Southern African Journal of Environmental Education, Vol. 35, 2019

Navigating non-sense by exemplifying situated life experience and intergenerational heritage knowledge in Education for Sustainable Development learning spaces

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> The method which people use in acquiring knowledge is functionally interdependent with, and thus inseparable from, the substance of the knowledge they possess, and especially from their basic image of the world. If this image is different, the method they devise for acquiring knowledge is, as a matter of course, different too. *(Elias, 1978:64)*

Abstract

This paper uses an activity system perspective to probe the related problems of knowledge abstraction and a lack of relevance as a modern legacy of colonial education practices in Africa. Its purpose is to contemplate Education for Sustainable Development (ESD) pedagogy to support learning that might be better situated in and resonate with local African contexts and the emerging sustainability concerns in everyday life. Colonial education trajectories and the recent inclusion of new environmental knowledge in African curriculum and civic learning contexts are examined. This points to how circulating environment and sustainability knowledge is being constituted in disciplinary fields as abstract concepts that are often difficult to relate to local sustainability concerns. Socio-cultural heritage and intergenerational meaning making are explored to uncover better situated ways of navigating much of the abstract 'non-sense' confronting African learners in many modern education contexts today. Illustrative examples of historical patterns of exclusion are scoped and two cases of pedagogical innovation are examined to contemplate how to navigate better situated and more relevant learning processes. Enacted in situated and co-engaged ways, ESD practices may enable the socio-cultural capital and environmental realities of local social-ecological contexts to articulate with better situated sustainability propositions for transitioning to more peaceful, just and sustainable futures.

Background

In response to a provocative comment by Professor Shadrack Gutto of the Institute for African Renaissance Studies, University of South Africa (UNISA) on the persistent 'non-sense'[1] in much modern environment and sustainability discourse, it was noted that if it weren't for non-sense in the world, there wouldn't be a need to contemplate learning spaces for mediating Education for Sustainable Development (ESD). In this paper, we examine how the problem of 'non-sense' exemplified by Gutto has commonly come to African learners as ESD in

 DOI 10.4314/sajee.v35i1.8

ISSN 2411-5959 | DOI 10.4314/sajee.v35i1.8

abstract propositions (reified and disembedded perspectives) such as biodiversity and climate change that are difficult to relate to the intergenerational lived experience as felt sustainability concerns of the day.

Climate change is perhaps the most pertinent area of contemporary ESD where the propositions put forward and the risks outlined present as abstractions that are not easily related to context and material practices. New environmental knowledge on climate has circulated, for example, in global imperatives for humanity to learn to live differently so as to mitigate impending climate change (IPCC, 2014). These imperatives for humans to change are emerging around increasing climatic variation and extreme events reflected in higher seasonal temperatures in southern and central Africa, for example. This pattern of human-induced change is producing a widening disruption of some of the stable seasonal cycles that have characterised central Africa in the past and a prediction of widening seasonal variation in areas such as in the Eastern Cape of South Africa that have always been characterised by high seasonal variability. A pressing 'fear-factor' in relation to climate change is currently exemplified in projections of global warming, deeper cycles of drought and more extreme events that are now being communicated to us through the earth and sustainability sciences by climate scientists (Jones, 2016). The scientific work is still characterised by generally poor predictions of how the seasonal cycles will play out each year (e.g. Engelbrecht, Landman, Graham & McLean, 2016; Landman & Beraki, 2012). The global models increasingly forecast a warmer, more dangerous climate for the globe as a whole and retrospective local data and historical records are clearly showing increasingly disruptive events and patters of change that are now being experienced in communities across the southern African region.

Deepening educational challenges in the ESD Global Action Programme

The emergence of climate change data and intergenerational experiences of change has led to calls for ESD as a widening strategy for mediating ethics-led learning and cultural change on a planetary scale (O'Donoghue, 2014). As climate change developed as a global concern, the Global Action Programme (GAP) (UNESCO, 2014) emerged as education activities to be enacted in the coming years. Alongside this and following the relative failure of the Millennium Development Goals, a surprising global consensus was finally achieved on 17 Sustainable Development Goals (SDGs) (UNESCO, 2015) and these were signed by all member states as an agenda for future sustainability with social-ecological justice.

