sustainable Development and the call for domestication and localisation (Exxaro Chair, Unisa)
- The interface between the National Development Plan, Africa Agenda 2063 and SDGs (National Department of Monitoring and Evaluation)
- Measurement, reporting and verification in the SDGs era (Statistics South Africa)
- Drawing up interlinkages between the SDGs, Global Reporting Initiative Sustainability Standards and the UN Global Compact (Sustainability Office Representative)

Following a presentation of the policy brief to the Unisa Management Committee (MANCOM) on 1 June 2017, revisions were made before a second draft was presented to the Acting Vice Principal. Preparations for an Indaba went ahead including invitations to the Minister of Higher Education and Training and other government officials. Despite their enthusiasm, the hosting of the Indaba had to be postponed.

Internal organisational dynamics can have negative consequences in terms of scheduling and planning events. Both Van Staden (2020) and Akins II et al. (2019) have written on these barriers. It was important for the institutional system to understand what Van Staden (2020) called the micro-level innovation. Drawing from Kennesaw State University, and through the application of the process model in change management, Akins II et al. (2019) found that self-determination was the most important way to advance sustainable development in higher education institutions, especially by middle-level managers. In the Unisa case, the author became a middle-manager level change driver, which eventually resulted in top management buy-in to SDGs localisation.

In an institution as big as Unisa, many events take place concurrently and it was important that the Indaba did not clash with a larger or top management event. In this instance, the planning would ultimately involve all university structures, including the

students. From Akins II's et al. (2019) observation, three types of institutional barriers to sustainability education and organisational change in higher education institutions should be addressed: awareness, resources and structural barriers. One of the matters regularly raised by Unisa management concerned resources for implementing the proposed SDGs localisation. The author had to reassure management that the Exxaro Chair in Business and Climate Change, to which he was incumbent, would lead the way in awareness raising and be responsible for topping up human resources as required. Unisa's concern is a valid one because capacity to address sustainability related matters and implement projects is still limited in higher education institutions from the global south (Alejandro-Cruz et al., 2019).

The Indaba was planned for 9 October 2017. It was postponed to 21 February 2019 and finally took place only on 29 November 2019. The postponements and struggle to confirm a date was extremely disappointing to the author who thus went into 'hibernation'. This was compounded by staff movements in the office of the Vice Principal: Strategy, Risk and Advisory Services. As a scholar with an interest in the SDGs and sustainability matters at Unisa, the author had developed a cordial relationship with the former Vice Principal of this portfolio, over the years from 2011 until 2017. With the changes in staff, a relationship had to be developed with the new portfolio manager, who came into office in the last quarter of 2017.

Based on Verhulst and Boks (2014) and Akins II et al. (2019), a few indicators were qualitatively and subjectively assessed in relation to two of the three barriers identified earlier. The results are portrayed in Table 2. Dedeurwaerdere (2013, p. 3783) had noted that many of these barriers cannot be "removed without far-reaching institutional change" and this may even require a new set of indicators to be established (Findler et al., 2019). Hence, Dedeurwaerdere's suggestion for an "incremental institutional change approach, based on a gradual institutionalisation process of existing initiatives" (2013, p. 3783) as there could also be value disruptions leading to a new institutional equilibrium (Milchram et al., 2019). Moving Unisa to reduce its carbon footprint, for example, would imply moving to renewable energy, re-thinking the nature of travel, re-orienting teaching and new infrastructure development. To some extent, this is what happened at Unisa with the move towards sustainability starting back in 2007 when the university ratified the United Nations Global Compact; associated progress is reported every two years. However, with regard to SDGs localisation, Kioupi and Voulvoulis (2019, p. 6104) maintained that "the interconnectedness of the SDGs and the complexity of sustainability as a concept make it difficult to relate the SDGs to educational learning outcomes". This draws attention to the concept of institutional work that focuses on the roles and responsibilities of key actors (Beunen & Patterson, 2019), work that is both political and often contested.

Table 2: *An assessment of selected change barriers to SDGs localisation at Unisa. Source: Author*

Barrier	Indicator	Significance	Comment
Lack of awareness	Lack of interest and involvement of the majority of the students and staff members	High	This was high, and is complicated by students being off campus.
	Lack of support by top management, including the college deans	Low	Not pronounced. There was considerable support, with the Vice Chancellor at the forefront.
	Lack of policy making in order to promote sustainability	Low	Unisa has adequate policies promoting sustainability, including being a signatory to the United Nations Global Compact.
	Lack of recognition, and change agents for sustainability and SDGs localisation are often not taken seriously	Low	Unisa recognises change agents, including establishing a sustainability office in the Vice Chancellor's office in 2012.
Lack of resources	Lack of money, with sustainability and SDGs localisation not seen as a priority for funding	Low	Unisa has dedicated resources towards sustainability, including retrofitting buildings to be greener (rooftop solar installations, rainwater harvesting etc.).
	High work pressure and lack of time, with sustainability and SDGs localisation often combined with other tasks	High	This remains true. For example, my involvement remains part-time, as with other staff (both teaching and non-teaching).
	Lack of access to information, due to absence of measuring instruments or unwillingness of staff	High	This has been experienced from Unisa Estate as data on energy and water consumption is incomplete when requested. The Estate department also often indicates lack of capacity.
	Lack of qualitative and quantitative performance indicators	High	Indicators are being refined, particularly as Unisa is now involved in Time Higher Education indices, as well as the United Nations Global Compact.

For the purposes of this study, only the change barriers of lack of awareness and lack of resources were assessed (see Table 2). Though they could not be assessed at Unisa due to lack of data, indicators associated with structural barriers remain fundamental and should be investigated in future work.

Cycle 2: The development of the SDGs for Society research stream

While what has been documented above was taking place, in December 2018 the coordinator of the Unisa Annual Interdisciplinary Academy and Summer School approached the author to develop a new research stream, the Society Research Stream (in relation to SDGs for Society). The Annual Interdisciplinary Academy was organised in conjunction with other major events during 2019. The main participants were Unisa students with the aim of developing their research, writing and publishing skills. Given that the SDGs for Society is the subject of another potential publication, discussion thereof will be left at this high-level engagement.

Through the SDGs for Society engagements, public lectures and college level presentations were made. These included a public lecture during the first Annual Interdisciplinary Academy and a Unisa College of Economic Management Board presentation. Other public lectures included one at the University of Botswana 19, another at the University of Zimbabwe and the final lecture in the 2019 series at the Africa Capacity Building Foundation in Harare. An estimated 600 students, staff and members of the public were reached during these engagements. More engagements in 2020 took the form of presentations to seven colleges[2] within Unisa. Momentum was returning; the engagements in the research stream rekindled the author's aspirations to host the Unisa SDGs Domestication and Localisation Indaba.

In April 2018, the author wrote to all MANCOM top officials on "The use of SDGs in global university ranking and reporting". This was informed by the author's ongoing research linked to the SDGs and the Times Higher Education (THE) universities ranking initiative. One of the Vice Principals responsible for Research, Postgraduate Studies, Innovation and Commercialisation offered support in an email copied to all the MANCOM top officials, infusing new energy and the mandate necessary to take the project further. Contributing to further momentum towards the Indaba, was Unisa's decision on 6 December 2019 to respond to the THE Impact Rankings 2020 with an inaugural report submitted online on 6 January 2020.

The next section focuses on the SDGs Localisation Indaba held on 29 November 2019 (Cycle 3) and its subsequent evaluation by participants.

Cycle 3: The SDGs Localisation Indaba

On 29 November 2019 the Unisa SDGs Localisation Indaba, originally scheduled for October 2017, finally took place following a revival of the vision with MANCOM. Several recommendations and insights emerged during three breakaway sessions for the academic, non-academic and student groups respectively. The key points emanating from the non-academic (operations) group are highlighted in Box 2.

Box 2: *Unisa SDGs Indaba non-academic discussion report-back. Source: Author*

There is a need to:

- Integrate the SDGs into roles and key performance areas
- Make individuals responsible for and reward them for delivering on SDGs
- Operationalise SDGs and focus on impact
- Develop capacity and create platforms for SDGs impact
- Put systems, processes and procedures in place
- Obtain accessible and reliable data, especially 'Big Data'
- Revitalise information centres like libraries – focusing on some of the quick, simple and 'big' wins
- Use own buildings as leading examples, and use this to create awareness
- Add other higher institutions of learning as critical stakeholders
- Grow own social capital – greater collaboration across universities, departments, and across local government, etc., sharing best practice and lessons learnt

Drawing on what transpired on 29 November 2019, the Unisa SDGs Localisation Declaration was produced. The latter and Indaba participant responses are discussed next.

The Unisa SDGs Localisation Declaration

This Declaration was the key output of the Indaba. Carefully crafted to be all encompassing, yet voluntary, the preamble makes reference to the following:

- Global agreements of relevance to the SDGs Indaba;
- Africa Union and Southern African Development Community (SADC) treaties and protocols;
- National acts and policies of relevance; and
- Unisa policies and strategic documents of relevance to the SDGs Indaba.

The main elements of the Unisa SDGs Localisation Declaration are set out in Box 3.

Box 3: *Major provisions of Unisa's SDGs Localisation Declaration. Source: Unisa, 2019, pp. 3–4*

- Further strengthen the concept of sustainable development and sustainability to form part of the institutional DNA and find resonance in Unisa's vision and mission statements;
- Undertake to address all the SDGs through the implementation of the Sustainability Framework 2020 from operational, research, development and innovation, teaching and learning, as well as community engagement and outreach perspectives;
- Undertake to prioritise and fast track at corporate level, by means of the Sustainability Framework 2020, the implementation of the relevant targets;
- Commit to establishing a multi-stakeholder SDGs Liaison Committee co-chaired by the Exxaro Chair in Business and Climate Change, the Director of the Sustainability Office as representative of the Vice-Principal (VP): Strategy, Risk and Advisory Services and one supported from any college that is already a champion in the SDGs space and was identified prior to or during the SDGs Indaba;
- Propose that the SDGs Liaison Committee members be SDGs Champions drawn from all relevant key entities that include college representatives, facilities management, other support departments at Unisa and selected representatives from VPs not already covered, and up to five outside recognised champions on SDGs implementation;
- Submit quarterly reports to the Social and Ethics Committee of Council to focus on progress against the implementation of the Sustainability Framework 2020;
- Exxaro Chair in Business and Climate Change to continue with college level engagements to raise awareness of SDGs and how this Declaration will be rolled out and implemented;
- Resource the Sustainability Office as appropriate to scale up the implementation of action plans that will emerge from this SDGs Localisation Declaration;
- No Unisa staff member and student should be left behind in the SDGs localisation and engagement programme;
- Consider any other appropriate alignments and reporting on SDGs with a view to instituting Unisa's Voluntary Reviews as part of existing reporting processes with no obligations to any outside body but solely for Unisa's internal monitoring, reporting and verification purposes.

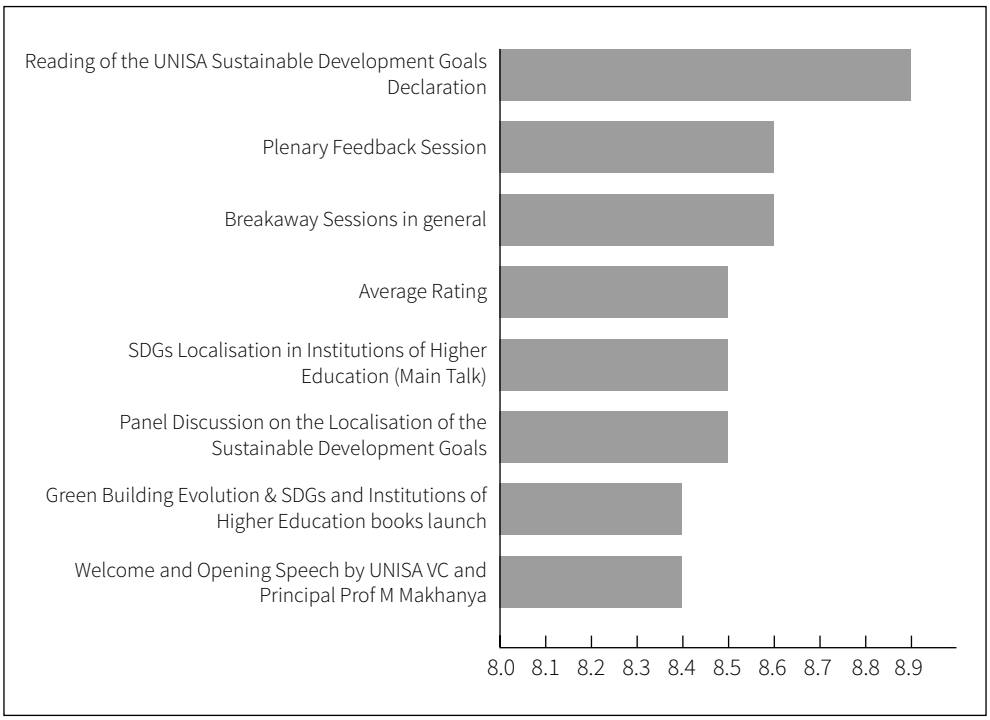
In the Unisa SDGs Declaration, 12 SDGs were identified for management purposes: SDG 3 (Good Health and Wellbeing); SDG 4 (Quality Education); SDG 5 (Gender Equality); SDG 6 (Clean Water and Sanitation); SDG 7 (Affordable and Clean Energy); SDG 8 (Decent

Work); SDG 10 (Reduced Inequality); SDG 11 (Sustainable Cities and Communities); SDG 12 (Sustainable Consumption and Production); SDG 13 (Climate Action); SDG 16 (Peace, Justice and Strong Institutions); and SDG 17 (Partnerships on the SDGs). However, there was consensus that all the 17 SDGs should remain relevant for the academic programme that enshrines research, teaching and learning, as well as service to the community.

SDGs Localisation Indaba participant responses

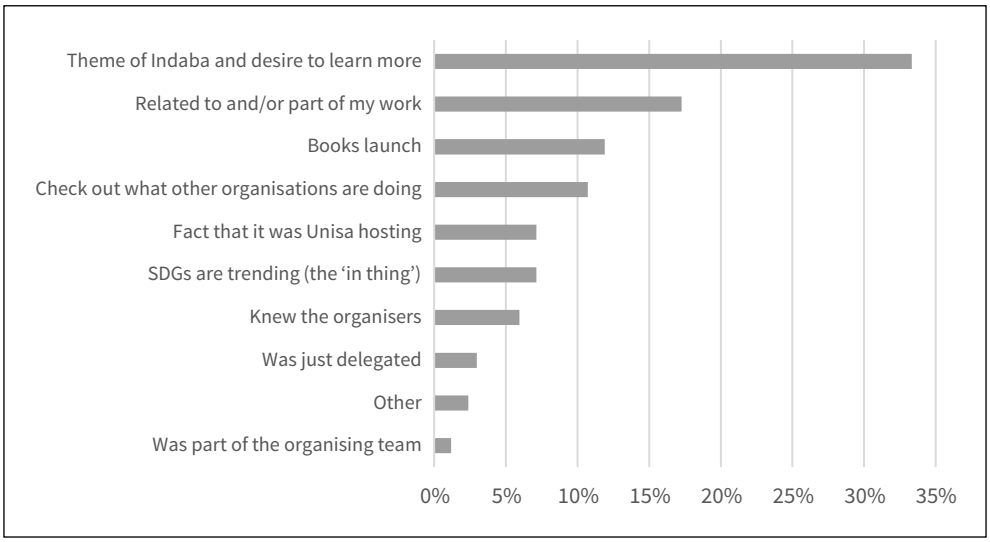
The respondents (56% of whom were in full-time employment, 32% in contract employment and 11% in an 'other' category) were asked to evaluate on a scale of 1 to 10 (1 = not useful, and 10 = very useful) how useful they found various parts of the SDGs Indaba. The findings are shown in Figure 3. It emerged that the participants were impressed with the SDGs Indaba with all seven segments rated above 8 out of a possible 10 points. On average, the rating was 8.5. The most useful segment, according to the participants, was the reading of the Unisa SDGs Declaration. This possibly signifies the participants' expectations of action after such gatherings. Tied in second place were the plenary feedback and breakaway sessions.

Figure 3: *Usefulness aspects of the SDGs Indaba (n = 72). Source: Author*



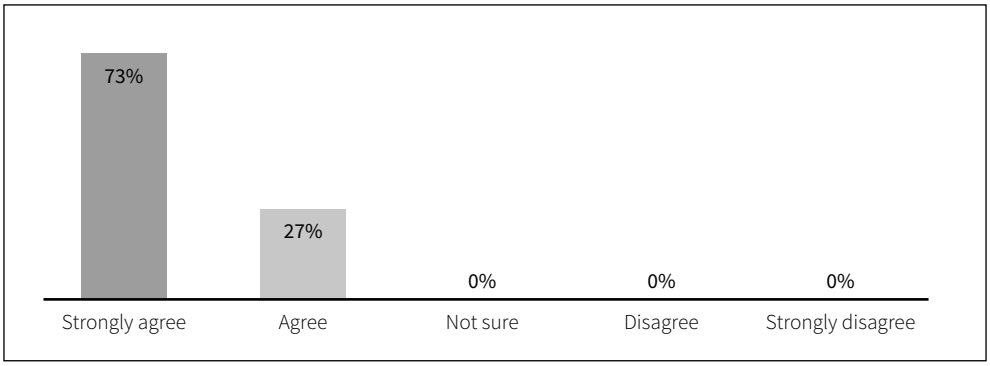
Participants were also asked to indicate (three aspects only) what had attracted them most to participating in the Unisa SDGs Indaba. The results are provided in Figure 4. The most popular was the theme of the Indaba and the desire to learn more (33% of the responses), followed by the fact that the Indaba was aligned with work in which the participant was already involved (17%). The launch of the two books and the desire to check out what other organisations were doing were additional pull factors. When asked to rate on a scale of 1 (not achieved) to 10 (achieved), whether the participants' expectations and objectives had been met, the result was 8.1 out of 10 possible points.

Figure 4: *Attraction to the Unisa SDGs Indaba (n = 72). Source: Author*



The participants were further asked to express an opinion on whether the concept of SDGs localisation in higher education is one that all universities in South Africa and worldwide should implement. The findings are indicated in Figure 5. All 72 respondents answered in the affirmative, with 73% indicating they strongly agreed. This response challenges all institutions of higher education to do more to localise the SDGs. However, when asked to reveal whether certain participants' institutions (higher education or not) had localised the SDGs, there was a low affirmative response. Only 30% indicated that their institutions had done so, with 32% responding they had not. The remaining 38% indicated they were 'not sure'. A more personal question was also included to gauge the participants' familiarity with and reading of the United Nations document *Transforming Our World: The 2030 Agenda for Sustainable Development* prior to the Unisa SDGs Indaba. A disappointing 47% of the respondents revealed they were not familiar with the document. This was a cause for concern, especially since 58% of the respondents were in the academic space (academic staff – 43% and students – 15%).

