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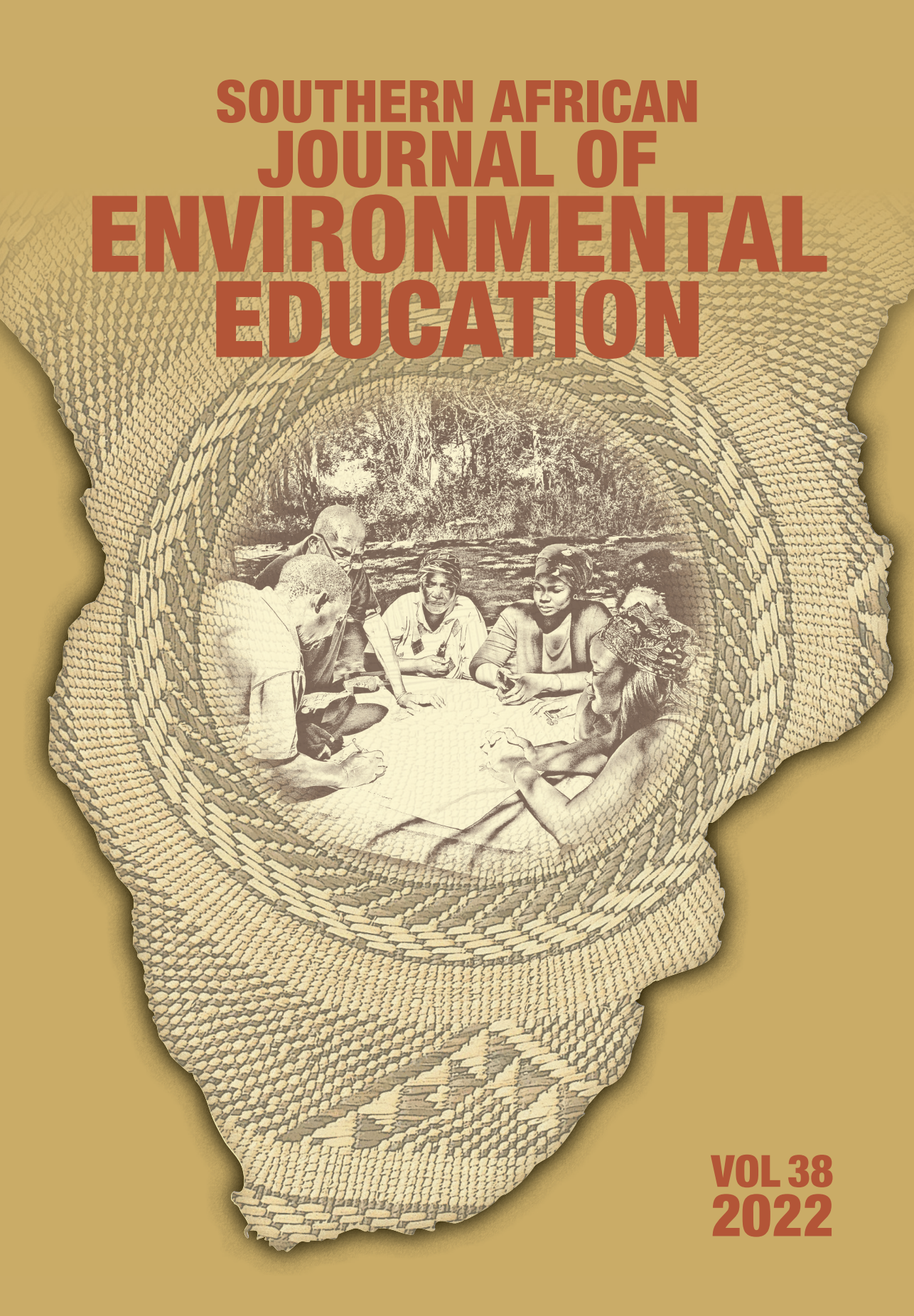

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Volume 38 (2022)

Editorial: Situating the diversity of Southern African environmental education scholarship within a global conversation at a critical juncture on Earth

Associate Professor Lausanne Olvitt, Editor-in-Chief

The collection of papers in Volume 38 in many ways mirrors the diversity of research methodologies and teaching approaches in the contemporary field of Environmental and Sustainability Education. The seven papers remind us that, whilst environmental educators and researchers are largely in agreement over the *nature* and *causes* of the social-ecological problems that we face in sub-Saharan Africa, there is less certainty around what types of educational approaches and pedagogies are adequate to help resolve them. The papers in this volume either offer pedagogical innovations that may strengthen teaching and learning for sustainable futures, or they provide insights into the social, cultural and economic contexts in which such teaching and learning occurs.