The SDGs gave momentum to the five priorities of the GAP and organisations all over the world have made GAP commitments to work on the following ESD priority areas:

- Advancing Policy: Mainstreaming ESD in both education and sustainable development policies, to create an enabling environment for ESD and to bring about systemic change
- Transforming learning and training environments: Integrate sustainability principles into education and training settings
- Building capacities of educators and trainers: Increase the capacities of educators and trainers to more effectively deliver ESD

- Empowering and mobilising youth: Multiply ESD actions amongst youth
- Accelerating sustainable solutions at a local level: At community level, scale up ESD programmes and multi-stakeholder ESD networks. *(UNESCO, 2014:14)*

ESD policy in Africa has been slow to emerge and clear answers to how education, teachers and training need to be transformed are not always readily apparent. The priority of youth engagement and local change to be enacted in the failing states of Africa also present as insurmountable challenges that are rife with contradictions. These uncertainties and ambiguities are emerging in attempts to mainstream ESD in the school curriculum and to engage youth and communities in change, as discussed in following sections of this paper.

A methodological note

Education is approached as a colonial and modernist activity system in southern Africa that, for the student, comes into existence alongside the experiential and knowledge capital acquired in modern daily life. Here the learning subjects (children as students), why they learn and what they learn are important if we are to get a better grasp of a situated historicity of schooling as a modern activity with inherent tensions and contradictions that may be shaping barriers to learning and change. This study thus approaches education as an emergent activity system for enabling learning and change. Its intent is to uncover and trace some of the inherent axes of tension and contradictions within the system in southern Africa today in order to determine what might be done to enhance learning-led change in a changing world.

The review process

The paper drills down into colonial histories of imperial domination and the modernist globalising trajectories that flowed from these. It examines how these processes have shaped patterns of knowledge production and education practices where cosmopolitan abjection continues to marginalise and exclude (Popkewitz, 2008). These challenges make it difficult for many citizen learners to navigate the complexities and risk of the day in relation to the current global priorities of social justice, globalising risk and future sustainability mapped out in the SDGs.

The history of colonial and modernist abjection in Africa points to how scholars, youth and communities are commonly confronted by descriptions of risk and propositions for future sustainability that are difficult to articulate with their experiences. The paper points to the need to address these problems of relevance through a restorative concern for situated, intergenerational processes of teaching and learning. A better situated (intergenerational and contextual) approach will require closer work within socio-cultural case histories, situated perspectives, lived experience, local metaphor and intergenerational knowledge practices (endogenous[2] onto-ethico-epistemic[3] processes) (Sandoval Rivera, 2017). In this way, African contexts and cultural capital will need to be more central in ESD if we are to have any chance of mediating ethics-led change to rebalance the social-ecological and political dynamics of the tiny blue planet that is now shared by an expansive humanity which originated in Africa.

ISSN 2411-5959 | DOI 10.4314/sajee.v35i1.8

Uncovering origins of disembedded non-sense in modern education

Not unlike elsewhere, the school curriculum in South Africa functions as a process that privileges circulating abstractions as powerful knowledge that, once mastered, can empower learners with deepening insights in relation to the workings of the world. Odora-Hoppers (2002a) has noted that, in a modern education system, the situated substance of knowledge in the science curriculum can routinely go unrecognised by young African students. She traces the root of this contemporary problem to how colonial education systems developed as a process that involved 'the overcoming or eradication of "traditions" which were automatically posited as "obstacles" and "irrationalities"' (2002b:20).

These patterns of marginalising exclusion developed out of a history of colonial and, later, modernist dominion through education. In early anthropological research, for example, much of the irrationality of indigenous peoples (natives) was ascribed to 'magic conceptions of nature' as an obstacle to learning European ways (Junod, 1920). Here the underlying assumption of colonial dominion through education was that: 'Whatever the future may be, there is no doubt that for the present the white race has to rule and guide the black race' (Junod, 1920:76). Here the supposition was that:

> Education, scientific training, higher moral and religious conceptions have delivered most of the Europeans from magic. The same will certainly happen to the Bantus if they submit themselves to the teaching brought to them by us, and there is no doubt that there is amongst them an ever-growing desire of obtaining instruction. *(1920:85)*