Figure 5: *Should all universities in South Africa and worldwide localise SDGs? Source: Author*

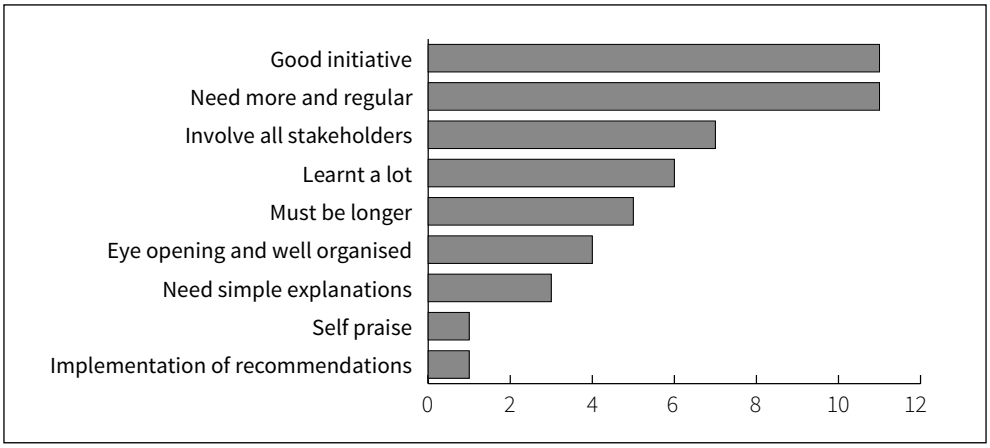


Following the hosting of the SDGs Localisation Indaba, several responses were posted on social media. Some were sent to the author and these are discussed briefly below. There was general consensus that the SDGs Localisation Indaba was highly insightful, impressive and valuable. The Indaba was also viewed as an extremely informative and exciting forum. One respondent wrote: "I left Unisa intellectually richer today" and committed to working towards pushing SDGs localisation in the Technical, Vocational Education and Training (TVET) colleges' space. The same line of interest and enrichment was evident in a response from one Unisa non-academic staff member who claimed that the SDGs Localisation Indaba had generated interest in the topic and that they were now committed to learning more and becoming more involved. One participant from a district municipality posted a segment of the SDGs Localisation Indaba on their Facebook page. The response to the posting was heartening as a group of youth stated they that did not want to be left behind. In their request, the representative of the youth group wrote the following:

> We would like to partner with Unisa on the SDGs localisation project. Our organisation is called the South African Youth Centre for Climate Change. We [have] just had our local youth conference in Durban and have delegates attending COP25 in Madrid.

There were an additional 49 responses to the open-ended question in the survey that asked participants to make any observations about the event. A breakdown of the responses is shown in Figure 6. What emerged is that the SDGs Localisation in Higher Education InstitutionsIndaba was helpful and those who commented, wished to see more of the same and longer events (the Indaba was only half a day). A call was also made to involve more stakeholders. In the words of one respondent: "Personally, I did not see the involvement of chemist[s], physicist[s], and othersparticularly from natural science." Another participant raised similar concerns: "I wish some of my colleagues could have attended so that we continue with this conversation".

Figure 6: *Responses to the open-ended question requesting comments (n = 49). Source: Author*



Some participants indicated that they had scant knowledge of the SDGs prior to their participation in the Indaba. Ongoing SDGs Indabas were proposed including tracking of progress. One participant noted while the Indaba had provided some great inputs, of concern was its sustainability in terms of implementing the recommendations, involving all key stakeholders from academia to communities and student, and the design of inter- and transdisciplinary modules and programmes. A call was made to broaden the SDGs Indaba to include the entire higher education ecosystem, including the TVET colleges in South Africa, which are lagging behind. One respondent requested the creation of a platform to assist the understanding and implementation of the SDGs, including a plan to roll out the SDGs localisation programmes to other institutions, as well as to all spheres of government in South Africa (national, provincial and local).

Conclusions

This paper describes the processes leading to the Unisa SDGs Localisation Indaba in November 2019. What started as an in-reach community engagement project ultimately embraced the whole institution, all SDGs and the wider South African higher education sector. Three clear cycles could be identified, namely the development of a Unisa management policy brief calling for an SDGs Localisation Indaba in 2017 (Cycle 1); the development of an SDGs for Society research stream under the Unisa Annual Interdisciplinary Academy and Summer School in 2018 (Cycle 2); and the SDGs Localisation Indaba in 2019 (Cycle 3). The findings revealed that apart from hosting a successful Indaba, Unisa was responsible for two additional achievements, namely the conclusion of a Unisa SDGs Localisation Declaration, and the decision to file for THE Impact Ranking in December 2019. The Declaration was ranked highly by participants. The Declaration was also responsible for the formation of a key institution, the SDGs Liaison Committee. Furthermore, several actions were agreed upon to expand the localisation of SDGs at Unisa. Lastly, the Indaba attracted

many participants from outside Unisa, especially from other higher education institutions, some of whom suggested the SDGs Indaba be held annually.

The primary recommendation from this paper is that those championing SDGs localisation should be prepared to continue pushing as management changes and processes are often delayed for long periods. It took almost three years to realise the SDGs localisation dream at Unisa. Hence, drawing from the literature and discussions, perspectives on institutional work, actors and stakeholder contestations, political power, and incremental transition to sustainability should all be further considered. For example, the creation of both an online and offline space for collaboration, building relationships between stakeholders that promote an enabling environment for active participation and engagement with citizens, and the incorporation of cultural dimensions from the Madrid project remain learning points. It is important to note that the COVID-19 pandemic stalled much of the progress towards the implementation of the SDGs Localisation Declaration. For an entire year, staff were working from home and some continue to do so. While progress has been made, movement in terms of commissioning the SDGs Champions was only evident in the second quarter of 2020. Plans are also under way to monitor the implementation of the SDGs localisation through identified measurable indicators, some drawn from the general United Nations SDGs indicators' framework. Thus, despite the work to date on SDGs localisation, more ongoing work is required at Unisa and other higher education institutions.

Notes on Contributor

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Endnotes

1 Indaba refers to Zulu and Xhosa tribal gatherings to deliberate on important matters in society. Such Indabas have found space and recognition in modern South African organisations including universities, political parties, and companies.

2 Colleges are similar to faculties in other university configurations.

The Change Project Approach: A response for reorienting teacher education to address Education 2030 in southern Africa – The case of Midlands State University, Zimbabwe

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Abstract

The change project approach could be applied to enhance teacher education for the purpose of confronting 21st Century challenges through education (Education 2030). The challenge for teacher education institutions is to prepare future teachers with the socio-ecological knowledge, skills, attitudes and values essential for sustainable living, by reorienting current unsustainable ways of thinking and doing. This can be achieved by integrating Education for Sustainable Development (ESD) and in a number of teacher education programmes in southern Africa, teacher educators have begun to do this. This paper discusses the critical role of a change project approach in creating the social transformation processes and actions required to achieve the ambitions of Education 2030. Cases from the Midlands State University in Zimbabwe have demonstrated important efforts to reorient university curricula. The paper investigates and discusses the challenges associated with reimagining teacher education and key considerations that need to be addressed to achieve the goal of Agenda 2030.

Keywords: *Change project approach; social transformation; Education 2030; Education for Sustainable Development*

Introduction

Institutions of higher education are powerful means by which society can create more sustainable futures. This can happen when teaching, learning and research are reoriented to incorporate the concept of Education for Sustainable Development (ESD) to address many of the current problems associated with human development. People and communities in southern Africa are exposed to a host of vulnerabilities as a result of rapidly degrading social, economic, and ecological environments, characterised by poverty, social decadence, increased droughts, desertification, and the more frequent occurrence of extreme weather events such as mass flooding. Recently, efforts to confront COVID-19 have spawned a myriad military metaphors and connotations including the "greatest challenge since the

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Second World War", "working on the frontline" and the virus being seen as an "invisible enemy" (Harris, 2020). Global crises tend to induce reflections on the relevance of education and hence the importance of attaining target 4.7 of the Sustainable Development Goal number 4 (SDG 4) on quality lifelong education. Given the quality of education accessible to the majority in southern Africa, people have not been empowered to adapt sustainably to, mitigate against or cope with the complexity of emergent issues in their environments.

According to UNESCO (2015), a good quality education empowers people to change the way they think and act in relation to a sustainable future. When sustainable development issues are integrated into all aspects of teaching, learning and research, institutions of higher education have the potential to transform society and develop students who are change agents, young people capable of transforming how society operates. In this paper we suggest that when teacher education is reoriented towards sustainability, through the principles of ESD, it has the potential to enable social transformation towards sustainable livelihoods. Our inability to address current environment and sustainability challenges reflects the way in which the current generation has been educated. Our priorities should focus on rethinking teacher education to help students think and behave in different ways that foster sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity. Teacher education institutions are therefore charged with the task of equipping students with essential knowledge, skills, attitudes and values empowering them to participate in creating a sustainable future and this can be achieved through transformative learning approaches (Urenje, 2020). This is a learning process in which previously held assumptions and interpretations are challenged and revised in order to guide future action (Mezirow, 1996). This means un-learning unsustainable practices that society has taught us, re-learning sustainable practices of the past and learning new ways of thinking and acting.

The effectiveness of the quality of teacher education and its relevance for the 21st Century is questionable given the struggle to demonstrate the competences for reorienting current teaching and learning. Its preparedness to mould a new cadre of teachers that would enable effective education for development is doubtful. The purpose of this paper is therefore to bring to light how the change project approach could enhance teacher education for the purpose of confronting 21st Century challenges by fulfilling the aspirations of Education 2030, particularly SDG 4. The paper shares experiences gained in a nine-month pilot programme on capacity development for Agenda 2030 (March-November 2019) designed to support the integration of ESD across the university formal education system in Zambia and Zimbabwe. The programme was funded by the Swedish Institute and jointly coordinated by the Swedish International Centre of Education for Sustainable Development (SWEDESD), Sweden (northern key partner) and the Copperbelt University, Zambia (southern coordinating partner). It was implemented in six universities in Zambia and Zimbabwe. This paper will focus on the case of a change project implemented at Midlands State University (MSU) in Zimbabwe as an outcome of the pilot programme.

Background and context

At the end of 2015 the United Nations adopted 17 sustainable development goals (SDGs), UN Agenda 2030, and emphasised that education is a powerful tool and driver to help attain these SDGs by ensuring an inclusive quality education and promoting lifelong opportunities for all. Teacher education should therefore support teachers in developing competences that fulfil the objectives related to sustainability so as to address our 21st Century challenges. When we apply the SDGs to the Southern Africa Development Community (SADC) region and Zimbabwe in particular, we link development priorities to a comprehensive policy agenda in a way that creates synergy and establishes a more effective response to regional and national challenges including poverty, health, sanitation, energy, employment, economic growth and environmental protection. Education is a critical component of this agenda for two reasons. Firstly, it is a goal in itself i.e. SDG 4 is oriented towards the achievement of educational quality within a lifelong learning framework. Secondly, education makes it possible to support the other goals, bringing a new focus and importance to education, learning processes and curricula. In particular, target 4.7 of SDG 4 draws attention to the relationship between ESD and educational quality. Zimbabwe's educational response has been through two ministries, the Ministry of Primary and Secondary Education (MoPSE) in charge of Basic Education, and the Ministry of Higher and Tertiary Education, Innovation, Science and Technology Development (MHTEISTD) responsible for teacher education.

Two landmark developments can be seen as a response to the 21st Century challenges in Zimbabwe. Firstly, in their efforts to enhance the quality and relevance of education, MoPSE embarked on a comprehensive curriculum reform process in 2014. This culminated in a new competence-based curriculum framework which was finalised in 2015 and set for phased implementation in 2017. The competence-based curriculum seeks to foster lifelong learning compatible with opportunities emerging from 21st Century challenges, and empowering learners for life and work with essential competences of critical thinking, creativity and innovation, communication and collaboration, among others. Secondly, MHTEISTD has revised Zimbabwe's state universities' traditional tripartite mission of teaching, research and community service to align higher education to the urgent national ambition to attain middle income status by the year 2030. The result was Education 5.0, which now requires institutions of higher and tertiary education (including teacher education) to not only: (1) teach, (2) research and (3) serve the community, but also to (4) innovate and (5) industrialise. Under Education 5.0, universities and teacher education institutions must reorient their curricula towards problem-solving for value-creation. The two developments are important because teacher education in Zimbabwe now needs to reorient curricula to fulfil MHTEISTD's ambition of creativity and innovation and also the competence-based expectations of the MoPSE where their teachers will be employed.

In the 2015 *Education for All* report, UNESCO argued that "ESD enhances the relevance of education, thus enhancing educational quality" (p. 206). Not only does ESD enhance the relevance of the content in education, but it also supports "transformative, active learning pedagogies and it foregrounds values of equity, peace, sustainability, ecological integrity

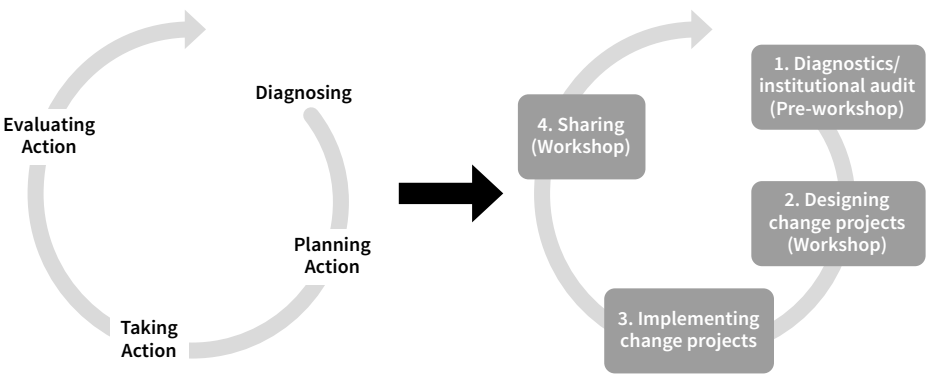
and social justice in education" (UNESCO ROSA, 2018, p. 3). Teacher education is charged with the task of nurturing 'educated citizens' who should be critical thinkers, creative and ethical persons who live in a sustainable way and care for the well-being of humanity and the environment. One of the major issues highlighted in the *Global Education Monitoring Report* (2016) is that teacher education needs to be more comprehensively aligned with the SDGs, and teachers need to be supported to understand and implement ESD. The same issue was raised at the end of the UN Decade of Education for Sustainable Development (2005-2014) at the World Conference on Education for Sustainable Development held in Aichi-Nagoya in 2015. (UNESCO ROSA, 2018, p. 3)

The purpose of this paper is therefore to bring to light how teacher education can be reoriented for the purpose of confronting 21st Century challenges by aligning the aspirations of Education 2030, SDG 4, MHTEISTD Education 5.0 and MoPSE's new competence-based curriculum. We use the change project approach to illustrate how MSU is reorienting their teacher education curriculum to fulfil the objectives of the pilot programme regarding capacity development for Agenda 2030.

The change project approach

The pilot programme regarding capacity development for Agenda 2030 in Zambia and Zimbabwe centred on an action learning intervention, the change project, designed to act as a catalyst to support transformative innovations towards sustainability in teacher education. We describe the change project as an institutional change initiative, which is collectively developed with the dean of the Faculty of Education, teaching and support staff. The learning processes and the momentum of the change project should remain in the institution even when the individuals who participated in the actual training have moved to other places. Each partner institution was responding to their institutional current and future demands in line with national and global sustainability trends. These methods and processes are applied in three action research cycles (see Figure 1).

Figure 1: *Change project action research cycle (Rumjaun & Urenje, 2017)*



Each institution participating in the pilot programme in Zambia and Zimbabwe was expected to design a change project "to reorient education and learning so that everyone has the opportunity to acquire the knowledge, skills, values and attitudes that empower them to contribute to sustainable development – and make a difference" (UNESCO, 2014, p. 14). The change project responds to the following two questions:

1. How can current teaching and learning be transformed in order to respond to the 21st Century Agenda 2030 challenges?
2. How can we use ESD teaching and learning approaches to transform teacher education in ways that empower student teachers (and practising teachers) for Agenda 2030 and beyond?

We chose to work with action research as its methodology enables practitioners to integrate their actions of implementing change while at the same time developing an understanding of the effectiveness of this implementation in an iterative manner. According to Alsop, Dippo and Zandvliet (2007), it is possible for practitioners (in our case, teacher educators) to examine closely their role as change agents and decision-makers through their own problematisation of the teaching and learning processes within their work contexts, and through their own reflexive practice (Hong & Lawrence, 2011). As a way of enabling teacher educators to interrogate their current practice, we followed a four-step cycle (see Figure 2) of action research developed by Coghlan and Brannick (2001):

1. Diagnostics – entails assessing the institution to identify issues that require action leading to improvements. An institutional audit is undertaken.
2. Designing the change project – in the next step the problem issue is identified, understood and isolated. This may require a workshop to plan and design the change project to confront the problematic issue.
3. Implementing the change – the project design and strategy must be implemented. It is important to monitor, evaluate and draw lessons from the implementation.
4. Sharing – this represents the last step of the action cycle whereby staff involved in the implementation of the change project get together in a workshop to share their experiences regarding embedding the change project in their institutions.

Coghlan and Brannick (2001) proposed two cycles for action research projects: a 'core action research cycle', which refers to the aims or content of the research project and a 'thesis action research cycle' or 'meta-learning cycle' which relates to how the project itself is implemented. A third cycle (Figure 2) emerges within the meta-learning cycle, which is the implementation and scaling (institutionalisation) of their change project ideas (Rumjaun & Urenje, 2017). With respect to the pilot programme for capacity development, these three action research cycles, (planning, execution and implementation or institutionalisation) are discussed below.

Core and thesis research cycles

Cycle 1: Planning – The core action research cycle

The core action research cycle took the form of an institutional dialogue and a pre-course assignment. This step was divided into two parts: (1) a planning workshop for leaders and policy makers in teacher education, and (2) a pre-course assignment in preparation for the first training session. The planning workshop in March 2019 was a collective planning activity with programme partners from Zambia and Zimbabwe to develop the course. The workshop was designed as a dialogue between ministries of education and higher education, government directors responsible for teacher education, university deans responsible for teacher education, and SADC ESD experts and facilitators. There were two outcomes from this workshop:

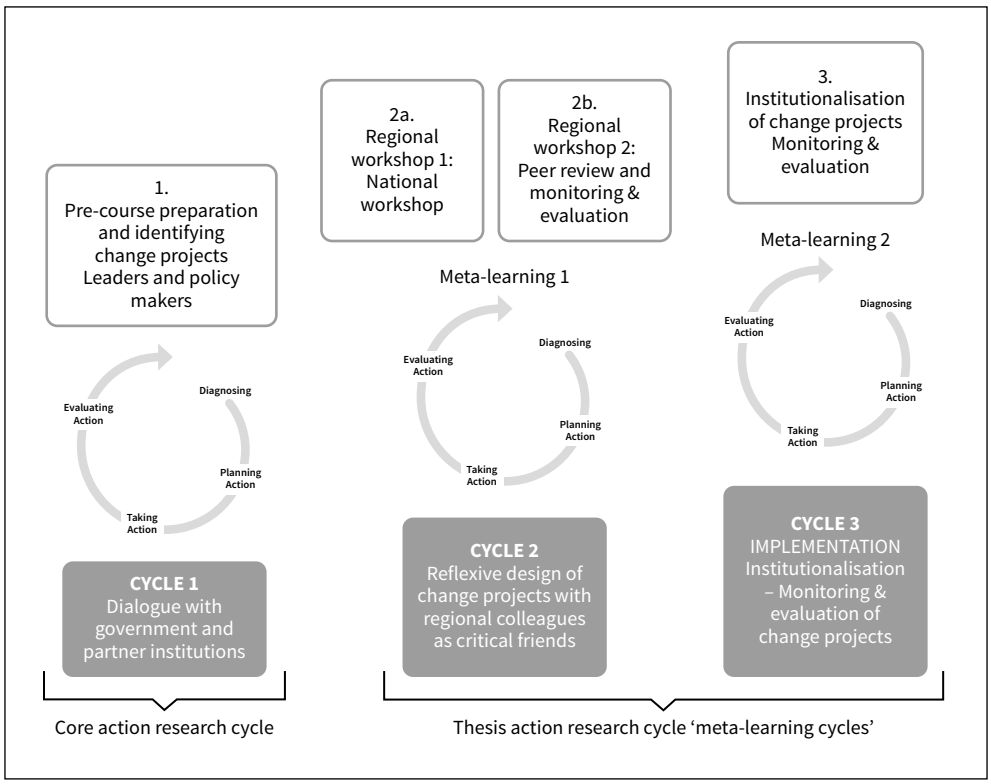
1. A commitment by participating ministries and universities to support the training and implementation processes during, and more especially after, the official training programme.
2. A capacity building or training outline and an agenda for learning support material to be developed.