From these roots and in this way, colonial education history appears to have contributed to the current curriculum paradox that embodied heritage knowledge has receded and situated, intergenerational (indigenous) life experience is seldom integral to learning at school. Here, it is possible to posit that most students were seldom engaged in situating and adequately using heritage knowledge practices and intergenerational life experiences in making sense of modern curriculum propositions. Abstract concepts thus commonly reside outside deliberative experience and can remain unrecognised as clearly relating to local concerns. Environmental knowledge as circulating abstractions to inform our current grasp of environment and sustainability concerns are thus commonly inaccessible in schools where many African scholars are confronted by scientific knowledge that still primarily presents as facts to be memorised. Histories of exclusion and institutional cultures of rote memorisation persist as pedagogical challenges for ESD in many African settings today.

These curriculum challenges of abstraction, relevance, translation and re-contextualisation are also common in modern school settings around the world. The problem is simply more acute in the colonial modernity of the Global South, particularly in Africa, where work with circulating knowledge in education is still not adequately related to, or derived from, a functional articulation with existing intergenerational knowledge and ways of seeing the world.

Circulating reference from inside-out and back

Bruno Latour (1999) sheds some light on how the circulating knowledge production processes in the sciences and the use of 'time-saving abstractions' have contributed to this curriculum paradox. He traces how scientific knowledge on soils in a transition zone in the Amazon came to be constituted across successive periods of fieldwork in Amazonia undertaken in conjunction with work in a soil laboratory in France. Examining these knowledge production processes using his approach to science studies, he reveals how modern scientific knowledge on Amazonian habitats came to be constituted within circular dialogical processes of careful field measurements and sampling. He notes how these processes of circulating dialogical analysis animated the phenomenon and processes in/of the region and how 'time-saving abstractions' emerged to constitute the concepts (articulating knowledge) that were then taken into scientific narratives primarily out of the western research literature and into the region so as to explain things and, through this, to identify and engage emerging problems.

Appropriation and externalisation in circulating knowledge

Colonial scientists working in this way with the habitats and peoples of Africa came to constitute much of the scientific knowledge on African social-ecological landscapes. Shava (2008) examines how much of the environmental knowledge in the sciences, for example, included knowledge capital appropriated from indigenous peoples and their knowledge practices. As this knowledge has come back to us in scientific disciplines and curricula the 'Africanness' is not easily recognised and identified with (Odora-Hoppers, 2002b). Identifying with environmental knowledge is becoming more and more important for succeeding generations if we are to develop better ways of knowing and doing things in the world today.

Blind spots in the circulating externalisation of knowledge

Here it is important to note how the metaphorical reasoning used to represent African knowledge was commonly epiphenomenal in fieldwork but that the 'time-saving abstractions' were commonly constituted from the cultural register of Europe. For example, when colonial scientists were confronted by the teaming herds of African ungulates, they began to develop the modern science of ecology as a field that explained the patterns of interdependence amongst animals and their biophysical surroundings. The social-ecological interactions shaping the distribution and abundance of Africa's biota escaped them (Pesanayi, O'Donoghe & Shava, 2019), and they came to narrate the tragedy of the commons (Hardin, 1968) as a social problem of unawareness and not as an outcome of colonial imperialism. In Africa, the tragedy of the commons was deployed as a political commentary for maintaining separate lands for wildlife (as well as for colonial exploitation) and this became the foundation of early conservation and environmental education. In this way the process was underpinned by education imperatives to tame the destructive hunting dispositions and to reverse communal land degradation evident amongst the rural indigenous peoples (O'Donoghue, 1997).

Inter-cultural misunderstandings abounded in processes such as this. For example, when earlier colonists asked the Xhosa to explain their *umqombothi,* indigenous people described how it was made by fermenting sorghum. Their descriptions were read and translated as 'African

ISSN 2411-5959 | DOI 10.4314/sajee.v35i1.8

beer' and not as a grain-fermented drink for ancestral ceremonies. In the epiphenomenal transactions, participants did not note that *umqombothi* was an ancestral process which was centred on fermented sorghum and that the same fermentation practices were used to make *maRewu* (a nutritious sorghum energy drink*),* soured porridge and other foods. Also lost to the appropriating conversation were the intricacies of 'crack fermenting'[4] to reduce bitterness (phytates) that enable better nutrient release in African grains, which have lower nutrient content than other global grains. In colonial times, rural natives were not only branded as ignorant and unaware, but as drunkards to boot.

The return of the abstract proposition with explanatory power

In the science curriculum today, nature conservation is taught as a science to manage wildlife in protected areas and to restore biodiversity to degraded rural landscapes. Fermentation is taught as scientific facts, with *umqombothi* routinely used as a local example of alcoholic fermentation. The concept of fermentation is attributed to famous western scientists like Louis Pasteur, who used a microscope to identify bacteria and to explain fermentation. The early discovery was followed by other western scientists who integrated the concept into the field of school science that we have today. In this way, the abstraction was used to identify what, in the western register, *umqonbothi* was (beer) and to correctly point to this product as an outcome of a scientific process of alcoholic fermentation. We now know that phytate reduction to release nutrients and minerals and to synthesise digestive enzymes happens earlier in fermentation processes before the food becomes an alcoholic beverage and how reductive fermentation optimises the availability of nutrients in African grains like sorghum and millet.

As the knowledge circulated in and out of Africa, time-saving abstractions were externalised and assembled around primarily western metaphors and dispositions until these developed into generalisations (concepts) that, when grasped, offer increasing predictive and explanatory power. The concepts then came to be ordered into bodies of knowledge to be taught in the science curriculum today. Here little or nothing could be read as coming from Africa as the appropriated knowledge in relation to African cultural practices was process-reduced into abstract propositions now coming in from the outside and difficult to relate to African knowledge practices. The abstract propositions related to fermentation and biodiversity are simply taught in the modern curriculum as the discoveries of European science, concepts for students to remember as scientific facts and to relate to local examples. Currently, these serve to explain how wildlife needs to be conserved and that *umqombothi* is a fermented alcoholic drink. The attendant disjunctures make it difficult for African students to see the relevance of what they are being taught and their learning is often reduced to remembering what is necessary for them to be successful at school.

Contemplating things turned around the other way

For illustrative purposes it may be useful to ask, 'Had the colonial scientists been Africans who worked out of laboratories in Africa, would it have been the children of Europe who struggled to relate to the time-saving abstractions?' The reversal here serves to point to how the political economy and reductive metaphor can both enable and disable meaning-making at differing ends of the circulating reference in scientific knowledge.

An outcome of colonial education exclusions led to little or no situated articulation of the curriculum knowledge with the lived world contexts of intergenerational daily life in Africa. As mentioned earlier, the challenges of identifying with abstract concepts is a challenge in relation to scientific and mathematical knowledge, for example. Here Sfard (2006:25), points to how, in attempting to understand learning, 'one needs to keep an eye on *the activity of identifying* that accompanies, informs and results from processes of learning' (emphasis added).

This summation derives from evidence of the failures of students to make meaning of mathematical abstractions owing to a process of 'ontological collapse'. Sfard describes how the process of objectification in knowledge creation takes place as actions and events are reproduced as statements through two intellectual moves, the first being 'reification' and the second, following this, a process of 'alienation'. The first is a process of transfer that, she explains, 'consists in replacing talk about actions, with talk about objects'. She notes how the process of alienation that follows involves 'presenting phenomenon in an impersonal way, as if they were occurring of themselves, without the participation of human beings' (2006:24). This analysis loosely resonates with that of Latour (1999), pointing to how decontextualising abstraction accompanied by the exclusion of contextual intergenerational capital in pedagogy might shape environmental knowledge on climate change as inaccessible non-sense that is difficult to relate to and accommodate.

The decontextualised learner in African contexts today

Herein lies a problem of much of the non-sense for African learners today, who are confronted with the challenge of a modernist ESD agenda that does not always afford sufficient contextual capital for meaning-making. Boughey and McKenna (2015), auditing higher education in South Africa, examine some of the modern curriculum challenges associated with the construction of 'the decontextualised learner'. They note how learners are confronted by learning challenges related to language and abstract theory that have little socio-cultural and historical resonance. They thus propose an enrichment of the 'theoretical stockpot' (2015:11), where education practices are transformed to strengthen situated learning and enhance epistemic access into meaning-making with the explanatory power that comes with a functional interdependence and resonance between abstract models of process and situated intergenerational knowledge practices.