Commitment from the deans and ministries of education formed part of an essential context for change projects based on a pre-course assignment which responded to the following:

1. What role can teacher education play in national ESD processes and Agenda 2030?
2. What is currently working well in our institution? How can we make it even better?
3. What is not working so well? How can we make it work better?

Based on these three questions, participants from each university were supported in developing a draft plan for their change projects, in relation to Agenda 2030. This pre-course assignment opened up the potential of universities as active participants to support national and regional aspirations of Agenda 2030. The assignment also showed the steps necessary to strengthen institutions in managing change processes. Three participants from each institution took the lead in completing this assignment and in representing the university in the regional workshops for capacity development.

Figure 2: *Core and meta learning cycles adapted from Coghlan and Brannick , 2001 (Rumjaun & Urenje, 2017)*



Cycle 2: Execution – Thesis action research cycle (Meta-learning 1)

After Core Action Research Cycle 1, the next step was to deepen and co-design planned strategies in the form of intra-country and inter-country dialogues between and among the institutions in Zambia and Zimbabwe (2a and 2b in Cycle 2 in Figure 2). This was done in three steps of two regional workshops (one in April and the other in November) and one country workshop (in July) (see Figure 2). In the first regional workshop, three participants from each university were supported to develop implementation plans for their change projects. Secondly, a national workshop was conducted for the three universities in each county during which the participants focused on adjustments to their implementation plans in close dialogue with their colleagues and superiors. This dialogue strengthened partnerships among relevant stakeholders in the university and refined the implementation plan in line with the principles of collaborative learning. In addition, at least one workshop was conducted at each university.

In the second regional workshop, participants came together again to report on progress, engage in monitoring and evaluation, ongoing action planning and scaling of their innovations. This process was devoted to finalisation of the change project outline

with co-participants as critical friends and with support from programme coordinators and regional resource people. During this step, participants completed a first cycle of the thesis action research cycle, meta-learning 1 (see 2b in Figure 2) of evaluation, learning and revision of their change projects. Subsequently, change project reports were collated by the project coordinators and synthesised for sharing with other participants, professionals in the field and future participants. Participants were encouraged to further develop and implement their change project, and to use their experiences and reports to make presentations at international, regional and local conferences where appropriate. The outcome of this learning cycle was a detailed implementation plan, complete with methods and approaches for evaluation and reporting on the project. Having discussed change project reports in the regional workshop, the cycle was completed by engaging participants in a reflexive process of testing and monitoring of transformational changes in their own practice. This also extended participants' access to colleagues from another countries and institutions they may not have worked with. This open access enabled them to establish collaborative partnerships for identifying further issues in their institutions and for developing processes for improvement. In so doing, they became aware of alternative ways of viewing and approaching educational questions, which opened new ways for examining their own practices.

Cycle 3: Institutionalisation of change projects (Meta-learning 2)

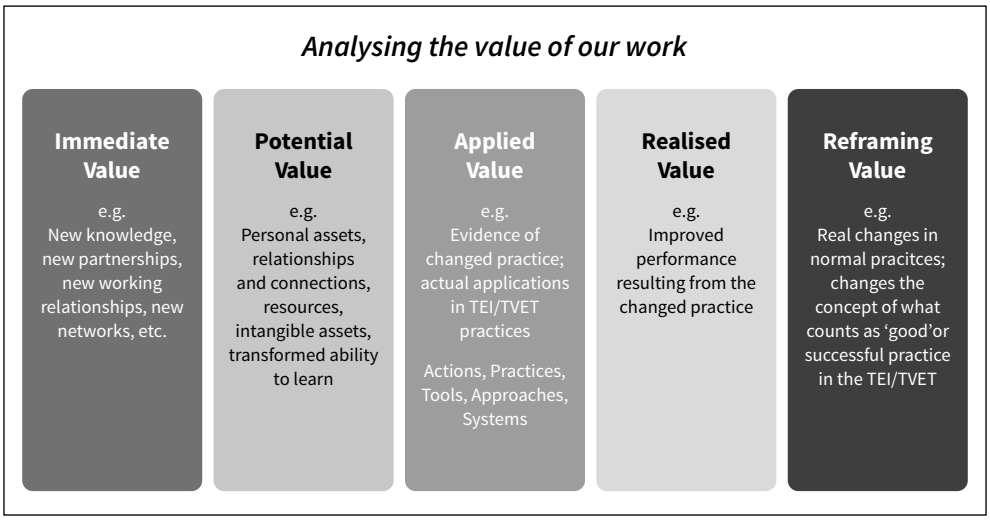
After the second and final regional workshop in Cycle 2(b), the project was no longer in direct control of changes taking place in the institutions. We will however continue to support collaboration between and among institutions through an informal e-learning network. In Cycle 3, the change project was strengthened by anchoring it in the home institution, renewing support from superiors for the implementation plan, and strengthening engagement of colleagues to form an institutional team for change. The programme suggests a second round of dialogue and critical reflection within the institution to which participants, colleagues and other interested parties are invited. The outcome of this phase is a presentation of how the change project is being situated in the work context which can be shared in the form of a poster, video or document.

A UNESCO ROSA web platform, which has been developed as a support mechanism for the Sustainability Starts with Teachers project, will provide a forum for support to the participants through, for example, enhanced possibilities for networking and peer support interactions. Participants will be encouraged to publish their project work as action research (this paper on MSU being an example). Through email and web-based support, there will be ongoing interaction between resource people, participants and their institutions.

For evaluation, we used the Value Creation Framework of Wenger, Traynor and De Laat (2011), which requires the development of a value creation narrative for participants over time. The framework offers a tool for evaluation of social learning processes, and it is an appreciative approach to evaluation, that can also stimulate reflexivity and (further) change. In our case, the framework was used to design and develop indicators for the

outcomes of transformative learning; these emerged from a critical review of the value creation narratives via wider synthesis and deliberative engagement. The framework that is made up of five cycles is summarised in Figure 3.

Figure 3: *Value creation framework adapted from Wenger, Traynor and De Laat (2011)*



The Midlands State University change project outcomes

MSU is one of the three universities from Zimbabwe that participated in all the cycles of the change project pilot programme described above. Four members of the Faculty of Education, including the dean, participated in the programme. The dean and one member of the Faculty participated in Cycle 1 planning phase workshop. Upon their return they held a Faculty workshop to introduce the concept of a change project approach in rethinking and rebranding the Faculty curriculum and practices in response to the goal of integrating ESD and other pressing national priorities in the education system. The workshop initiated thinking about potential change projects and motivated Faculty members to rethink their practices especially in relation to ESD.

The genesis of the MSU change project

The change project was concretised prior to and during the pilot programme's first regional workshop in April 2019. Three members from the Faculty met several times to deliberate on a possible change project using the pre-course assignment and the change project template provided for the workshop preparation. Three shifts in the education system influenced the development of the change project significantly. Internationally, the need to integrate ESD in school curricula provided insights into how the teacher education curriculum at MSU needed to respond to this shift. Nationally, the team considered the introduction

of the competence-based curriculum in 2017 and the Ministry of Higher Education's call for Education 5.0 to be integrated in and inform university's curricula and practices. Primarily, the project was designed to reconfigure the education and training model in the Faculty of Education by aligning courses to provide graduates with skills, knowledge, values and attitudes for addressing 21st Century challenges. The overall intention was to improve existing education practices in the light of emerging national and global socio-economic trends. The project also sought to bring about changes in the teacher preparation programmes in the Faculty, so as to produce teachers who are knowledgeable about ESD, the competence-based curriculum, and Education 5.0, specifically in terms of the philosophy, broad goals and implementation implications of these innovations. The initial ideas on this change project were presented at the first regional workshop of the pilot programme in April 2020 and feedback helped to refine the project.

Features of the refined change project

After the first regional workshop, the MSU project team held several meetings to refine the change project and agree on implementation. Based on the intentions of the change project outlined above, it focused on developing 'The teacher we need for the 21st Century and beyond'. The Zimbabwean competence-based school curriculum emphasises the development of competencies and values such as problem solving, critical thinking, decision making, innovation, technology literacy, conflict management, teamwork, enterprise development, cooperation, self-respect and respect for others, self-discipline, accountability and commitment to others (Ministry of Primary and Secondary Education, 2014). The curriculum also calls for the integration of topical global issues (presented as cross-cutting themes) such as gender equity, health issues, food security, technology, environmental issues, and disaster and risk management in the teaching of the different learning areas. Thus, the MSU's change project is concerned with re-designing or reconfiguring the teacher education curriculum with the goal of producing teachers with the above knowledge and competencies, for their needs as teachers in Zimbabwean schools and for their personal needs as functional citizens in the 21st Century.

Specifically, the project is introducing changes in the following aspects of the teacher education curriculum: revising module outlines so that they integrate ESD issues and 21st Century competencies; changing lecturers' instructional pedagogy so they model the teaching methodology that teacher education graduates are expected to implement in schools; changing assessment formats so they measure the development of lifelong competencies and knowledge of global issues; and guiding students' research projects towards substantive curriculum and global issues. Furthermore, lecturers are encouraged to shift from presenting formal lectures, and engage in active learning pedagogies such as involving students in investigations, presentations, debates, problem solving activities, and analysis of live case studies.

Implementation of the change project

The refined change project was presented in a workshop for all Faculty of Education lecturers at MSU in August 2019. The workshop aimed to encourage lecturers to adopt the change project as a Faculty project, and to agree on implementation modalities and targets. Another objective was to highlight areas of the teacher education programmes that needed to be changed. Action plans were agreed on for implementation during the August to November 2019 semester. These included rebranding module outlines so they reflected the ideals of the changed teacher education curriculum; enacting active learning pedagogies in lectures; and using assessment formats and tasks that support sustainable development competencies and knowledge in student teachers.

Following implementation from August 2019, the change project was presented at a country workshop held in September 2019. Useful insights were obtained from this workshop, specifically the need to think about scaling the project to institutional level. The change project was then presented at the second regional workshop in Lusaka, Zambia, in November 2019. While the project was generally accepted as a viable change project that could transform the teacher education curriculum at MSU, participants encouraged ongoing implementation and thinking about ways of addressing the following: monitoring implementation progress; ongoing evaluation of the impact of the changed curriculum on the student teachers in terms of the developing knowledge, competencies and values; scaling the project to institutional level; and networking with other teacher education institutions for purposes of sharing successes and developing a systemic approach to education as a whole.

It was the intention of the project team to hold another faculty workshop early in 2020, so as to review implementation progress and to integrate suggestions made at the workshops described above. The COVID-19 lockdown that began in March 2020 meant the workshop was delayed and it was ultimately held virtually in September 2020. Following presentations from two members of the project team to refresh understanding of the faculty change project, most of the time was spent in a plenary discussion concerning implementation updates from members, strategies for monitoring progress, ways of evaluating students' learning outcomes under the changed curriculum, strategies for scaling the project to institutional level, and how to network with other institutions in the education system.

The overall observation was that there had been little progress in implementing the project. However, two cases gave insights into how the change project could be implemented as planned. The first case involved one of modules, *Community Development*, in *Adult Education*, in which for purposes of continuous assessment, students were expected to identify and find ways of solving a community problem. For assessment purposes, the students were expected to produce a write-up in the form of a report on what they would have done. They were also expected to compile a file, describing the process (with pictures) from problem identification to strategies used to resolve the problem and the impact of the intervention. Lecturers in the section visited the site to assess on the ground what

the student would have done. A specific example was given of a student in a rural area who identified poverty and hunger as the problems facing the community. The student approached an NGO to partner him in developing income and food generating projects such as market gardening, rabbit keeping, poultry projects and goat keeping in the community, which is now benefiting from these projects.

The second case involved the *Textiles and the Environment* module in *Textiles Technology and Design*, in which students are expected to identify any problem in society to investigate and develop solution strategies. A write-up of what the student would have done constitutes the continuous assessment for the module. In both the modules cited above, students were expected to write a formal examination for summative assessment purposes.

While it was acknowledged that the two modules exemplified the ideals and goals of the change project, some matters were raised which members felt could be working against achieving the goals of the project. Firstly, it was felt that the change project should not be limited to specific modules. Efforts should be made to implement the agreed changes across all modules and programmes. Secondly, it was observed that using final written examinations as part of assessment in modules such as those described above shifted the students' focus from the competencies to be developed in the module, to memorising notes for purposes of passing the course. Where examinations are involved, students tend to expect formal lectures and written notes from the lecturer. The major concern becomes passing the examinations rather than developing competencies in action research and active learning. Hence there was a consensus that in some modules, written examinations should be dropped and that certain modules use continuous assessment only. Such assessment could involve artefacts made by students, presentations on results of investigations, debates on issues that are considered pertinent in communities, reports on learning activities that the students would have engaged in. This would assess substantive knowledge and competencies that are consistent with the 21st Century competencies.

The plenary discussion also focused on mechanisms for monitoring the implementation of the change project. It was agreed that existing managerial structures in the different departments of the faculty would monitor how individual lecturers are implementing the change project. Reports on implementation progress and challenges would be presented in the next faculty workshop. In terms of evaluating students' learning outcomes, lecturers were encouraged to shift from written assessments (such as routine assignments and tests) to assessment tools that measured acquisition of significant competencies such as those agreed on in the project. For purposes of scaling up the project to the whole university, an interdisciplinary approach was suggested. For example, lecturers in the Science subjects within the Faculty of Education could link up with lecturers in the Faculty of Science and share their efforts and successes of integrating ESD into their modules. It was also agreed that success stories within the Faculty would be shared by way of university-wide platforms such as Senate reports and on the university website through the Department of Information. There was insufficient time at the workshop to deliberate on strategies for networking with other teacher education institutions, and for ensuring sustainability. It

was agreed that these would be discussed in the next workshop, the main focus of which would be reviewing the implementation progress of the change project.

Evidence of value created by the MSU change project approach

As noted, evaluation was done using Wenger et al.'s (2011) Value Creation Framework. Firstly, there was evaluation at the end of workshops and secondly, a few months into the implementation of the change project as a way of monitoring the transformation process. End of workshop evaluation was designed to gain insight into which aspects of the workshops were most valuable for change project participants, and into the potentially transformative aspects of the workshop for individuals and institutions. Some participants' responses are reflected in Table 1 below.

Table 1: *Evidence of value created by the change project approach at MSU*

Value created	**Value creation narrative** Evidence: What value is being created for you and your institution in the change project?
Immediate value New partnerships, relationships, knowledge, networks	The workshop was valuable to me because I now have a different perspective when viewing education. I now view education as an industry not as a profession. I gained new knowledge that change is not an event but a process which is not easy. The project has sharpened my focus and insights on challenges before us in an attempt to realise quality education. The content on SDGs and agenda 2030 was very helpful.
Potential value Personal 'assets' (new knowledge, new partnerships, resources) Transformed ability to learn and bring about changes	As a Department and Faculty we agreed to reconfigure the education model so that students exit with valuable skills, knowledge, attitudes and values which were not there before the workshops. My management and presentation skills were improved. The project is bound to bring about change in pedagogy. The faculty members benefited from our presentations which we did after the workshops, which helped them to be well versed with the new shift in the education system. Our change project might contribute greatly towards the vision of the institution by improving the quality and relevance of education through producing students who are innovative and industrious. I have come to appreciate the importance of interdisciplinary approach in initiating change. The workshop revitalised need to align programme content to the ministerial framework of Education 5.0.
Applied value Any evidence of changed/changing practice. Any tools developed, approaches changed/changing in systems	We restructured the modules and module outlines. These were very useful materials because when we rebranded the modules the aim was to meet the demands of the 21st century which is very crucial. I have shifted from being a dry academician to embrace liberating pedagogy. I have shifted from lecturing to active learning pedagogy.

Value created	Value creation narrative Evidence: What value is being created for you and your institution in the change project?
Realised value Any evidence of changes in performance	Some of our students have already started working on various products using the available resources and generating income which is good. Some of the problems in the food industry like food loss are being addressed because of that change project. In the Department, assignment tasks and examination items are showing a shift towards embracing 21st Century challenges.
Reframed value Significant changes in the institution/ programme	No evidence as yet of sustained changes that can define success.

As shown in Table 1, the Value Creation Framework provides a useful tracking mechanism for understanding how the change processes have been influenced by the pilot programme, as well as showing insight into aspects of the change project itself that have transformative potential. This offers a cumulative (formative) perspective on the overall value being created for participants and institutions over the life of the programme. From this, it is possible to track influences from the pilot programme process and content back to the reflexive changes made to the change project plans and the change projects themselves.

Discussion

The core and thesis research cycles outlined in the section above are used as a framework for discussion to analyse the professional and institutional developments taking place at MSU as a result of the change project intervention. The Value Creation Framework (Wenger et al., 2011) is also used to develop an emerging value creation narrative at MSU as demonstrated by transformative learning processes arising from wider synthesis and deliberative engagement.

Cycle 1: The core action research cycle

A major accomplishment of the change project approach was its endorsement and acceptance by the Ministries of Education and the six universities in Zambia and Zimbabwe. Stakeholders confirmed the value this brings to ongoing education and teacher education reforms. Apart from complementing initiatives to achieve Agenda 2030 in adopting 21st Century learning outcomes in education and training, the partnership has created and enhanced opportunities for both North-South cooperation between Sweden and the SADC region, and for an education and research network promoting South-South cooperation between Zambia and Zimbabwe. These features enabled mutual exchange, sharing and co-learning among programme participants. Firstly, during the planning workshop that initiated the change projects, a co-creation approach facilitated dialogue among directors in Ministries of Education, deans responsible for teacher education, and faculty members. Their advice ensured a fit and relevance of the project to the policy context of national and institutional reforms and existing transformation initiatives in education and teacher

education. Secondly, principles put in place meant that the change projects recognised policy, engaged leaders, building on existing strengths and networks, with a focus on value addition and impact creation. Thirdly, the programme appeared to work because it focused on and profiled creativity and ESD innovation from the onset, and foregrounded an agenda for learning. We learnt from MSU that it created self-belief among participants and raised their awareness of Agenda 2030, the SDGs, ESD, and 21st Century learning outcomes and how they relate to quality and relevance of education and teacher education.