The successive crises of failure in colonial African education and in the modern contexts of education in Africa testify to a complex of linguistic, socio-cultural and political factors inhibiting learning and change. Elaborating these further must remain beyond the scope of this paper, where we have restricted ourselves to simple illustrating some of the outcomes of an imperial colonial production of knowledge constituting barriers to learners identifying with much of abstract environment and sustainability knowledge that one still finds in modern education in Africa today.

Faced with the difficulties that many students have experienced when it comes to identifying with the externalised abstractions of environment and sustainability knowledge, educators, primarily in the sciences, have been working with the idea of pedagogical content knowledge (PCK) after Shulman (1986). In simple terms, this approach has played out in

ISSN 2411-5959 | DOI 10.4314/sajee.v35i1.8

increasing work with analogous illustrations of scientific concepts, creating a whole new arena of circulating metaphor for accessing abstract propositions and their explanatory power. This work is still to give attention to African metaphor, situated experience and heritage in ways that might activate and articulate with intergenerational epistemic processes. Richie (2013) outlines how this is being done in New Zealand through indigenous onto-epistemologies and pedagogies of care with young school children. Working in southern Africa, Maqwelane (2011) examines how a situated pedagogy of care using indigenous knowledge (IK) communicated by *Gogos* (wise grandmothers) enhanced the relevance of the school curriculum and strengthened literacy performance amongst children in a school context in rural Eastern Cape. Education imperatives for articulating intergenerational indigenous meanings and meaning-making processes with modern world knowledge, such as these, are emerging in social movements to introduce African environment and sustainability concerns in the school curriculum and in climate change work with youth on ESD imperatives of learning-led change, both discussed in the sections that follow.

ESD in the school curriculum and the challenge of school reform

As environment and sustainability concerns have emerged in late modernity, there have been a proliferation of social movements working on change in, and the reform of, the school curriculum. Notable here is the ESD Expert.Net collaboration that produced training materials that have contributed to the South African Fundisa-for-Change teacher professional development programme. These collaborations are shaping conceptions of ESD that are proliferating in widening UNESCO-GAP commitments to address the globalising social-ecological and sustainability concerns of the day.

Pedagogical challenges associated with the modern curriculum have proliferated as important bodies of new environmental knowledge, for example ecology, have been developed to uncover emerging environmental problems such as the loss of biodiversity. In the earth sciences, one also finds climate change and earth systems science emerging as key concerns for the survival of humanity into the Anthropocene. These processes have shaped ESD Expert.Net and Fundisa-for-Change imperatives to educate for future sustainability through environmental education and ESD, giving impetus to social movements to engage with these new concerns as a curriculum for future sustainability.

Disjunctures in outside-in knowledge and curriculum innovation

Early environmental education attempted to bring conservation concerns into the curriculum in South Africa as well as to take young children out for encounter experiences in natural settings. Working from outside formal education, the emerging fields of environmental education and ESD developed along with new content and models of process for transforming the school curriculum and education practice. As environment and sustainability concerns became more pervasive and the risk escalated to a global level, more and more new environmental knowledge was introduced into the school curriculum in a failing postcolonial education system. Here the curriculum topics still have the problem that, in Africa, the new

knowledge was not only foreign to the teachers, but it was also not commonly articulated with intergenerational knowledge and seldom reflected metaphorical cues which resonate with African cultural history. The underlying metaphor in ecology and biodiversity derives from the colonial ideal of an African Eden of diverse species and develops as an evolutionary and genetic narrative that implicates the rural African peoples in the modern degradation of the commons. Added to this, few African learners have first-hand experience of the wonders of the wildlife areas that are primarily the playground of rich visiting tourists. There is little or no functional interdependence with which African learners might engage the loss of biodiversity as an intergenerational concern, and degraded rural habitats are commonly read as an enduring characteristic of the African postcolonial landscape.