Cycle 2: Thesis action research cycle (Meta-learning 1 – Access to a community of critical friends)

While there are generally many programmes for professional development for teachers in the SADC region, there are few professional development strategies for teacher educators (professors and lecturers) responsible for preparing the teachers for service. This constitutes a serious gap. The thesis action research cycle or meta-learning 1 (Figure 2) was designed to deepen and co-design teaching and learning strategies for the 21st Century in the form of intra-country and inter-country dialogue between and among the institutions in Zambia and Zimbabwe. Lack of continuous professional development and learning communities in teacher education was evident from the onset of the programme.

Four levels of professional access were identified:

1. Institutional level, as linkages were established across subject disciplines and departments;
2. National or inter-university level where change project leaders were in interaction with colleagues from University of Zimbabwe and Great Zimbabwe University;
3. Regional level between institutions from Zambia and Zimbabwe; and
4. International level between southern Africa and Sweden.

This programme enabled the interaction among teacher educators regarding teaching and learning for the 21st Century and this interaction influenced their professional development. The MSU experience indicated that teacher interactions triggered by change projects helped with professional development in several ways: enhancing reflection on teaching practice, establishing a professional discourse community, raising the standards for teaching performances, and facilitating collaboration across subject disciplines. In addition, participants had access to knowledge e.g. ESD principles and associated frameworks, like an alternative assessment framework of significant learning; access to information about 21st Century issues and competencies; and access to national policies like curriculum frameworks and visions.

Cycle 3: Institutionalisation of change projects (Meta-learning 2)

Emerging tensions as a potential source of change and development required a collective strategy to deal with the hegemony of curriculum status quo and curriculum transformation as sticking points. Regrettably, there is no necessary correlation between educational

achievement and socially and environmentally benign sustainable behaviour, but rather the opposite (Orr, 2004). In this case, education can be viewed as being part of the problem of resolving environmental and sustainability issues of the 21st Century. Many universities in southern Africa are struggling with how to respond to the demands of the 21st Century including how to end epistemic violence and decolonise teacher education curriculum (Heleta, 2016). It appears MSU has been struggling with an efficient response to demands of the 21st Century, the competence-based curriculum in the schools and Education 5.0. Even though some practitioners were willing to effect change, they suffered from an action deficiency syndrome, an inability to take decisive action (Urenje, 2012). However, evaluation responses from practitioners at MSU indicate that emerging tensions could provide the potential energy for practitioners to confront historically accumulated structural tensions within the system (see some practitioners' responses in Table 2). Change projects enable emerging tensions between the status quo and change to be addressed by 1) abandoning business as usual ethic and trying out new varieties of teaching and learning (business unusual); 2) being critical of cosmetic changes that protect the status quo and opting for major transformative changes; and 3) moving away from simplistic sustainable development projects like recycling and gardening in favour of radical curriculum innovation. Table 1 showed how the Value Creation Framework provided a formative tracking mechanism for understanding how the change processes have been influenced by the pilot programme. Table 2 shows insights (from teacher educators at MSU) into aspects of the change project itself that have transformative potential.

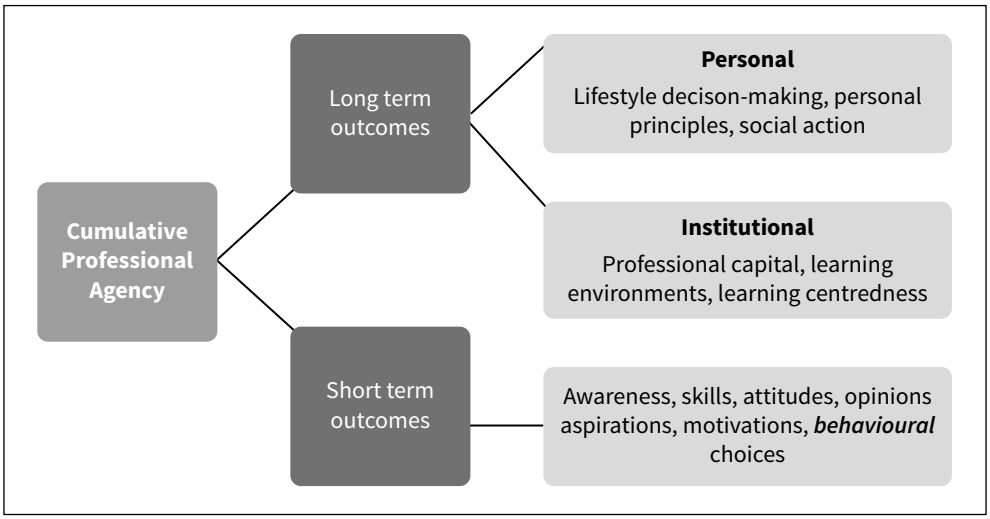
Box 1: *Emerging value creation narratives from MSU practitioners: Breaking out of action deficiency syndrome*

- The project is bound to bring about change in pedagogy.
- The faculty members benefited from our presentations which we did after the workshops, which helped them to be well versed with the new shift in the education system.
- Our change project might contribute greatly towards the vision of the institution by improving the quality and relevance of education through producing students who are innovative and industrious.
- I have come to appreciate the importance of interdisciplinary approach in initiating change
- The workshop revitalised need to align programme content to the ministerial framework of Education 5.0

The challenge at MSU was how to include all departments in the change project given the existence of high levels of acceptance of the status quo. Regardless of the tensions arising

from a new way of thinking and acting, however, a higher level of professional practice is also developing as a result of the catalytic agency of the change project approach. A combination of personal, relational and collective agency has started to unfold, sowing seeds for a superior level of professional practice, which can be referred to as Cumulative Professional Agency (Urenje, 2012). Through the change project approach, MSU participants have started to deliberate and fine-tune their capabilities to drive curricular and pedagogical changes, the outcomes of which are beginning to show in the change project aims and objectives as shown in Figure 4. (See features of refined project and Table 1 – evidence of value created by change project.)

Figure 3: *Cycle 4: Monitoring and evaluation; value creation (Rumjaun & Urenje, 2017)*



This cycle is still unfolding. Certain questions need to be considered. How do we keep the fire burning? How do we safeguard the lessons learnt, ensure continuing education effort (transformative learning efforts) for teacher educators as a way of safeguarding their skills of teaching and learning for social transformation and, in turn, boost their student teachers' outcomes?

Conclusion

This paper has explored how the change project approach could be applied to enhance teacher education for the purpose of confronting the 21st Century challenges through education. In the case of MSU, the change project approach can be thought of as a process of learning how to build the capacity of teacher educators for future-oriented thinking and acting, an example of implementing ESD across institutional disciplines with the potential to impact on achieving educational goals of quality and relevance, in line with Agenda2030 and SDG 4.7. Through the change project approach, MSU has initiated an intra- and inter-

departmental dialogue to better understand the principles of using ESD for developing, constructing and implementing strategic plans for a competence-based curriculum; assessing and developing personal and institutional capacity to implement SDG 4; and analysing, enhancing and evaluating performance to better meet their stakeholder needs. The change project has been instrumental in enabling the institution to work with other SDGs, which emphasise essential knowledge, skills and attitudes to meet the challenges of creating a more sustainable world. Through this initiative, MSU has found a way of drawing the MoPSE (in charge of basic education) closer to the MHTEISTD (responsible for teacher education) in their common goal of responding to national aspirations for a competence-based curriculum – thus potentially creating value for the country as a whole. The paper has discussed the challenges and opportunities associated with reorienting teacher education and key considerations that need to be addressed to achieve the goal of Agenda 2030. The action research model opened up opportunities for future research in reorienting teacher education to meet the dynamic demands of the 21st Century.

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Percentage contribution

Areas of contribution	Author	% Contribution per area, per author (each area = 100%)
Conception or design of the paper, theory or key argument	Urenje	50%
	Chauraya	30%
	Chikunda	20%
Data collection	Chauraya	55%
	Urenje	30%
	Chikunda	15%
Analysis and interpretation	Urenje	34%
	Chauraya	33%
	Chikunda	33%
Drafting the paper	Urenje	40%
	Chauraya	30%
	Chikunda	30%
Critical review of paper	Urenje	34%
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Influencing Generations: Pre-service teachers' environmental worldviews at a South African university

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Abstract

One of the key means of achieving environmental mindfulness is through education. Using a social transformation orientation lens and questions in the Revised New Ecological Paradigm (NEP) scale (Dunlap, Van Liere, Mertig & Emmet Jones, 2000), this study at a South African university examines the environmental worldviews of a cohort of pre-service education students prior to and after completing an introductory module on Resources and Environmental Management as part of a Social Science course. Quantitative results indicate that the module did not change NEP scores significantly, suggesting that engagement with the course content is low and hence concern for the environment is low. The results suggest that more emphasis ought to be placed on environmental education to improve pre-service education students' mindfulness towards the environment.

Keywords: *sustainability and environmental education in teacher education; Geography education; environmental worldviews*

Introduction

Achieving environmental sustainability rose to prominence on the global agenda as far back as 1987 when the World Commission on Environment and Development released a report entitled *Our Common Future* (commonly known as the Brundtland Report), which essentially addressed concern for the environment and proposed long-term environmental strategies for achieving sustainable development (Brundtland, 1987). Since the adoption of sustainability as the overarching principle of environmental governance, scholars have not only debated what sustainability means, but also how to achieve sustainability (Holden, Linnerud & Banister, 2017). One of the key means by which we, as a global citizenry, are to achieve sustainability is through education (Woodworth, Steen-Adams & Mittal, 2011; Evans, et al., 2017). Through developing an understanding of the environment and our relationship with the environment, we can foster mindsets that promote sustainable actions at an individual level (UNESCO, 2021). This study seeks to examine the environmental worldviews of a first-year cohort of pre-service Bachelor of Education teaching students prior to and after completing a module on environmental resource management (one of four modules in a 'Geography in Education' level one course). The importance and necessity

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of this study is twofold. Firstly, it will examine the impact that this module had in changing students' mindsets. Secondly, the student participants are future educators who will go on to educate pupils in a school setting. The importance of understanding their worldviews, and whether these have changed (or not) is essential given the many generations they will in future influence through their teaching. The findings of this study will also help determine whether the course should be reimagined.

Literature review

A person's environmental worldview is an expression of the values that person associates with the environment and its resources (Evans, et al., 2017). Environmental worldviews can be said to lie on a continuum from biocentric, or nature-based, to anthropocentric, or human-based (Van Riper & Kyle, 2014). Biocentric worldviews are formulated out of a high value being placed on the environment where concern for the environment goes beyond the concern for self (Nordlund & Garvill, 2002; Wynveen, et al., 2021). On the other hand, anthropocentric worldviews represent values that consider the fulfilling of human needs to be the core function of the environment, which therefore exists for us to utilise and exploit to our benefit (Nordlund & Garvill, 2002; Wynveen, et al., 2021).

Researchers have found links between the values held by a person concerning the environment, reflected in their worldview, and the resulting attitudes and behaviour towards the environment (Dietz, Fitzgerald, & Shwom, 2005; Amos & Carvalaho, 2020). People's actions are linked to where on the continuum of biocentric to anthropocentric worldviews they are located. Anthropocentric worldviews arguably cultivate the exploitation of the environment for human gain regardless of the sustainability of this exploitation. In order to change this worldview and foster environmentally responsible behaviour, it has been argued that society needs to improve environmental literacy, which in turn will shift people's beliefs or value systems as they relate to the environment (Woodworth, et al., 2011; Ling, et al., 2020).

Many universities have included some form of environmental education in their programmes in a bid to promote environmental literacy with the end goal of eliciting sustainable behaviour at a national and global level (Woodworth, et al., 2011; Reddy, 2021). Research on these programmes has found that simply by educating students on environmental issues, their environmental concern was raised and their worldviews shifted in line with their concern (Pe'er, Goldman & Yavetz, 2007; Shephard, et al., 2009; Woodworth, et al., 2011; Reddy, 2021).

Several studies have been conducted looking into the environmental worldviews of students and staff across education sectors (Cotton et al., 2007; Liu & Lin, 2014; Manoli, Johnson & Dunlap, 2007; Pe'er, et al., 2007; Shumba & Kampamba, 2013; Strack, et al., 2017). The Revised New Ecological Paradigm (NEP) (Dunlap, et al., 2000) has been used repeatedly in such studies with relative success. The NEP is a survey-based instrument comprising 15 statements and is designed to measure the environmental concerns and values of people. (Dunlap, 2008; Van Riper & Kyle 2014). By assessing participant responses to statements

that are designed to bring to light the participants' environmental values, their worldviews can be understood on the continuum between biocentric and anthropocentric.

The desire to influence students' worldviews towards more sustainable value systems is seen as a positive outcome of teaching students environmental education at a tertiary level (Shephard, et al., 2009; Brennan, 2017). This ideal drives institutional mandates for environmental education: "educators must take the lead in sustainability so that our graduates can be encouraged and supported to promote sustainable practices in their chosen career" (Shephard, et al. 2009, p. 572; Brennan (2017). Furthermore, it is noted that teaching students about environmental concerns in a bid to foster a biocentric worldview is important, as it is these students who are our future leaders (Kopnina, 2019). Therefore, teaching environmental sustainability for the purposes of changing future leaders' values and behaviour is fitting at the tertiary level.

This is possibly even more justifiable when it is future teachers being educated. It is these educators who could also promote sustainable practices in their forthcoming careers (Shephard, et al., 2009; Evans, et al., 2017). Despite the importance of educating pre-service teachers to ensure they incorporate sustainability teaching in their future careers, studies have shown that teachers have been poorly trained for this (Pe'er, et al., 2007; Reddy, 2021). The extent to which sustainability education has been integrated into initial teacher education curricula is unclear (Evans, et al., 2017) or requires substantial revision (Brennan & Widdop Quinton, 2020). This is problematic if one is to assume that the "adequate preparation of teacher education students in environmental education is a prerequisite for their future ability to design and implement effective environmental education" (Pe'er, et al., 2007, p. 393).

This study seeks to understand if student teachers' environmental worldviews change after completing a module on Resources and Environmental Management.

The Resources and Environmental Management module emphasises human impact on the environment while exposing students to different theoretical approaches to managing the Earth's resources. These approaches included Free Market Environmentalism, Sustainable Development, Conservation and Environmental Justice. The module, along with the assessments therein, was designed to get students to critically reflect on human impacts on the environment and the various theoretical approaches, which can be used to manage or reduce these impacts. Students were encouraged to form an opinion and argue for whichever theory they believed to be the most appropriate for managing South Africa's natural resources.

The aim here is to see whether student teachers exit the course with a more biocentric worldview. Subsequently, the study wishes to see whether a change in worldview also changes the way in which students will teach environmental subjects in future to their own pupils. This will allow us to consider whether there is a lasting change encouraged through environmental education at a tertiary level to student teachers.

Methodology

This study used purposive sampling (Patton, 2002) in an exploratory research design (Stebbins, 2001), whereby an inductive approach (Thomas, 2006) was taken to gain new insights into the extent to which the module influenced environmental worldviews. A mixed methods approach (Denscombe, 2008) was used to gather both qualitative data and quantitative data. For the quantitative data, questions from the Revised New Ecological Paradigm scale (Appendix 1) were administered before and after the module. For the qualitative data, at the conclusion of the module, students were invited to respond to five open-ended questions (Appendix 2) which sought to give them an opportunity to express their opinions freely, having completed the module.

The survey was undertaken at a School of Education in a South African university among students registered for an elective Social Sciences first-year module (six weeks in duration) entitled Resources and Environmental Management, as part of a four-year Bachelor of Education degree. All students registered for the class were eligible and were invited to participate in the survey, which was administered before the commencement and at the conclusion of the module. Since the authors wanted to see whether their input in the module had an impact, Glaser and Strauss's Grounded Theory (1967) was followed, approaching the research with an open mind "to discovering new factors of relevance to an explanation of that area" (Denscombe, 1998, p. 215). In this sense, the authors elected to follow a trail of discovery to see what impact the module had, and later to determine what paths could be followed in future to improve outcomes.

The revised New Ecological Paradigm (NEP) Scale is a widely used measure of environmental orientation, and was developed by Dunlap, Van Liere, Mertig and Emmet Jones (2002), based on the original work of Dunlap and Van Liere in 1978. Containing fifteen statements, it investigates a range of environmental worldviews, assessing pro- and anti-sentiments using a five-point Likert scale (Appendix 1). Response items on the Revised NEP are phrased so that the pro- environmental responses are alternated between agreeing and disagreeing.

The survey was administered to all registered Social Science 1 students who were present in class. Using a pre- (BEFORE) and post-course (AFTER) intervention study design, the surveys were administered on the first and last days of the course. A total of 295 students participated in the course. The response rates, and proportion of qualifying responses, are presented in Table 1.

Table 1: *Response rates and qualifying responses*

	Before		After	
	n	%	n	%
Number of students in course	295		295	
All respondents	146	49.5	109	36.9
Completed both questionnaires	*95*	*32.2*	*95*	*32.2*
Qualifying respondents	131	44.4	102	34.6
Completed both questionnaires	*82*	*27.8*	*82*	*27.8*
Completed only first questionnaire	*49*	*16.6*	*20*	*6.8*

The overall response rate for BEFORE and AFTER was 49.5% and 36.9%. Only 32.2% of the students completed both questionnaires. Fifteen and seven students in BEFORE and AFTER, respectively, did not complete all 15 items of the NEP and were not considered in further analysis. This leaves 82 qualifying students (27.8%) who completed both questionnaires and 49 and 20 who completed BEFORE only and AFTER only respectively. The relatively low participation in completing both questionnaires may say something about student's belief systems and engagement with the course content, more about which will be discussed in the conclusion.

The reliability of the NEP scale was determined by Cronbach alpha (Cronbach, 1951) and item-total correlations (Henrysson, 1963). Cronbach alpha values were low at 0.56 and 0.59 for BEFORE and AFTER respectively. (We look at the individual question scores later, to explore the reasons for the low values.) Comparison of the NEP score between BEFORE and AFTER using all respondents was carried out using the independent samples t-test at a 5% significance level. The mean increase in score from PRE to POST was 0.23 (95% CI: 0.14-0.32); although this was statistically significantly greater than 0 ($p<0.0001$), the practical significance of such a small increase is likely to be small.

In addition to the NEP instrument, at the same time of completion of the instrument, students were asked a number of closed and open-ended questions in the second round of data collection – see Appendix 2). These questions were designed to look into why students have changed their worldviews, if these had changed, and how this will influence their future teaching, if at all. The responses to the open-ended questions were inductively coded independently by the two authors to increase the validity of the themes that emerged (Patton, 2002).

Results

Quantitative analysis

When looking at the mean NEP scores both before and after the course, there was a clear indication of pro-NEP sentiment, or ecocentric worldview, amongst the students in the course. The mean NEP scores in all cases were > 3, indicating pro-NEP sentiment. This means that the overall sentiment of the students towards environmental conservation and sustainability was positive before and after the course. The mean increase in score from before the course to after the course was 6.3%. This 6.3%, when looked at as an overall NEP score, masks the individual changes in each question response. Table 2 summarises the percentage changes before and after the course.

Table 2: *Summary of the NEP scores*

	Before	After	Before	After	Before	After	Before	After	Before	After
Statement	Strongly disagree	**Strongly disagree**	Mildly disagree	**Mildly disagree**	Unsure	**Unsure**	Mildly agree	**Mildly agree**	Strongly agree	**Strongly agree**
1. We are approaching the limit of the number of people the Earth can support	11.5	4.9	4.6	2.0	5.3	5.9	37.4	24.5	41.2	62.8
2. Humans have the right to modify the natural environment to suit their needs	16.8	28.4	24.4	26.5	15.3	13.7	29.8	21.6	13.7	9.8
3. When humans interfere with nature it often produces disastrous consequences	3.8	4.9	3.8	0.0	12.2	5.9	26.7	18.6	53.4	70.6
4. Human ingenuity will ensure that we do NOT make the Earth unliveable	9.16	13.7	6.9	10.8	47.3	32.4	21.4	27.5	15.3	15.7
5. Humans are severely abusing the environment	2.3	4.9	4.6	0.0	2.3	2.0	29.0	26.5	61.8	66.7
6. The Earth has plenty of natural resources if we just learn how to develop them	5.3	4.9	6.1	8.8	6.9	7.8	23.7	21.6	58.0	56.9

	Before	After	Before	After	Before	After	Before	After	Before	After
Statement	Strongly disagree	**Strongly disagree**	Mildly disagree	**Mildly disagree**	Unsure	**Unsure**	Mildly agree	**Mildly agree**	Strongly agree	**Strongly agree**
7. Plants and animals have as much right as humans to exist	0.76	0.0	1.53	1.0	3.8	1.0	12.2	9.8	81.7	88.2
8. The balance of nature is strong enough to cope with the impacts of modern industrial nations	38.9	54.9	33.6	21.6	16.0	12.8	7.6	6.9	3.8	3.9
9. Despite our special abilities, humans are still subject to the laws of nature	5.3	2.0	6.9	3.9	19.9	29.4	30.5	29.4	37.4	35.3
10. The so-called "ecological crisis" facing humankind has been greatly exaggerated	42.7	52.9	19.1	21.6	26.0	18.6	9.2	3.9	3.1	2.9
11. The Earth is like a spaceship with very limited room and resources	12.2	4.9	14.5	9.8	9.2	4.9	33.6	31.4	30.5	49.0
12. Humans were meant to rule over the rest of nature	44.3	51.0	14.5	12.8	12.2	9.8	13.0	12.8	16.0	13.7
13. The balance of nature is very delicate and easily upset	5.3	0.0	7.6	3.9	19.9	12.8	29.8	33.3	37.4	50.0
14. Humans will eventually learn enough about how nature works to be able to control it	7.6	13.7	22.9	13.7	20.6	31.4	29.8	30.4	19.1	10.8
15. If things continue on their present course, we will soon experience a major ecological catastrophe	2.3	1.0	0.76	2.0	6.9	1.0	16.0	16.7	74.0	79.4

It can be observed from Table 2 that responses to certain questions change rather substantially before and after the course. These changing responses are further explored below. In item 1, there was a significant increase of 21.58% of students who strongly agreed that we are approaching the limit of the number of people the Earth can support. The module was therefore successful in making students aware of the limited capacity of the Earth to support the human population.

Item 3 shows that 70.6% of students, having completed the module, now believe that human interference with nature often produces disastrous consequences when compared with the response before, of 53.4% (which was already a reasonable level of environmental awareness). This is still a substantial increase of 17.2% from the start of the course. Another instance of a change in the students' NEP scores worth mentioning relates to item 4. There was a 14.9% decrease in the number of students who are now unsure that human ingenuity will not make the Earth unliveable. These students are now tending to disagree more strongly with the statement, which is a positive finding, indicating that on completion of the module, more students are now of the view that human ingenuity will ensure a sustainable viable Earth.

For item 8, "The balance of nature is strong enough to cope with the impacts of modern industrial nations", after completion of the module there are more students who have shifted from mildly disagreeing to strongly disagreeing. There was, however, little change in the mean score of the students who agreed, before and after. This illustrates that a before-course belief in the negative impacts of industrial development was strengthened during the module, and can be linked to the module on the environmental impact of mining on water quality.

Of note is the change in responses before and after the course for item 11. After attending the module, students now believe more strongly that the Earth is like a spaceship with limited room and resources. This increase is relative to a decrease in the number of students who previously disagreed with this statement. The change in item 11 is mirrored in item 13 where more students now strongly agree that the balance of nature is very delicate and easily upset. Therefore, we can see that students now appreciate that the Earth's resources are limited and easily disturbed, in line with the ecocentric view.

An interesting change is evident for item 14. Before the module, more students both agreed and disagreed with the statement that "humans will eventually learn enough about how nature works to be able to control it". These students now make up the majority of participants who are, on completion of the module, "unsure" of their response to this statement. The course almost certainly made them more aware of the complexity of the issues, whilst the lecturers realised that content needs fine-tuning to help students develop deeper insights.

In relation to item 15, "if things continue on their present course, we will soon experience a major ecological catastrophe", at the conclusion of the course, the number of unsure students decreased from 2.3% to 1% in relation to item 15, whilst the number of

students who strongly agreed went up to 79.4% from 74.05%. Overall, this does tie in with students realising that things cannot simply continue as they have in the past.

Qualitative analysis

All 295 students were also invited to respond to five questions (developed by the authors, see Appendix 2) as part of the survey at the course's conclusion, to explore the reasons behind any change that had occurred, and how this may influence their future teaching. Analysis of the qualitative data suggests that the module developed a more nuanced understanding of the environmental issues dealt with. In a close-ended question, students were asked whether they felt that their level of environmental concern had changed after taking the Resources and Environmental Management module. Of the 112 responses to this question, 111 students believe that their level of concern has changed. For the one student whose environmental concern had not changed, his/her reasoning was that "It hasn't changed because I did not get more information about managing the resources". For this student, who was already environmentally aware at the start of the module, the module did little to inform or change his/her opinion. For the remaining 111 responses indicating a change, the responses were coded using thematic content analysis (Given, 2008) and five main themes emerged. Coding showed that student responses could have multiple themes embedded within them and therefore the number of instances a theme occurred does not total to the number of students who responded to the question. The themes identified are presented in Table 3.

Table 3: *Themes which emerged from thematic content analysis*

Theme	Number of students who identified the theme as a reason for their change in concern
1. Human actions degrading the environment, and inadequate environmental management.	41
2. Concern regarding the scarcity of resources	11
3. Concern for future generations	14
4. Students' thinking changed due to becoming more aware of the environmental impacts associated with human beings	67
5. The negative impacts of environmental exploitation on communities living in that environment	16

In a follow-up question (Question 2, Appendix 2), students were asked whether this change was indicative of an increase or decrease in their concern. It is noteworthy that all 112 respondents indicated an increased level of concern. When coding their open-ended responses as to why their concern has increased or decreased, four themes emerged (see Table 4).

Table 4: *Themes which emerged from responses regarding levels of concern*

Theme	Number of students who identified the theme as a reason for their change in concern
1. An awareness of increasing environmental degradation	22
2. Increased awareness of the state of the environment overall	55
3. Concern for impacts on current and future generations	46
4. An awakening of environmental conscience and increased understanding of own contribution to degradation	46

The qualitative responses garnered through the study are rich and illustrate the mounting concern students now feel concerning the environment. Student X noted that his/her concern "has increased because I have become aware of the activities which threaten the environment. I have also done a self-introspection to check how badly I contribute to the destruction of the environment". The course has therefore not only enabled students to be critical of environmental management practices on a broader scale, but has also made them reflective on a personal level. This personal reflection led to strong emotions of attachment to the environment: "The environment has become so important to me that I have integrated it into my daily routine, I feel more responsible to look after the environment and I want to be a part of the change to make for a better place" (Student XX). A sense of empathy has also been elicited in some students as is illustrated in this quote from Student XXX: "As much as I am not directly affected by the negative consequences, I am now fully aware of the issues faced by many of my fellow brothers and sisters out there and also the struggles they face in trying to fight for their health, due to the diseases they suffer from".

The final closed-ended question required students to reflect on whether the course had enabled them to clarify their worldviews. Of the 112 respondents to the question, 97 said 'yes', three said 'no' whilst there were 12 non-responses. The non-responses could be attributed to students who did not turn the survey sheet over and therefore did not see the last questions.

For one of the students unable to clarify his/her worldview, the reasoning was as follows: "The course readings mainly stated the problems around the environment, not the solutions." This response suggests that students require knowledge of the solutions before they are willing to clarify their own personal worldview. However, this does not reflect the nature of the contested environment and how it should be managed. For another student, confusion stems from the inability to align themselves with any one of the various theories presented to them on environmental management. Their response also illustrates concerns around sustainable development as an approach which seeks to mutually promote the good of the environment, the economy and society rather than seeing these three as being in conflict: "I am still not sure whether we should put the environment before humans or work more toward sustainable development".

Students were asked (Question 4, Appendix 2) in what ways they were likely to change their environmental behavior as a result of knowing their worldviews. The 129 responses received are summarised in Table 5.

Table 5: *Ways students report they are likely to change their environmental behaviour as a result of doing the module*

Theme	Number of students who identified the theme as a reason for their change in behaviour
1. Reduce resource consumption (examples given include: water, electricity, car usage)	49
2. Response indicates an awareness without any action identified	20
3. Student will engage in proper waste management i.e. no longer littering	27
4. Promotion of environmental citizenship, example: reporting water leaks and joining protests.	33

Discussion

The aim of the Resources and Environmental Management module in the Geography in Education course was to give students a better understanding of human impacts on the environment and to encourage them to form an opinion regarding environmental management. In the process, four theoretical approaches to managing the environment were presented; not all of these theories promoted an ecocentric worldview regarding the way the environment should be managed. Proponents of the theory of free market environmentalism, for instance, advocate that human ingenuity will enable humans to innovate their way out of environmental crises and thus takes an anthropocentric stance on environmental decision making and management (Martin, Maris & Simberloff, 2016). Conservation as a theory, on the other hand, promotes a biocentric approach, where all life, including that of fauna and flora, is to be preserved for its intrinsic value and not necessarily for the usefulness of species to humans.

What we are able to see from the NEP scores, which measure pro-environmental worldviews as those that are aligned with a biocentric outlook, is that students both before and after the module did not align themselves with a biocentric management approach such as conservation, as much as they did with the anthropocentric approach of free market environmentalism. This is evident when statements two and four are considered: as a result of attending the module, students seem to have shifted their worldviews towards being more pro-human ingenuity and humanity's ability to manage the environment.

The results of the NEP survey indicate that in addition to the module not making a meaningful difference in changing student's NEP scores, it did not help students to clarify their worldviews. Despite having completed the course, many students are unsure of

their opinion with regard to NEP statements. For some questions, the number of 'unsure' students increased, for example items 4 and 14. This suggests that a longer or more focused course is needed to help with clarity; however, it is unlikely that a longer course will have much impact in changing students' associated worldviews from anthropocentric to biocentric. In an age where human ingenuity is at the forefront of progress it seems likely that students will more readily align themselves with theories that propose to manage the environment in this way.

While we cannot say that the course had the intended impact in changing student's NEP scores, we can say that students are, as a result of the module, more engaged with environmental concerns now than they were before and would change their behaviour. The multi-generational impact of the module can be significant if students implement changes in practices as teachers.

When looking at both the quantitative NEP data and the qualitative responses, we can argue that while the NEP survey does not indicate significant pro-environmental change in students' worldviews, it also does not capture the depth of impact of the module on the students. It is possible that these students, while finding themselves more aligned with an anthropocentric theory of managing the environment, have still been positively impacted by the module. Future longitudinal research to assess the long-term impact of short course modules is necessary.

Conclusion

In this research, our aim was to understand whether a short course (module) on the environment brought about a change in environmental worldviews. The current practice in the university where the study was undertaken, as in other higher education institutions, is to bring environmental education into a course as one of the curriculum modules with the expectation that it will foster lasting change among the students. However, based on the findings of this study we would argue that a module is not necessarily enough to take students from uncertainty to certainty in their understanding. Furthermore, a module cannot be certain to change a worldview to a biocentric one as reflected in a high NEP score, if it is to be a critical appraisal of all the options on environmental management, rather than a narrow promotion of only one option, which would limit students from making an informed decision for themselves.

Ongoing research in local contexts is needed to identify the factors that influence positive environmental worldviews and this would be the next logical step in this research.

In the words of Kioupi and Voulvoulis (2019, p. 1), our understanding of sustainability problems "is incomplete and in part clouded by profound uncertainties" and perhaps the best that can be expected from an introductory module is for students to see the bigger picture and understand the transformative role education can play in transitioning to sustainability. The next steps in future research are to investigate what recommendations can be made to Education faculties to ensure that students engage with environmental concerns, and work out how to teach effectively about these.

Appendices

Appendix 1: Revised New Ecological Paradigm Statements (Dunlap, 2000)

How strongly do you agree or disagree with each of these statements? **Tick the appropriate box that matches your feelings towards the statement.**	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. We are approaching the limit of the number of people the Earth can support					
2. Humans have the right to modify the natural environment to suit their needs					
3. When humans interfere with nature it often produces disastrous consequences					
4. Human ingenuity will ensure that we do NOT make the Earth unliveable					
5. Humans are severely abusing the environment					
6. The Earth has plenty of natural resources if we just learn how to develop them					
7. Plants and animals have as much right as humans to exist					
8. The balance of nature is strong enough to cope with the impacts of modern industrial nations					
9. Despite our special abilities, humans are still subject to the laws of nature					
10. The so-called "ecological crisis" facing humankind has been greatly exaggerated					
11. The Earth is like a spaceship with very limited room and resources					
12. Humans were meant to rule over the rest of nature					
13. The balance of nature is very delicate and easily upset					
14. Humans will eventually learn enough about how nature works to be able to control it					
15. If things continue on their present course, we will soon experience a major ecological catastrophe					

Appendix 2: Closed and open-ended questions

Question 1: Has your level of environmental concern changed after taking this course?

Question 2: Do you think your concern over the environment has increased or decreased?

Question 3: How has this course enabled you to clarify your environmental worldview?

Question 4: In what ways are you likely to change your ecological behaviour as a result of knowing your worldview?

Question 5: As a result of knowing your worldview, how will your classroom teaching practice change?

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Percentage contribution

Areas of contribution	Author	Percentage contribution
Conception or design of the paper, theory or key argument	Goldschagg	50%
	Long	50%
Data collection	Goldschagg	20%
	Long	80%
Analysis and interpretation	Goldschagg	80%
	Long	20%
Drafting the paper	Goldschagg	80 %
	Long	20%
Critical review of paper	Goldschagg	90 %
	Long	10%

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Teachers' Choices of Teaching Methods for Environmental Education: A case study of Life Skills teachers at a primary school in South Africa

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Abstract

The success of environmental education has been attributed to several factors including teachers' competencies and attitudes, teaching methodologies, availability of resources, and curriculum design. Many researchers in environmental education suggest that innovative and resourceful teaching approaches may translate into meaningful environmental education. This study provides an insight into the influence of this on environmental education in a South African classroom through a qualitative approach. Interviews were conducted to understand the teaching approaches used in the subject of Life Skills. The findings of the study suggest that the pedagogical content knowledge and identity of the teacher are determining factors for teachers' pedagogical choices. This paper suggests that it is not the resources that are crucial to learning, rather the presence of a resourceful teacher. A resourceful teacher is able to introduce innovation regardless of the availability of teaching resources. This information could inform pre-service teacher training programmes in focusing on the development of a resourceful environmental education teacher.

Keywords: *environmental education, Life Skills, teaching approaches, Pedagogical Content Knowledge (PCK), educational resources*

Introduction

Environmental education (EE) can be defined as "a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment. As a result, individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions" (United States Environmental Protection Agency, 2017). Key outcomes of environmental education are awareness and sensitivity, knowledge and understanding, attitudes, skills and participation. In the South African school environment, the advocate for and facilitator of these outcomes would be the teacher. The role of teachers in environmental education is thus critical (Ramadhan, Sukma & Indriyani, 2019). It is up to the teacher to adequately educate students in EE through the integration of the outcomes listed above.

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The inclusion of EE in the South African school curriculum creates opportunities for learners to interrogate their own values, beliefs and actions, particularly with respect to sustainable development, social and environmental issues (Shallcross, et al., 2006). While there are no standardised methods for teaching EE, proponents of EE have emphasised holistic and interdisciplinary teaching and learning (Richardson, Liang & Wake, 2014; Mwendwa, 2017). Environmental education can be considered as education about, in and for the environment (Fien, 1992). Learners can be engaged in learning through critical inquiries into real issues of the environment (Mwendwa, 2017). The implementation of learning strategies such as these in the South African classroom, however, presents numerous challenges which include resource limitations (Winther, Sadler & Saunders, 2010). However, EE is not solely dependent on resources and infrastructure but includes the teacher as a central component in effective delivery. In this regard, the knowledge base of teachers is important, but their identities are equally important (Kimaryo, 2011; Mwendwa, 2017). A knowledge base is only as good as the teacher's ability to represent and communicate the knowledge and skills to learners (Mwendwa, 2017). In addition, teachers' learned behaviour, personal attitudes and experiences may impact on teaching and learning in EE (Jannah, et al., 2013). The research question that guided this study was: What factors influence pedagogical choices in Environmental Education?

Environmental education in South Africa

In South Africa, directives to include environmental issues in formal education were mandated decades ago through the *White Paper on Education and Training* (1995). However, the current policy on Minimum Requirements for Teacher Education does not make explicit reference to environmental education (Reddy, 2017). Since 1995, several curriculum changes have been implemented at the basic education level. For example, Biology was replaced by Life Sciences and the theoretical aspect of environmental education was included in this subject at secondary school (Grade 8-12) level (Department of Basic Education, 2011). Practical aspects of EE are also carried through in the subject of Life Skills at the primary level (Grade R-7). Teachers are meant to link environmental concepts to implementation in everyday life using the platform of Life Skills (Department of Basic Education, 2011; Blyth & Meiring, 2018). Previous studies have shown that integration of EE into the curriculum is challenging (Loubser, et al., 2014; Mudaly & Ismail, 2016; Reddy, 2017). Reddy (2017, p. 117) asserted that "the means by which educators achieve the goal of teaching learners about the environment and environmental issues are as important as the curriculum provision themselves".

This implies that Life Skills teachers need to identify and integrate relevant contextual concerns with meaningful learning activities related to EE so that learners develop an understanding of the interrelatedness of the environment, health and well-being (Blyth & Meiring, 2018). Teachers have been reported to struggle with this requirement, particularly in a resource-strained South African school context. Integrating EE with Life Skills is difficult

as teachers need to recognise how to realise the particular knowledge and values embodied in this subject, in the form of learner growth and development (Marques & Xavier, 2020).