Fundisa for Change

These challenges are notable from 1994, the year that signalled the end of apartheid in South Africa and the framing of a new outcomes-based education (OBE) system. The curriculum change that emerged and the successive adjustments that followed – the National Curriculum Statement (NCS) and now the Curriculum and Assessment Policy Statement (CAPS) – were accompanied by the inclusion of environmental education as a cross-cutting concern; and one now finds new environmental knowledge included as an integral part of many subject areas. This brought the challenge of training teachers working with new environmental knowledge in school subjects to actualise a meaningful and situated engagement of learners in environmental and sustainability concerns. The Fundisa for Change programme was established by a consortium of universities to provide course-supported training to activate environmental learning around the new environmental knowledge that most teachers had not before encountered in their schooling or professional careers.

Over time, we have noted that by giving attention to the new environmental knowledge that teachers have to learn and to teach, we may not yet have given sufficient attention to how new environmental knowledge is situated in Africa and is articulated in relation with the lived experience of students. For example, how is the new ecological knowledge on biodiversity loss articulated with intergenerational learning in, about and for the social-ecological landscapes of African contexts and everyday life? Given these and other common omissions, it is not surprising that young African students can find it difficult to relate to the many global environmental concerns in their local context and in terms of the ecological, social, economic and political complexities that constitute their daily lives. Here environmental and sustainability education can present as complex, irrelevant and even oppressive processes without a knowledgeable, skilled and empathetic teacher working in collaboration with the concerns of African youth.

ESD in youth and community learning contexts

The youth 'population bulge' in Africa has the potential advantage of becoming a young populace that is energetic and increasingly educated. The adult literacy rates show sub-Saharan Africa at 65% (UNESCO-UIS, 2017) and this is likely to increase. Here literacy is reviewed as

ISSN 2411-5959 | DOI 10.4314/sajee.v35i1.8

the ability to read and write, with understanding, a short, simple statement about one's everyday life (UN, 2017). The emerging youth problem is one in which more literate but unemployed young people are confronted by an ambivalence in relation to where they come from and who they are. These uncertainties can be accompanied by modern attitudes of entitlement and the immediacy of an 'I want it now' culture in youth, who can increasingly be described as 'techno kids'. The African youth bulge thus presents a contrasting mix of opportunities and challenges.

Youth in a struggle with a foreign education system

Some of the intractable challenges facing an expanding African youth are reflected in an education system where much of what they encounter is nonsensical and irrelevant in many ways. The education system was designed around the need for labour for colonial modernisation in Africa. Following independence, the problematic gap between education and industry widened. This is not a simple matter, deeply rooted as it is in a development paradigm now transitioning into a green economy for future sustainability. Faced with a lack of jobs, hammered by HIV/AIDS, globalisation culture and products, youth with little prospect of work are, in recessionary times, demanding free education and access to their share of economic resources. In South Africa, the increasing cost of education has led to the #FeesMustFall campaign that started in 2015 in a system where the equalisation of opportunities continues to be a problem. Here colonial education perspectives reach into the present from the Bantu Education of apartheid times when most current teachers were educated. The gaps in their knowledge and a narrow pedagogy of the teaching for, and the testing of, memorisation still impact on the quality of teaching and learning in the classroom.

The challenge of transitioning to and through ESD

It is in this challenging educational environment in South Africa that ESD has emerged, with the purpose of enabling youth to take an active part in transitioning to sustainability by entering life-long learning, enhancing social cohesion and realising future sustainability. Some of the major competencies specified for these processes of change include, but are not limited to:

- Promoting the ability to act and make decisions.
- Raising environmental awareness.
- Thinking about different scenarios or alternatives to a situation or problem at a local and global scale.
- Fostering a sense of belonging to the environment.
- Promoting a critical analysis of some phenomenon or subject and
- Positioning one's self to argue for and respect different points of view.
  (Cebrián & Junyent, 2015:7)

These goals require new pedagogies such as peer-to-peer social learning, group assignments and online learning interactions. The problem is that the teachers are not well equipped in these areas and few relate to modern youth culture, which has embraced blogging, Twitter and Facebook as ESD learning tools.