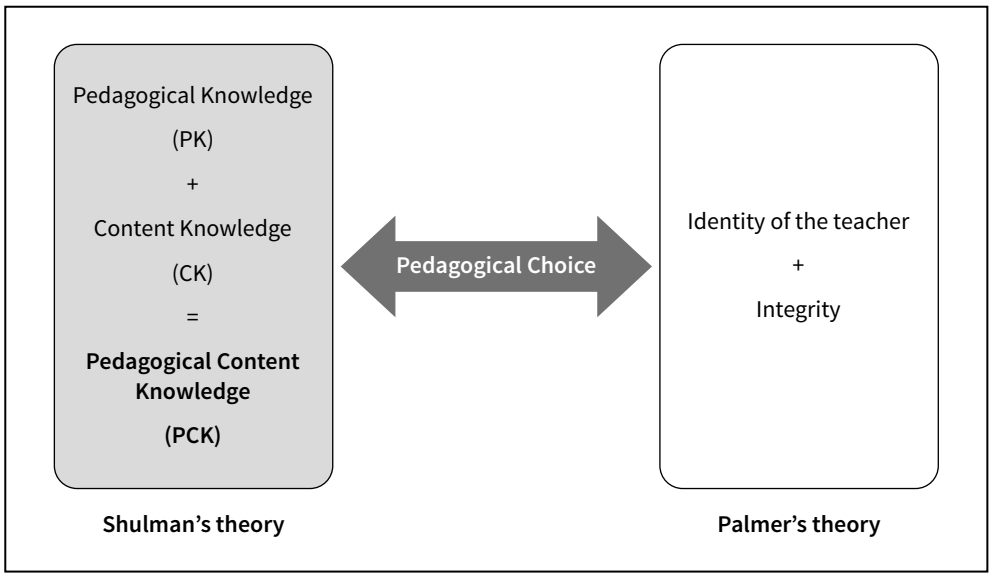
Researchers suggest that South African teacher education programmes prepare teachers for content teaching and are primarily focussed on the 'what', instead of the 'how' (Ramsaroop & Van Rooyen, 2013). Teaching innovation and resourcefulness linked with the 'how' have to include factors such as school contexts, quality and availability of resources and teacher training and experience (Karkkainen, 2012). Resources such as textbooks, internet access, interactive boards and television are unevenly distributed in the South African schooling system and in many schools, these resources are very limited. According to the Department of Basic Education's 2018 statistics, of 23 471 public schools, 20 071 have no laboratory, 18 019 have no library, and 16 897 have no internet. However, the mere presence of these resources is not necessarily enough to guarantee that effective teaching and learning will occur (Spaull, 2013). The teacher is an essential component. An imaginative, innovative and resourceful teacher is the key to successful learning (Asiegbu & Okpala, 2019; Borodina, Sibgatullina & Gizatullina, 2019). Teachers are an important resource in EE, as their attitude, behaviour and motivation may influence what learners do, think and internalise (Jannah, et al., 2013). 'Individual commitment' has been highlighted as the root for inquiry-based teaching, for example (Cheng & So, 2015). Teachers with good tacit knowledge of environmental education use this knowledge as a base to inform their initiatives and to integrate supplementary teaching methods to their lessons (Kimaryo, 2011).

Theoretical framing

Palmer's (2007) theory of identity formed the grounding theory of this study. The theory used to analyse the findings was Shulman's (1987) Theory of Pedagogical Content Knowledge (PCK). Both theories were applicable and appropriate and using them together provided a holistic lens for considering the research question.

According to the Palmer theory, "we teach who we are". It is based on the notion that teaching emerges from one's 'inwardness', identity and integrity. Palmer proposed that the 'tangles' of teaching have three important sources: the subject, the learners and the inwardness of the educator (Palmer, 2007). He advocated that good teaching cannot be reduced to technique; good teaching comes from the identity and integrity of the educator (Palmer, 1997). This theory has relevance for this study, where the teacher is explored as a significant resource in environmental education in the classroom. Shulman's (1987) theory, on the other hand, purports that the knowledge base of the educator frames their own learning and teaching practice. Pedagogical Content Knowledge (PCK) is the combination of content and pedagogy, and hence this theory is also relevant for this inquiry. Shulman (1987) described PCK as a form of content knowledge comprising subject matter knowledge, knowledge of the learner, knowledge of the curriculum, knowledge of the context and knowledge of the pedagogy. A combination of these two theories supported a holistic understanding of the teacher and their practice in EE in this research.

Figure 1: *Diagrammatic representation of Shulman's theory and Palmer's theory used to interpret teachers' pedagogical choices (Source: Author)*



Research design and methodology

This study employed a qualitative approach in order to gain an in-depth understanding of teaching and learning in EE. Data collected from semi-structured interviews with five teachers provided insight on experiences, practice and pedagogical choices. The study was conducted at two public primary schools in KwaZulu-Natal, South Africa. The five Life Skills teachers included in the study had teaching experience ranging from 3-37 years. Teachers were coded with pseudonyms.

Data collection

The two schools were selected through purposive sampling based on proximity, similar socio-economic levels and demographic distribution. The schools are situated in residential areas with predominantly African and Indian residents in the low to middle socio-economic category with a mix of urban and rural households. Both schools have basic educational resources in place and fees are paid by parents.

Piloting the interview schedule

The initial interview questions were piloted with a Grade 5 Life Skills educator from a non-participating school. This validated the data collection instrument and allowed for screening of errors and ambiguity in the questions. After piloting, the interview schedule (see Appendix 1) was amended according to the suggestions received.

Setting up relationships

Ethical clearance was obtained from the DUT Institutional Ethics Committee (IREC #84/16), while gatekeeper permission was obtained from the Department of Education (SA) and the principals from each of the schools. Informed consent was provided by all participants. The principal briefed the educators about the study. Separate sessions were held with educators individually to provide details of the study and expectations regarding their role as participants.

Conducting the interviews

The purpose of the interviews was to generate information on the educator's background from inception of teaching, reasons for their career choice and most importantly, their current teaching methods and what informs their pedagogical choices. The interview schedule included questions about their rationale for choice of profession and their experiences in the field. They shared both positive experiences as well as the challenges associated with integrating EE into the primary school curriculum. The choice and use of varied teaching methods were also explored.

Demographic information was collected. The interviews were recorded on a digital audio recorder after permission was obtained from the interviewee. The interview was guided by the interviewer and interview schedule to ensure the necessary information was obtained. While all the teachers had a lack of resources in common, they had different personal experiences and attitudes towards Life Skills. In spite of this, their pedagogical choices were similar.

Data analysis

All interviews were transcribed and analysed by manual scanning for categories of responses and themes (Ngulube, 2015). Qualitative data analysis consisted of highlighting themes evident in the transcribed conversations between the educators and the researcher during interviews. The data analysis method used was a case- and theme-based approach. Themes were generated based on both the research questions, and the frequent occurrence of explanations or information provided by the participating educators. To analyse the cross-sectional descriptive data, codes and categories were developed using Shulman's framework, focusing on Pedagogical Content Knowledge as the framework. Palmer's theory was used to understand how the personal and professional aspects of teachers influence teaching. Analysis of data leads to themes which may include ordinary (predicted themes) and unexpected developing or emergent themes. Each transcript was thoroughly analysed to explore the attitudes, experiences and views of participating educators in relation to the research questions.

Results and discussion

While teachers differed in personal experiences and attitudes, the challenge of resource limitations and subsequent teacher resourcefulness in teaching EE within the curriculum were common themes. Three overall themes emerged from the data:

(1) Challenges of embedding EE within the Life Skills curriculum and implementing EE;

(2) Resourcefulness in teaching practice; and

(3) Teacher as a resource, with and the associated need for training and professional development.

The research findings are discussed below according to these themes.

The challenges of embedding and implementing environmental education within the Life Skills curriculum

Teachers in this study perceived Life Skills as less significant than other subjects, therefore less effort or innovation was perceived to be required. Teacher R, for example, seemed to value Maths and English more than Life Skills:

> I would go more into detail with Maths and English than I do with Life Skills but not with that emphasis for Life Skills, where you say I would go out of my way to introduce it.

A similar remark was made by Teacher MO who said that he would not go the extra mile for a subject like Life Skills, whereas he would for Mathematics or Science. This could be a common perception of many teachers who teach Life Skills. It is a significant finding, because learners' interest in a subject is likely to be dampened by a teacher's negative attitude towards the subject (Jacobs, 2011).

Similar findings were reported by Ramsaroop and Van Rooyen (2013), where teachers reported challenges with interpreting the curriculum, as the written syllabus was not patently clear, and time allocation was too limited to 'get creative'. Teacher M shared that the prescribed syllabus, the Curriculum and Assessment Policy Statement (Department of Basic Education, 2011), commonly referred to by South African teachers as CAPS, was restrictive:

> We are guided on teaching aspects that are specifically within the CAPS document. We can wander out, but not too much. We have to complete this within a specified time frame and we have to follow a prescribed syllabus. In certain quarters we are doing the basics.

Satchwell (2013) explained that time is often an issue in addressing EE; there is little opportunity to integrate new or innovative concepts, content or methods as the prescribed curriculum does not allow it. Creativity is also problematic when issues such as large class sizes and time constraints prevail. Teacher S chose group work and simple outdoor activities for his Life Skills lessons:

> We've got such big numbers. Because we have 46, to individually assess each person takes up a lot of time. Worksheets, assessments and discussions are mostly with English. Maths, it's content knowledge. Life Skills, it's more outdoors, you teaching dancing, singing, sports, and things like that.

This reflects a notion that methods requiring little to no pedagogic effort are reserved for Life Skills, whereas 'core' subjects warrant greater attention. An intrinsic motivation and passion for the subject plays a crucial role in lesson delivery. It is essential that teachers reconsider Life Skills as equally important as the 'core' subjects. However, we need to acknowledge the challenges in South African classrooms with respect to successful EE teaching and learning.

Time-constrained teaching periods, under-resourced schools and large classes are some of the challenges reported by teachers in this study. Similar results have been found in other developing countries. Challenges include overcrowded curricula, overcrowded classrooms, an overriding focus on traditional subject examinations, high teacher workload, inadequate teaching approaches, lack of supervision and support, amongst others (Mugambi, 2013; Chirwa & Naidoo, 2014). In this study, Teacher M, an experienced teacher with a passion for his profession, shared limitations which restricted him from incorporating various teaching methods for EE:

> What hampers our progress is large class sizes. We are unable to bring them to the library to show them movies because our timetable is structured [such] that while we are teaching Life Skills, another class is in the library.

Factors such as completing the prescribed curriculum, specified time frames and the lack of appropriate physical spaces for engaging in non-traditional teaching approaches prevent the exploration and flexibility of alternate teaching methods. Large class sizes pose a challenge. The learner/teacher ratio in the two schools in this study averaged 40:1. A greater strain is placed on a teacher's time in explaining activities when introducing a new concept to a large group of students and facilitating new methods or ideas (Kimaryo, 2011). Teacher MO described these challenges:

> Most of the cases we have 1:48 and our classrooms cater for 40. The desks in the classroom is one long fixed table; it creates a problem concerning group work. With Life Skills, group work is very important.

Group activities, practicals and outdoor activities linked to active learning are difficult to implement and manage in large classes. These issues were corroborated by teachers in Tanzania (Kimaryo, 2011).

Teacher P shared that a lack of internet access prevented her from using visual learning techniques. She felt that while some learners may enjoy reading and textbook instruction, others may find visual methods more effective in knowledge construction and understanding:

> We are always backstopped by resources. We are just as ambitious and technologically inclined to the changes but we don't have the resources.

Although teachers reported resource constraints such as the lack of textbooks and funds for field trips, there are numerous free online and print resources available. Whether these are accessed and used or not, depends on the teachers' awareness and initiative. Creative teachers are able to find appropriate online resources and and use their own innovation to overcome certain limitations.

Even though Teacher P was willing to incorporate technology into her teaching, she was constrained by these particular challenges in public primary schools in South Africa. The time-constrained, resource-restricted teachers explained that they can hardly complete their syllabus let alone introduce innovation into their teaching:

> I have 45 learners. I can't. I wouldn't think of trying something new. Forty-five learners with 45 different emotional states, different backgrounds. I can't grasp trying something new. (Teacher R)

Since none of the prevailing challenges are likely to be easily resolved, we have to look towards resourcefulness of the teacher in practice, as well as the use of the teachers themselves as a resource in EE. It may be possible to deliver lessons in imaginative and innovative ways despite the various resource-related challenges. This would be largely based on the PCK of the teacher to make well informed choices.

Resourcefulness in teaching practice

Although teachers are constrained by the resource-related challenges outlined above, the mere presence of teaching resources is not sufficient to guarantee that effective teaching and learning will occur. The teacher is an essential component. An imaginative, innovative and resourceful teacher is the key to a rewarding learning experience. Those teachers who were passionate about teaching were able to inspire learners despite not having many resources. Readily available resources included newspapers, the outdoors and the community. Teaching methods using these resources were not too costly or time-consuming. Although teachers listed these factors as challenges, they were able to work around them. They found innovative ways to creatively deliver lessons beyond the classroom.

Teacher M has supplemented his teaching with real-life examples to evoke thinking and inquiry. His use of quizzes and creative activities can be attributed to his personal professional development and his pedagogical content knowledge. Le Grange (2004) has presented a framework that includes three prominent teaching and learning approaches in EE (about, in/through and for the environment, as described by Fien, 1992). With the focus on education in/through and for the environment, knowledge becomes embedded in practice through learners' experiences with every day (real-life) social and environmental concerns. The emphasis is on changing the learners' mindsets to becoming 'thoughtful citizens' (Singh, 2011, p. 115; Swarts, Rens & De Sousa, 2015).

Despite challenges, the participating teachers tried to be innovative within their contexts. Teacher M was an advocate for using real-life situations as a platform for learning and understanding concepts (as also described by Kervinen et al., 2020). He used local newspapers, the television news and family discussions about present environmental situations to reinforce teaching:

> It's very important that learners are not passive within the class, they need to be active. I create group activities for them whereby they have panel discussions or a quiz. We talk about us going to the supermarket and we buy plastic bags. I encourage learners to tell their parents not to buy these bags. As much as the CAPS document is important, [this] coupled with personal experience will give them a broader outlook in life. (Teacher M)

Teacher M supplemented his teaching with real-life examples to evoke thinking and inquiry. He did research and extensive reading to widen his view of the topic covered, so he develops his subject matter knowledge and knowledge of the context through personal inquiry. Teacher M encouraged learners to think and reflect on their own lives in the context of EE.

Teacher MO employed a similar technique:

> We find that some children don't have tapped water, they have to walk distances to collect water so we teach them how precious water is and we teach them about the present drought.

Olatundun and Adu (2013) explained that learning occurs when it is practical and applicable in real-life settings; the personal experience of learners provides a basis for them to discuss the environment and its relationship to their daily lives. Teacher M and Teacher MO have developed the necessary content knowledge and pedagogic skills to incorporate such learning into their teaching. This is the definition of 'Core Competence' in relation to teacher competence as described by Clark, Triggs and Nielsen (2014).

Teacher MO used innovation in a simple form to teach EE:

> I believe in taking them [learners] outside because when I do pollution we go on a walk. We use the environment and we look at things that are in the environment that causes pollution. Then we look at the sky, we look at the smoke that's coming out of the factory. Then we smell the air. We use a hands-on approach, that's how they learn Life Skills, with a hands-on approach the children really learn. Actually that's what teachers are supposed to be doing as part of teaching. They have to give worksheets and give enrichment exercises.

This cost-free exercise is an excellent way to teach EE. Teacher MO's resourcefulness enables him to teach in a captivating manner by using the senses and outdoor education.

Talking and reflecting on situations were common methods used by Teacher P. She indicated that this evokes feelings of appreciation and awareness on environmental issues among others:

> Let's just reflect, what our lives would be like if we didn't have the commodity of water. And it is for the children to go back and reflect and appreciate.

Teaching learners to reflect and appreciate is key to environmental education. Teacher P's technique of delivering the subject content and linking this with reflection on daily practice and life, is likely to be effective in teaching learners to become environmentally literate citizens. For a change in behaviour to occur, one must be able to relate learning to personal life and transform learning into action. Self-reflection was encouraged by Teacher P as the basis for further brainstorming, exploration and discussions of learners' experiences of any subject. She reported that her approach captures the attention of learners and intrigues them, allowing for the lesson to flow thereafter. She has noticed this effect on her learners and explained that she achieves this by ensuring her lessons are fun and interactive: "talking about something that would make them smile… think… giggle… talk and at the same time reflect it to their daily lives". Teacher S also used discussion and outdoors as a method of teaching Life Skills: "Well we have discussions, you bring up jokes and things like that. Life Skills is more about outdoors".

The learning environment created by Teacher P was one of freedom and she provided a platform for learning in a non-authoritarian way. She made talking, discussion and reflection fun while creating an opportunity for deep learning to occur. This process has to be facilitated by a teacher with a sufficient pedagogic knowledge base enabling use of good techniques for optimum results.

Teacher P described other techniques she used in teaching:

> They had to do a survey. They educated elderly neighbours or people with little children on how to be wise in saving water. It was part of going the extra mile in taking what you learn in school and teach it to the community. We looked at the consumption of water at home to flush a toilet, have a bath, have a shower, your dishwashing and we compared both; even the garden sprinkler to the hose; and we looked at ways which water could be saved.

The home or community survey method may not be applicable for all lessons but for this one on water conservation, the cost-free use of a survey replaced an otherwise potentially monotonous chalk-and-talk exercise:

> It was very beneficial because the feedback that came from the kids was WOW. Neighbours and friends commented that they didn't think there was another way of doing this. I researched this and in countries like Australia there are two drain lines where one goes for recycling water. They shared this information with their parents and other people. So the lesson that started from this research went to the class and beyond the class.

The lack of resource options disappointed passionate Teacher P as she has noticed the effect of different teaching methods on the response of learners:

> They don't take much to audio but as soon as you put up a picture they all are interested and [the lack of resources] for me is disappointing. There are so many ways we can teach a subject besides just chalk-and-talk and write notes.

The unavailability of resources stifled Teacher R's creativity and willingness to go the extra mile: "It's basically textbook, chalk, charts, pictures and magazines. We don't have concrete resources with the learners". Teacher R experienced the same challenges as the others but did not appear to make an effort to find ways to overcome these obstacles. It is thus evident that the teachers themselves are important resources in EE, and their attitude, experience and personal development regarding EE may be critical to successful teaching and learning.

The teacher as a resource (identity and professional development)

According to Palmer (1997), good teaching cannot be reduced to technique; good teaching comes from the identity and integrity of the teacher. He proposed that all the aspects of a teacher's life that have influenced them as a person, and the use of those experiences and learning, inform the professional choices of the teacher. The teacher's general understanding of the teaching of environmental education i.e. the teacher's knowledge, beliefs about the purpose and goals for teaching environmental education (what Palmer refers to as the 'why'), are important and will determine their choices with regard to instructional strategies, assessment and the use of materials and resources (Magnusson, Krajcik & Borko, 1999). The 'who' behind the pedagogical choices, that is, the individual teacher, is important as it informs the learning, attitudes and knowledge one acquires and uses as a teacher.

Teacher P found her profession rewarding and her willingness to be innovative can be linked to this intrinsic factor: "It gives me an overwhelming feeling of satisfaction to know I've made a difference, a positive difference". Teacher MO shared his view on the profession and the importance of having a passion for teaching:

> Teaching has got to be a passion and I have a passion for children. I'm teaching now for 34 years and if you don't have that passion for teaching you'll never get them, you got to have that love cause you know if you look at teaching, you can't become a rich man, it's got to be a passion.

Teacher M viewed his choice of career path as a result of a 'noble calling': "There were a lot of barriers nonetheless when we got into the profession and it was a noble calling, it was an outreach to the community". Researchers have also identified a teacher's commitment, knowledge of instructional methods and facilitation skills in the class as crucial in teaching Life Skills and related subjects like Life Orientation (Lamb & Snodgrass, 2017).

Teachers in this study seemed to be confident in terms of their EE knowledge base with the exception of Teacher R. They generally showed a positive attitude and a readiness to tackle EE teaching. Some of the teachers talked about self-learning which alluded to their own initiatives in searching for more knowledge and keeping in touch with current issues. These teachers were aware that their own learning was also lifelong and is not confined to the classroom. One teacher expressed feeling less competent in teaching EE because of a lack of formal training. Professional development is essential to boost confidence and

improve effective delivery of EE. This is a critical issue, as teachers who are not confident and do not perceive themselves to be adequately competent in teaching EE may not be able to fulfil EE goals.

Teacher M enhanced and broadened his knowledge through reading, looking at subject material and observing international education and subject trends.

> I'm teaching this subject for a few years now so every year I try to improve by reading, looking at new material, looking at trends that are set in other countries, not only first world countries. I look at problems that first world countries are experiencing and solutions, success stories and failures.

A teacher's self-directed inquiry and learning assists in improving pedagogical content knowledge. A simple, yet empowering tool of reading relevant literature can assist teachers with keeping abreast of their profession. The experiences, backgrounds and personalities of teachers in this research emerged as a key influence in their individual teaching methods and practices. Each teacher varied but it was clear that their individual teaching methods stemmed from their professional choices, personal experiences and intrinsic beliefs on the content or subject, demonstrating that the individual teacher is a valuable resource in EE. Teachers who viewed the profession as a calling or an opportunity to make a difference (Teacher P, Teacher M, Teacher MO and Teacher S) all demonstrated some effort in EE pedagogical choices and practices. They either incorporated outdoor education (Teacher M), group work (Teacher S), surveys and community engagement (Teacher P) or discussions, case studies and news reports (Teacher MO) to supplement their teaching in an innovative way.

Teachers have been found to be reluctant in engaging learners on topics of environmental issues due to the pedagogical insecurities of their own knowledge and understanding (Satchwell, 2013). Consistent training can equip teachers with the confidence they require to initiate and conduct activities relating to environmental education. Teacher MO emphasised the need to be updated on subject matter and teaching content: "There will be new activities that we can look at to enhance the lesson".

Teachers require sufficient knowledge on environmental issues to enable them to integrate environmental aspects in their delivery of subjects apart from Life Skills. Increasing teacher experience in environmental education will enhance effectiveness of EE and cultivate environmental literacy (Yuan, et al., 2017). Investment in professional development is essential to promote an interdisciplinary approach which will enable learners to identify the environmental links with other facets of curriculum and life. The standard of education can be improved through the professional development of teachers (Pedretti & Nazir, 2013). In the short term, teachers need to be trained to develop teaching and learning materials from the resources which are available in their environment to facilitate learning. Similar to South Africa, teachers involved in a study conducted in Tanzania did not receive training in EE when training as teachers nor had they undergone any in-service training in EE. However, some teachers felt that they were competent in

teaching EE at primary school level, given their knowledge and self-learning which, when coupled with enthusiasm and motivation, can achieve the outcomes of EE (Burns & Bell, 2011). Online or distance learning allows teachers the opportunity to learn in their spare time. Yuan et al. (2017) suggested newsletters as a means of regularly providing EE teachers with relevant professional knowledge and introducing EE related regulations to support teacher development.

The findings from this small-scale study suggest that teachers who are passionate about teaching and learners will find ways to use available resources as optimally as possible. It would appear that resource availability comes second to a teacher who is able to educate innovatively stemming from his/her passion for teaching. Using the theoretical frameworks, the study provided an understanding of the two facets which inform teaching method choices, namely, the pedagogical content knowledge of the teacher and the identity of the teacher. These are the professional and personal aspects of the teacher which contribute to good environmental education in the South African classroom.

Conclusion

Environmental education in the primary school classroom is an attempt at raising an environmentally literate society and teachers play a crucial role in achieving this goal. The research reported here set out to provide an insight into the actual influences on environmental education in the South African Life Skills classroom through a qualitative approach. Five Life Skills teachers participated in this study which aimed to explore the following research question: What are the factors influencing pedagogical choices for environmental education and the reasons for these choices? The findings were analysed using theoretical frameworks by Shulman and Palmer and suggest there was no evidence to support that the availability of resources or lack thereof influences pedagogical choice. Pedagogical choice seemed to be influenced by pedagogical content knowledge and teacher identity. The 'who' of the teacher surfaced as the greatest determinant of pedagogical choice.

The availability of physical and material teaching resources did not seem to be a significant determining factor for innovative teaching. The most significant factor was found to be the teacher when exploring the reasons behind good environmental education. This paper suggests that it is not the available resources that are crucial to learning, rather the presence of a resourceful teacher. The individual identity of the teacher is important when evaluating the effective delivery of EE; teachers can be both resourceful and a resource. This research study has shown that despite the challenge in availability of resources as the common thread amongst all participating teachers, most teachers were able to add a level of innovation to their pedagogical choices for EE. Those teachers that made an extra effort demonstrated positive attitudes regarding EE and the teaching profession. Teacher R contrasted with the other teachers in this study and clearly displayed a lack of effort stemming from her view of the teaching profession and the importance allocated to EE.

We can focus on the opportunity to aid teachers with training on the 'how' of environmental education to enable them to identify good pedagogical choices in resource-

constrained situations. Professional development in EE is therefore essential to provide a means for introducing teachers to new strategies and materials that they may access for teaching within a resource-constrained context as is common in the South African classroom. It is also recommended that we introduce this information to potentially inform the development of pre-service teacher training programmes in focusing on the development of a resourceful environmental education teacher. Training institutions should provide the future teacher with the skills to identify innovative options for teaching. A greater emphasis should also be on the development of the teacher as a person and sustaining this development on an ongoing basis. Programmes should aim to develop resourcefulness in teachers by expanding their thinking to beyond the limits of the classroom or challenges of the school. Development of professionals should be continuous in order to ensure teachers are updated and remain relevant within their field.

Notes on Contributors and their Contributions

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Percentage contribution

Areas of contribution	Author	% Contribution per area, per author (each area = 100%)
Conception or design of the paper, theory or key argument	Ruthanam	40%
	Reddy	30%
	Pillay	30%
Data collection	Ruthanam	100%
Analysis and interpretation	Ruthanam	50%
	Reddy	25%
	Pillay	25%
Drafting the paper	Ruthanam	50%
	Reddy	30%
	Pillay	20%
Critical review of paper	Ruthanam	40%
	Reddy	30%
	Pillay	30%

Appendix 1: Teacher Interview Questions

1.Tell me about your life as a teacher from the time you started? Why did you choose to study teaching?

2. What makes your teaching in the classroom enjoyable?

3. Tell me about your experience teaching Life Skills?

4. Tell me about any bad experiences?

4. Which teaching methods or styles do you prefer for EE in Life Skills?

5. Why do you prefer this/these methods?

6. Have you tried other methods?

- If not, why?
- If yes, what methods did you try?
- What were the outcomes?

7. What are your challenges regarding teaching EE using different teaching methods?

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VIEWPOINT

How to Teach Global Challenges? A Solution-Focused Approach

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Abstract

Our present and our future are determined by massive global challenges. While the United Nations' Agenda 2030 attempts a global answer to cope with these challenges, schooling in general and Geography teaching in particular, have to find answers for how to deal with challenges such as climate change, loss of biodiversity, water scarcity, poverty or migration. Historically, a mainly problem-oriented teaching approach shaped the learning settings on these topics, with most of the lesson time dedicated to the problem. A solution-focused teaching approach, presented here, makes the solution the main focus in terms of time, thoughts, creativity and discussion, without neglecting the challenges. This approach considers principles of Education for Sustainable Development and contributes extensively to the key competences it strives for. By means of concrete examples from Germany and India and suitable elements such as 'stories of change', this paper explains and reflects on this innovative teaching approach.

Keywords: *global challenges, Geography teaching, solution-oriented teaching, Education for Sustainable Development*

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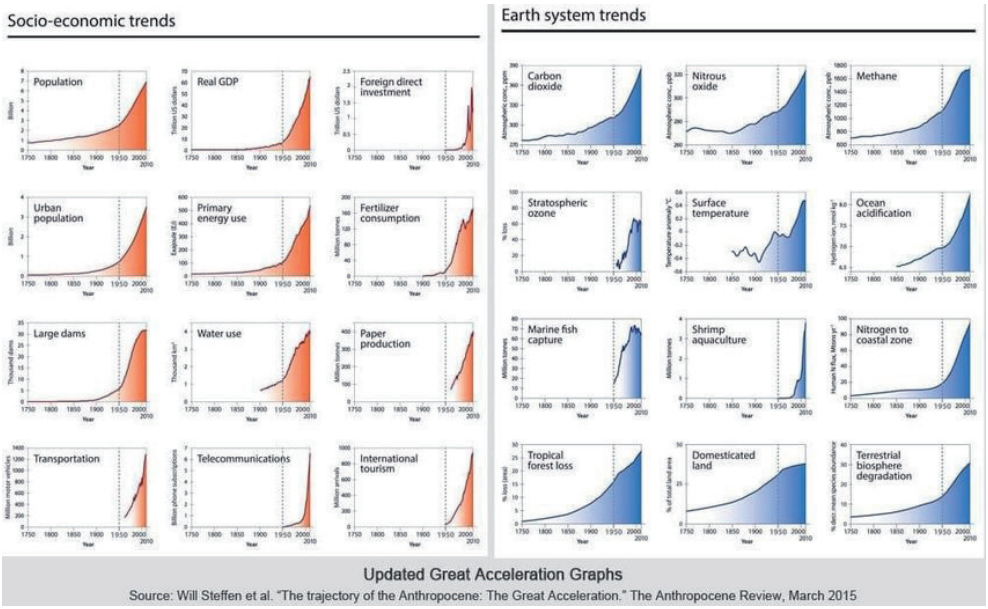
The Earth rising above the lunar horizon, photographed by the astronauts of the Apollo mission in 1968, introduced billions of people for the first time to the immense beauty of the Earth, but above all, to its vulnerability. Protected by a remarkably thin atmosphere, the Earth and its ever-increasing population moves through infinite space. More than half a century has passed since this eye-opening vision without this awareness being adequately reflected in our actions. Rather, we as a global society are acting less and less sustainably, as reflected, for example, in the annual scheduling of Earth Overshoot Day. In the 1970s we only overstretched the Earth's regenerative capacity by a few days in December; in 2019 this was 1 August. By that time, we had used up the planet's regenerative resources for the entire year, and from then on we have been living on what has been an ever-dwindling store.

This general overexploitation of the planetary system is accompanied by a multitude of global challenges, to which the United Nations has most recently responded with the Agenda 2030 and its 17 Sustainable Development Goals (SDGs) (United Nations, 2015; Martens & Obenland, 2017). Agenda 2030 sets out the targets that each country must achieve on its own, and the world as a whole, by 31 December 2030. Such an undertaking can only be approached as a process involving society as a whole, and consequently the institution of schooling in the broadest sense must also consider what contribution it can make to this agenda, and how the SDGs can best be integrated into teaching.

Working with global challenges and SDGs

As Jürgen Osterhammel (2016) impressively explained in his work *Die Verwandlung der Welt (The Transformation of the World)*, the decisive course was set in the 19th century for the globalised world in which we live today. We are experiencing the positive consequences of this historic change of course in the form of dramatically improved standards of living for many; the enormous increase in our mobility options; and longer life expectancy by decades due to better nutrition, hygiene, education and health care. On the negative side, we have been experiencing since the middle of the 20th century an exorbitant increase in the demand for resources of all kinds, a dramatic strain on and destruction of the natural environment, and increasing radii of action for more people in shorter periods of time within the framework of a globalised economy (Welzer, 2014, 2019; Hoffmann, 2018a; Göpel, 2020). In the past decade, a team led by Will Steffens not only introduced these developments into the discussion under the title "The Great Acceleration" (see Figure 1), but also made them visible by means of impressive graphics. These have become a symbol of the Anthropocene, i.e. the approach that describes the present as the 'Age of Man' according to the logic by which the most influential factor gives its name to the designation of geological periods (cf. Steffens et al., 2015).

Figure 1: *The Great Acceleration (Steffens, et al., 2015)*

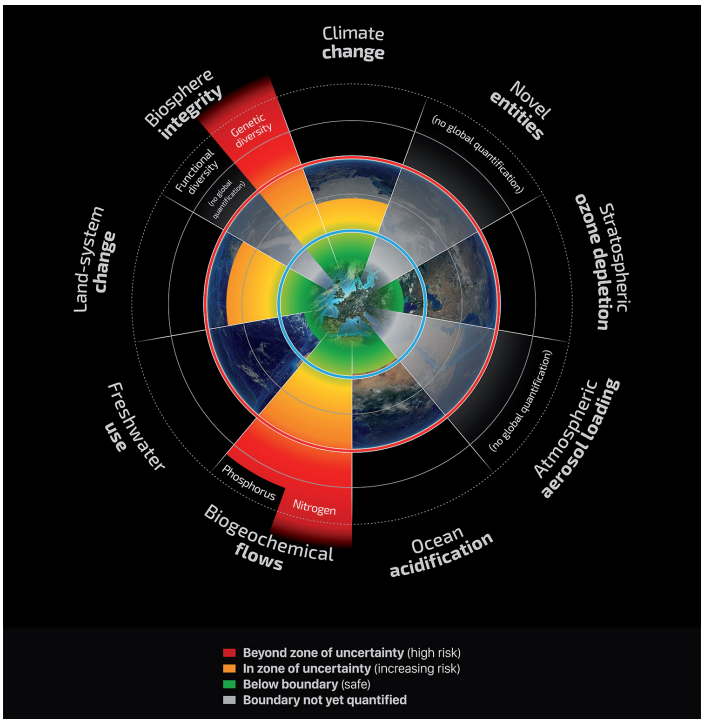


The associated consequences have neither a local nor a regional limitation; they have a global impact. These global challenges, i.e. existential problems that occur simultaneously on at least two continents, determine to a considerable extent the worldwide living realities of the present and the expected near future (Hoffmann, 2018a). This applies to anthropogenic climate change which, according to the current state of affairs, and contrary to all agreements of the Paris Climate Summit of 2015, is expected to reach not +1.5°C to a maximum of +2°C by the end of the century, but an increase in the global average temperature of +3.6°C. It applies equally to numerous other global challenges. For example, the World Biodiversity Council (IPBES, 2021) puts the number of species directly threatened with extinction at one million. The global dimension of soil degradation, which is as yet being addressed only very tentatively by global policy makers, is also documented by frightening figures: less than 15% of global soils that could potentially be used for agricultural production are still available, while at the same time tens of millions of additional hectares of arable soils are lost every year through erosion, contamination, overbuilding and salinisation – a reality that has entered the discussion as "Peak Soil".

In addition to the continued dominance of climate-damaging energy supplies based on fossil fuels and energy-intensive lifestyles, the main causes of these developments are land-use systems that massively affect soils and biodiversity, as the German Advisory Council on Global Change (WBGU) pointed out in its latest report, *Rethinking Land in the Anthropocene: From Separation to Integration* (WBGU, 2021). Furthermore, massive quantitative as well as qualitative supply problems with drinking water are emerging, particularly in the semi-arid

regions of the world, as a result of climate change. Global phosphorus and nitrogen cycles are increasingly dysfunctional, and the pH value of the oceans has already shifted by one decimal from 8.2 to 8.1 (from the slightly basic towards the acidic sphere) over the past two hundred years. The planetary boundaries, as identified by researchers at the Stockholm Resilience Centre over the past decade (see Figure 2), have in the meantime, according to their assessment, already been exceeded with respect to functional biodiversity and phosphorus and nitrogen cycles to an extent that threatens their regenerative capacity, while other areas, such as the freshwater issue, ocean acidification and also climate change, are currently still seen to be within the resilient range of the Earth system. About others, namely the emergence of new substances or atmospheric aerosols, too little is currently known to make a qualified assessment of their state (cf. Steffens, et al., 2015).

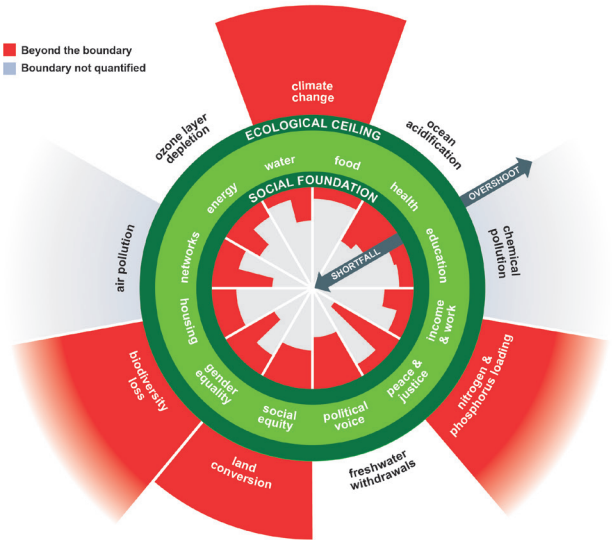
Figure 2: *Planetary boundaries (Steffens, et al., 2015)*



In addition to these natural system stress limits of the Earth system, Kate Raworth and colleagues have summarised and quantified the socio-economic dimensions of global challenges in the 'Doughnut Economics' model (Raworth, 2016; see Figure 3). This illustrates how, in addition to the ecosystem challenges identified and assessed by the Stockholm Resilience Centre, poverty, access to clean drinking water, education, resilience, political voice, labour, energy supply, social equity, gender justice, health and nutrition describe the

socio-economic challenges of the global society, which are expressed worldwide in the form of hunger, disease, or increasing migration processes.

Figure 3: *Doughnut Economics model (Raworth, 2016)*



In many cases, these global challenges are not communicated with a systemic understanding, but are perceived, discussed and also taught additively. This does not do justice to their multiple interdependent causal links and consequently makes it difficult to identify meaningful approaches to solutions. However, it is precisely these – causal links and solutions – that should be given special attention in the context of Geography, Science and related subjects.

With the Millennium Development Programme, the world community attempted for the first time at the turn of the millennium to address global challenges in an approach based on the principle of sustainability. However, the limited commitment of the programme to the countries of the Global South and the overly disproportionate emphasis on social aspects in the eight fields of action and their objectives (halving the number of hungry and poor people, primary education for all children, gender equality, reducing child mortality, improving maternal health, combating HIV/AIDS, improving environmental protection and building a global partnership) meant that the frequently voiced structural criticism could not be dismissed out of hand. Nevertheless, during the 15-year period from 2000 to 2015, striking successes were recorded regionally, particularly in Southeast and East Asia, and sectorally, especially with regard to the reduction of maternal mortality and increasing educational access. However, there was no sense of overcoming the global challenges as a whole.

Thus, it was important to follow up the Millennium Development Programme with another world development programme, Agenda 2030, which was adopted by the United Nations General Assembly on 25 September 2015 and has been in force since 1 January 2016. With a total of 17 goals for sustainable development, the SDGs, the United Nations is ultimately responding to the real global challenges. This overcomes the structural deficits of the Millennium Programme, in that the target formulations are now binding for all countries and, in addition, the sustainability approach has been applied much more broadly.