The search for relevance in a globalising world

The subjugation of African intergenerational heritage practices and life experiences has come to haunt the current generations as few youth value, and some even disavow, indigenous knowledge over the new more globalised culture emanating primarily from the West. Not only do the youth adopt new dress, music and language, they also ascribe to dispositions that do not necessarily affirm their African identity.

Towards new communities in learning

More and more youth commonly use technology; some have created their own communities of learning, which are mainly online. These are framed as communities of inquiry (CoI) by Garrison, Anderson and Archer (2000), who observe that online communities comprise a social presence, a teaching presence and a cognitive presence. They note how the communities' goals are primarily concerned with: (i) remembering – the ability to reproduce or recognise the presented material; and (ii) understanding – the ability to construct a coherent mental representation.

CoIs have a learner-centred disposition where multimedia is used to aid human cognition. These approaches contrast with traditional African ways of teaching, namely oral storytelling and learning by doing. The variety of learning methods here opens up the possibility of working with heritage knowledge as a means of encouraging modern youth to contemplate future sustainability via multimedia (Sandoval Rivera, 2015). In this way, they could potentially create relevant concepts and knowledge that is applicable in their lives. Using new forms of collaboration and partnerships in learning appears to be a useful approach for supporting youth to navigate and make sense out of much of the non-sense in education (Kibuka-Sebitosi, 2015). In support of the articulation of modern learning interactions with processes founded in African heritage, Madzima (2010) explores how young learners have drawn on the African philosophy of *Hunhu-Ubuntu* to become successful learners in a context of modern schooling. Goduka and Chilisa (2016) elaborate on *eZiko* (the hearth) as a collaborative space of situated intergenerational learning and social innovation.

Restoring intergenerational histories and life experiences in learning

The above review of some of the challenging complexities of the struggle for relevant learning in schooling, and in the expanding contexts of youth learning in Africa, point to the need for the restoration of learning processes that articulate with life experiences, intergenerational knowledge practices and the ethical dimensions of care for the environment and each other. As we are confronted with circulating generalisations on increasingly pressing risk to future sustainability, we tend to teach the circulating environment and sustainability knowledge as necessary propositions for ethics-led learning to change. In taking this approach, knowledge commonly presents as pressing information coming in from the outside.

In the opening quote to this paper, we note that for learning the 'substance of the knowledge' that we possess, and our 'basic image of the world' are functionally independent to constitute knowledge that we can take into, and act with, in the world. This supposition points to the need for ESD curriculum processes and pedagogy where:

ISSN 2411-5959 | DOI 10.4314/sajee.v35i1.8

- The African context matters;
- Intergenerational knowledge practices shape dialectic learning;
- Life experience (ontology) animates meaning;
- Ethical purpose is emergent from these; and
- The constituting of knowledge (epistemology) comes to have relevance and purpose because it resonates with situated matters of concern and articulates with the realities of the world in which we live together.

Seen as a whole in, and out of, African socio-cultural histories, the above synthesis points to the need for not simply working from, and bringing in, new environmental knowledge in curriculum and community contexts (from the outside as it were), but to mobilise and articulate this knowledge within intergenerational learning journeys that arise in socio-cultural contexts. This premise is not easily realised with topics like biodiversity loss and climate change unless these are better situated in what makes Africa climatically challenging in relevant ways, with unique histories of knowledge practices that have sustained its peoples over many generations of living in, and creating, habitable landscapes.

Confronting the need for working from intergenerational histories in ESD

The Habitable Planet initiative of the CSIR-ACCESS[5] programme has been developed as an initiative to enhance the situated learning experiences of students in the earth sciences. The curriculum employs innovative pedagogical approaches to resolve the problem of abstraction that is dissociated from African experience. From the outset, African examples and metaphor are used to illustrate how scientific knowledge and the ethical issues relate to life experiences and cultural perspectives. This reversal casts the learner as expert on ethical issues and the learning challenge is for participants to work together to develop an 'African perspective on climate change'. However, to do so, they must first rigorously engage with the often-abstract propositions of scientific knowledge in ways that articulate with the African context. This includes up-to-date earth-sciences data on the drivers of climate change and the processes that make the planet habitable for all living things. Here the climate change curriculum has been strengthened in two significant ways:

- Animating models of process that build up an explanatory perspective on climate and the changing seasonal cycles and the locating of these in southern Africa at the intersection of the Southern Ocean, the eastern Indian Ocean and the seasonal migration of the central African Intertropical Convergence Zone (ITCZ); and
- Articulating the abstract models and unique context with African social-ecological histories and intergenerational knowledge practices.