Figure 4: *The Sustainable Development Goals (https://commons.wikimedia.org/wiki/File:Sustainable_Development_Goals.svg)*

In order to achieve these goals, SDG 4 (Education for Sustainable Development), is of particular importance. On the one hand, the SDGs themselves are a form of learning content; on the other hand, they are a necessary tool for achieving the goals set out in the SDGs as a responsible society. Inevitably, the question arises: how to deal with the SDGs (or their flip side, the global challenges), in the classroom in the most adequate way?

How can global challenges be dealt with in (Geography) lessons?

Firstly, we need to gain clarity regarding the teaching objective:

- Is it only about the cognitive perception of global challenges and their associated SDGs?
- Should the dimensions, causes and consequences of the global challenges be addressed using a causality-oriented approach?

- Or should approaches to *overcoming* global challenges also be the subject of the lessons?

Although both the SDGs and the term 'global challenges' have only been formulated in a few Geography education plans in Germany (for example, in Baden-Württemberg and Lower Saxony), these are fixed components of Geography curricula and education plans of all types of school in all federal states and beyond the borders, ranging from climate change and water crisis to species loss and desertification to soil degradation, poverty, migration and urbanisation. The guidelines laid down in individual curricula on addressing these topics vary widely in terms of their objectives and thus offer varying scope for concrete implementation. To find consensus in view of this diversity, Agenda 2030 can certainly offer guidance (cf. Martens & Obenland, 2017). At the operational implementation level of the targets of Agenda 2030, the following formulation has been agreed for SDG 4.7:

> By 2030, ensure that all learners acquire the knowledge and skills necessary to promote sustainable development, including through education for sustainable development and sustainable lifestyles, human rights, gender equality, a culture of peace and non-violence, global citizenship, and an appreciation of cultural diversity and culture's contribution to sustainable development (United Nations, 2015, p. 19).

Thus, we have a solution- and action-oriented objective focused on individual competence development. The competencies that learners of all ages and from all social contexts should develop concretely in relation to sustainable development determined the discussion that took place for decades at national as well as international levels. With the publication *Education for Sustainable Development: Learning objectives* issued by UNESCO in 2017, this discussion came to a final consensus in my view. According to this guideline, the development of eight key competencies is to be promoted within the framework of Education for Sustainable Development. These include:

- the competence to think critically,
- systemic competence,
- the competence to anticipate,
- normative competence,
- integrated problem-solving competence,
- strategic competence,
- collaboration competence, as well as
- the competence for self-awareness.

Equipped with these competencies, according to UNESCO's vision, each individual citizen is empowered to make an active contribution to society's overall development towards a sustainable society. This competency approach has since been widely accepted and underlies a number of publications, including *Teaching Sustainable Development Goals* (Hoffmann & Gorana, 2017).

This approach is not fundamentally alien to Social Science, Social Studies or Geography teaching in Germany. In particular, in Social Sciences, a problem-(solution-) oriented approach to the design of lessons has developed over decades. This approach is still widely used in textbooks and teaching materials and is also the basis of many contributions to Geography didactics. In general, lessons are opened by means of pictures showing more or less dramatic realities. Thus, thousands of textbook chapters and teaching sequences on climate change begin with pictures of flood- or drought-stricken regions, with polar bears floating on small ice floes in Arctic waters, or with dramatic pictures documenting glacier retreat in high mountains. The topic of soil degradation is introduced with drastic erosion damage or gleaming white areas of salinisation, or introductory images show emaciated people or migrants on the move to open up the topics of hunger, poverty and migration. The further course of the majority of these approaches, which seem to be firmly established in our teaching culture, focuses on the causes and dimensions of the respective problem before a possible solution is finally addressed and discussed with the students. In many cases, approaches and concepts of sustainable development are addressed in a topic-specific manner in this context and are also taken more intensively into consideration, so that all aspects are sufficiently taken into account.

It is worthwhile to reflect on this approach, which has been widely cultivated for years. It is especially important to reflect on the effect of this approach on the students. How is subject matter taught in this way, perceived from the perspective of 16- or 17-year-olds? Their perception of the subject area of global challenges introduced in this way is linked to their own life perspective and at the same time is strongly 'emotionalised'. Here is an example: the opening page of a textbook chapter entitled *The Future of the Earth* is dominated by two pictures. One shows a huge traffic intersection with several lanes, without any enlivening greenery in sight or any kind of settlement. The second picture directs the viewer's gaze over a space with dry cracks almost devoid of vegetation, two women carrying small water containers. The images convey hostile spaces. From the students' point of view, the first encounter is not primarily an analytical, sober consideration of a problem to be solved. Rather, in the sense of the highly emotionalised process of perception and understanding described by the American psychologist Daniel Kahnemann as "fast thinking" (cf. Kahnemann, 2011), they perceive the real scenes or future scenarios presented in the image as a determining factor in their own lives, which may not be factually wrong. The resulting reaction, which is also emotionally dominated, may vary in intensity from one individual to another. It ranges from hopelessness to resignation, encompasses worry, danger, fear and threat, and brings doomsday scenarios into the realm of the expected. Neither of these extremes provides an adequate basis from which the students can immediately engage with the global challenges presented in a solution-oriented manner, but instead sets discussions in motion along the lines of the fears triggered. This effect, which can be observed again and again in the reality of teaching and which is expressed in discussions with students, must surely be a reason to consider alternative approaches. The solution-focused approach to teaching outlined below could be seen as an option.

A solution-focused teaching approach

The development of a solution-focused teaching approach in the context of the thematic field of SDGs or global challenges has to be seen also against the background of the debate about the educational value of the subject Geography in our time. This can be focused on the following four points:

- Analyse, discuss and evaluate natural and social phenomena and processes in a fundamentally integrative and systemic way;
- Analyse, discuss and evaluate spaces on all scales from the local to the regional to the global dimension in a question-oriented manner;
- Examine spaces on all scales in a problem-solving and action-oriented way, especially in the sense of the principle of sustainability; and
- Orient the temporal perspective towards the present and the future.

On the basis of these objectives, it becomes clear that a solution and future orientation based on the principle of sustainability is of particular importance, as has been acknowledged for the competence orientation of Education for Sustainable Development in recent years (outlined above).

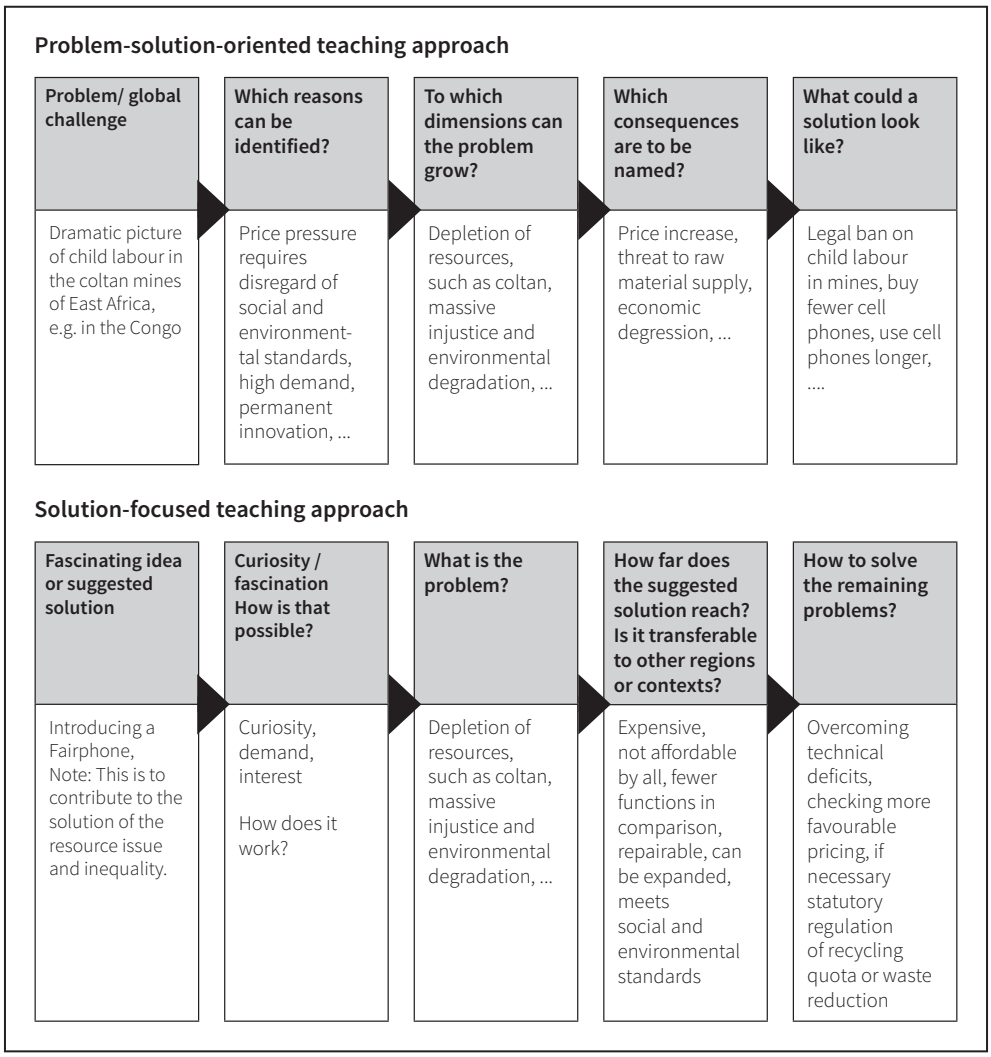
While the problem-oriented teaching approach focuses on the problem, such as the worldwide water shortage, and deals exclusively with the various facets of the problem itself, the problem-solution-oriented approach goes one step further. Like the problem-oriented approach, the problem-solving approach begins with the problem and deals with it in detail, but then moves on to ask about possible solutions and discusses these in detail and in a targeted manner. One advantage of this fact-based approach is that solutions discussed are highly attuned to a detailed analysis of the problem and can thus be perceived and evaluated as a concrete mechanism that is close to reality.

In contrast to these two approaches, the solution-focused approach focuses more on the engagement with and discussion of proposed solutions and approaches. Following this approach, the solution proposals already form the introduction to the lesson and take considerably more lesson time than the problem constellation. This is illustrated with an example of resource scarcity as a topic to be taught (Figure 5). If a lesson on the topic of resource scarcity begins with a discussion about a Fairphone, for example, or a lesson on emissions and climate change begins with a concept for intelligent street lighting, or a lesson on the world water crisis begins with the presentation of an environmental award to the developer of a new type of high-performance ceramic filter, then students are immediately intrigued and usually react with curiosity. This can lead to them wanting to participate in the development of such clever ideas. This positive reaction is usually followed by questions from the students themselves about the effectiveness of the idea presented, so that the next step in the lesson is to ask about the dimensions and quality of the problem to which the proposed solution is supposed to be an answer. In this context, the operator "to verify" must be given central importance. This is because at the core of the solution-focused teaching

approach presented here is the question: How good is this solution-focused approach? Can the Fairphone solve the environmental and socio-economic problems of thousands of children mining for tantalum and coltan in the mines of East Africa? Is the technology of intelligent street lighting, as tested in Ludwigsburg, Germany, a serious contribution to overcoming energy problems? Or, does the ceramic filter solve the deficits of a clean drinking water supply that can be observed particularly in the Global South?

The example of the shortage of resources due to cell phone production is used in Figure 5 to illustrate this point.

Figure 5: *Problem-solution-oriented vs. solution-focused teaching approach – an example of 'Resource scarcity due to cell phone production' (author developed)*



In contrast to the problem-solving approach to teaching, the students working with a solution-focused teaching approach enter a solution-focused mode of thinking from the very beginning. The reactions of resignation, worry or even fear familiar in other teaching approaches are largely absent. Experience shows that a solution-focused mode of thinking is largely maintained even when the dimensions and effects of global challenges are at the centre of the subsequent classroom activity. It is important to maintain this throughout the entire course of instruction, and ideally even to support the development of this way of thinking as a basic attitude among young people.

If this kind of solution-focused lesson opening leads to examining the effectiveness of a fascinating innovation, its possible transferability and global application, the next step is to deal with the dimensions, causes and effects of the global challenge from the perspective of the solution. This stimulates the desired creativity, future and solution-orientation, but also critical thinking, which are among the key competencies to be developed in the context of Education for Sustainable Development. The associated pedagogical-psychological effect is enormous, because the students perceive themselves in an open thinking space in which they can develop their own creativity and take on the challenges posed in a solution-oriented manner and, depending on the lesson design, also experience a sense of self-efficacy.

From an educational-psychological perspective, the strongest argument in favour of this approach is that, when appropriately designed, it does not encourage depressive moods or a sense of hopelessness. This is true even if an initial fascinating idea or the proposed solution can only partially or under extreme conditions overcome a global challenge. In such situations, it has been noticed that most students ask: How do we solve the remaining problem(s)?

The implementation of a solution-focused teaching approach is illustrated in the textbook *Globale Herausforderungen. Die Zukunft, die wir wollen* (*Global Challenges – The future we want*) (Hoffmann, 2018b). It is follows in large parts the factual logic of the traditional problem-solving approach. However, the decisive factor – the paradigm shift of this approach – is to place the solution ideas at the beginning and to deal with them primarily and critically, constructively for the longest part of the lesson, without downplaying or ignoring the global challenges, their scale or their potential danger. In contrast, widespread teaching practice devotes most of the class time to the problem and only discusses possible solutions at the end, to a limited extent and in a short period of time.

Proposed solutions are by no means limited to technical innovations or resource- and energy-saving processes, but can also be in the form of 'stories of change'. This approach is the basis of the teaching manual *Teaching Sustainable Development Goals* (Hoffmann & Gorana, 2017).[1] In this guide each of the 17 goals is presented with regard to the official formulation of the goals, the global conditions that need to be overcome, and possible didactic-methodical approaches. In addition, and this is the key characteristic of this teaching material, a real story is told about each of the 17 SDGs. This is designed with the culture-changing effect of narratives propagated by Harald Welzer (2014) in mind. Narratives are to be understood as collective stories and concepts with which

each individual associates positive experiences. For example, narratives such as personal freedom, freedom of movement, opportunities for development, democracy or consumer orientation, and others, are the starting point of positive individual experiences, which in their sum contribute to social cohesion and can certainly be understood as culture-forming. Narratives not only reflect cultures, but can also change them. Thus, narratives can be used as an instrument for social change and therefore can also be misused. Following these considerations, the Teaching SDGs manual tells a 'story of change' for each of the 17 goals. Against the backdrop of the international ESD Expert Net working group and with the aim of learning from one another, four 'stories of change' were compiled from each of the countries involved in the project – India, Mexico, South Africa and Germany – while the story of ESD ExpertNet itself was told for SDG 17, which formulates the formation of global partnerships as a goal.

To illustrate these conceptual foundations, one of these stories is presented here:

The curious case of Whali in Mangrol

When Kunal and his friends visit their fishing nets, which they place off the coast of Gujarat, they can see, already from a distance, whether their nets have been destroyed or not. Coming closer, they see one of the most impressive species of the oceans: a whale shark. Kunal bows over the edge of his boat, cuts several metres of the net and releases Whali to the open sea. Neither his father nor his grandfather would have done this. They would have been delighted with such a huge catch. In 2004, a spiritual Hindu leader, Morari Bapu, addressed the village community of Mangrol, a small settlement on the coast of Gujarat in India, urging them to protect the whale sharks – the largest fish in the sea. Whale sharks reach lengths of 40 feet or more. Morari Bapu called it Whali, which means "dear one". He used the metaphor of a daughter coming to her maternal home. In the Indian custom a daughter, where possible, delivers her first child in the place of her own childhood. And, of course, nobody would consider harming her. The Gujarat coastal region is a breeding area for the whale sharks. Whale sharks were being killed by the fishermen for liver oil and meat after getting caught in the nets. The population of the whale sharks on the Gujarat coast dwindled drastically from 1995 to 2000. In 2001, whale sharks were included in IUCN Endangered Species List. The same year, fish species were brought under Schedule I of the Wildlife Protection Act of India. Since then, poaching whale sharks has been made punishable under the Wildlife Protection Act. Seeing no abatement in the killings, the Wildlife Trust of India launched a massive public campaign – 'Save the whale shark'. This campaign included the local community, fishermen and Morari Bapu. Tata Chemicals stepped in to compensate fisher folks who had to cut their nets to let the big fish get away into deep waters. The compensation benefitted both people and the whale sharks. The campaign led to the protection of 585 whale sharks and became one of the biggest whole community efforts to protect the largest species of fish. Indeed, Mangrol became the world's largest site for the protection of whale sharks! The efforts of the village community, fisher-folks, state forest department, international NGOs, and corporates made it possible to protect the whale shark. (Hoffmann & Gorana, 2017, pp. 63-64)

With such narratives of change, not only is the specific objective of SDG 14 "to conserve and sustainably use the oceans, seas and marine resources for sustainable development" made clear, but learners also learn, through further narratives, that there have been a multitude of successful approaches, projects, measures, initiatives and deeds that have contributed to the realisation of all SDGs.

Departure from the commonly practised teaching approaches involving discussions in the subjunctive, in favour of teaching in the indicative has an effect. However, this approach must be wary of becoming a form of indoctrination, for example, expecting students to adopt a particular solution such as solar power or electric vehicles uncritically. With all the enthusiasm for ideas or stories, it is essential to maintain a critically analytical perspective. This is the only way to ensure that students gradually realise that active participation in shaping a sustainable society is based on the following three steps:

- The cleanly conducted, critically reflective analysis of the current situation;
- A realistic, clearly formulated goal oriented to the principle of sustainability, and
- The personal determination to act consistently in favour of the formulated objective.

Conclusion

It is vital to establish the SDGs or their reflection of reality, which can be described as global challenges, as an integral component of Geography and related lessons. However, with regard to concrete implementation in the classroom, there are long-established problem (or problem-solving) oriented approaches, which have been contrasted here with a solution-focused approach as an innovative proposal. The application of this solution-focused approach must not be based on naive good faith, as its implementation is tantamount to a tightrope walk. On the one hand, this approach promotes anticipatory and critical thinking, is solution and future-oriented, stimulates creativity, motivates and activates the students and can thus rightly be seen as a significant contribution to action orientation as a desired outcome of Education for Sustainable Development. On the other hand, however, such a solution-focused teaching approach could also lead to blind faith in technology on the part of the students, to the trivialisation of the problem dimensions and their urgency and, as a result, to students indulging in carelessness and deliberately chosen inactivity. Educators and teacher educators need to see and evaluate these advantages and potential disadvantages for themselves. However, in the final analysis, when the pedagogical-psychological effects and the associated containment of future fears generated by the alternative approaches are included in the overall evaluation, the pendulum swings (for me) in favour of a solution-focused teaching approach.

Against this background, I propose that this teaching approach be actively tested. It automatically introduces more "Eureka!" moments and can be seen as a "provocation of the future" (cf. Land, 2018) into our teaching and into our societies, which can only be to our

benefit in view of the global challenges to be met in our "full world" (cf. Weizsäcker, et al., 2017). Therefore, a solution-focused teaching approach is at least worth an attempt!

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Endnotes

1 *Teaching Sustainable Development Goals* (Hoffmann & Gorana, 2017) https://esd-expert.net/teaching-and-learning-materials.html

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