Earlier work towards an African perspective has produced a cohort of peer educators who now deliver all of the teaching on the above concepts. In this way, the globally situated knowledge is introduced through an 'African' filter of illustrative knowledge and authentic African experience.

Next, the students are challenged to change their understanding of the nature of science itself, so they see it not as a list of abstract facts to be memorised, and a list to which western scientists are the gatekeepers, but as a continual interplay between local observations and explanatory theory.

A central tenet in this work is 'what makes southern Africa special?' Here the earth systems scientific knowledge is constituted in relation to the seasonal cycles and cultural histories of the southern African geophysical landscape. In this way, the intergenerational histories and life experiences of learners allow them to build knowledge on the regional systems and processes driving climate variability. The revelation that southern Africa is globally exceptional at something (in this case the cultural/environmental landscapes) has important symbolic value. This dispels the idea that that which is external to African is superior and it builds critical confidence, the lack of which has been identify as a key barrier to African students succeeding in higher education (Toughmay, 2014).

Turning to cultural histories, a good example here is the precolonial seasonal migrations and cultural capital for the historical mitigation of the effects of high climate variability (O'Donoghue, Shava & Zazu, 2013). Not only did the Xhosa migrate their cattle in relation to seasonal rainfall variations that we now primarily attribute to the el Nino–la Nina oscillations in the southern Pacific but they had seasonal practices (*galesha)* to optimise water retention in the soil in readiness for a late start to the summer rains in drought years.

Through the introduction of situated learning programmes blending intergenerational African knowledge with the abstract propositions of earth systems science, the Habitable Planet Programme and Fundisa for Change are effectively changing the game as learners use what they know and can relate with as special, to find out and explain changes in the seasonal cycles, and to contemplate what is to be done for future sustainability. This enables them to back reference the knowledge into people of, and in, Africa living with seasonal variability in southern Africa as a unique and special environment. This can also locate the diversity of peoples living and working in Africa in meaningful ways that are enabling us to work together in addressing the challenges of increased climate variability and seasonal change that confronts us in southern Africa today.

Endnotes

1. In this paper, 'non-sense' is used in the literal sense of lacking coherence, not making sense in that we are not able to access relevant knowledge that articulates with sustainable ways of being and doing things in the world.
2. Socio-cultural and historical perspectives that arise within life experience and have situated relevance.
3. Here 'onto' refers to lived experience, 'ethico' to valued purpose and 'epistemic' to meaning-making that is constitutive of the knowledge to provide orientation in the social-ecological environments of the world we share.
4. The Hlubi, for example, gently brush washed grain with a grindstone to crack the outer casing so that water gets in to activate the germination of fermenting enzymes that reduce phytates and release nutrients for easy digestion.

ISSN 2411-5959 | DOI 10.4314/sajee.v35i1.8

5. This programme is part of the South African Global Change Grand Challenge initiative that is located within the Centre for Scientific and Industrial Research (CSIR).

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Percentage contribution

Areas of contribution	Authors	Percentage contribution
Conception or design of the paper, theory or key argument	O'Donoghue	*50%*
	Kibuka-Sebitosi	*16%*
	Tshiningayamwe	*16%*
	Palmer	*16%*
Data collection	O'Donoghue	*50%*
	Kibuka-Sebitosi	*16%*
	Tshiningayamwe	*16%*
	Palmer	*16%*
Analysis and interpretation	O'Donoghue	*50%*
	Kibuka-Sebitosi	*16%*
	Tshiningayamwe	*16%*
	Palmer	*16%*
Drafting the paper	O'Donoghue	*50%*
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	Tshiningayamwe	*16%*
	Palmer	*16%*
Critical review of paper	O'Donoghue	*50%*
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	Tshiningayamwe	*16%*
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