Our southern African scholarship contributes to a global conversation around the powers, shortcomings and possibilities of education, and so it is important to reflect critically on international trends and emerging trajectories. This editorial seeks to bring this volume of the journal into a precursory conversation with two international publications that recently entered the public domain, as a kind of benchmarking exercise or 'reflexive barometer' of our regional work in relation to international educational developments.

The first of these publications is UNESCO's 2021 report, entitled *Re-imagining our futures together: A new social contract for education*. The report conveys a direct and urgent message that planet Earth needs a new social contract for education at a global level that will "allow us to think differently about learning and the relationships between students, teachers, knowledge, and the world" (p. 3). UNESCO idealistically reaffirms education as powerful transformative force:

> Education is the foundation for the renewal and transformation of our societies. It mobilizes knowledge to help us navigate a transforming and uncertain world. The power of education lies in its capacities to connect us with the world and others, to move us beyond the spaces we already inhabit, and to expose us to new possibilities. It helps to unite us around collective endeavours; it provides the science, knowledge and innovation we need to address common challenges. Education nurtures understandings and builds capabilities that can help to ensure that our futures are more socially inclusive, economically just, and environmentally sustainable. (UNESCO, 2021, p. 10)

The UNESCO report proposes answers to three essential questions that we, as environmental educators, should continue to grapple with:

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1. What should we continue doing?
2. What should we abandon?
3. What needs to be creatively reimagined?

Similar questions and responses were deliberated in 2022 during the 15th Invitational Seminar on "Challenges for environmental and sustainability education research in times of climate crisis", hosted by Ghent University in Belgium. By the end of the seminar, the group of international delegates had identified four pressing challenges in current Environmental and Sustainability Education (ESE) research:

1. There is a flawed assumption that individual transformation somehow leads to social transformation.
2. Theories of change in ESE research and practice are often not explicitly named and worked on.
3. There is a need to make sharper distinctions between internal changes in educational institutions and larger societal transformations at government and planetary level.
4. There are many blind spots as to whose voices dominate our ideas and discourses of change, which in turn influence whose stories are told or not told. (Deutzkens et al., 2022, p. 64)

These pressing challenges for our field, alongside UNESCO's three questions and call for a new social contract for education, offer a lens through which to reflect on the scholarly contributions in this volume of SAJEE.

Overview of the contributions in Volume 38

Velempini and his co-authors open the volume with an article that highlights the intersectionality of food, water, livelihoods and education. Using a systems thinking approach, they set out to identify what can be learned from the COVID-19 pandemic for transforming education for sustainable futures in southern Africa. The experiences and insights shared in the article align closely with the third challenge put forward by the abovementioned ESE Invitational Seminar: they report that during the height of the COVID-19 pandemic, the formation of new partnerships, relationships and coalitions at community as well as at inter-governmental levels, was enabled by important interconnections across micro-, meso-, exo- and macro-systems. Velempini and colleagues conclude by identifying six 'transformative praxis pathways' for transforming education for sustainable futures.

The next two articles centre around approaches to teaching primary school children about their African wildlife heritage and local wildlife conservation practices. Despite their different epistemological starting points, both highlight the significance of culturally-resonant learning processes. The two case studies contribute usefully to ongoing discussions around the fourth pressing challenge identified by delegates of the 2022 ESE Seminar in Ghent, namely, the need to interrogate the "many blind spots as to whose voices

dominate our ideas and discourses of change, which in turn influence whose stories are told or not told" (Deutzkens et al., 2022, p. 64). **Bhurekeni** takes an Afrophilic 'Philosophy for Children' approach to Environmental Ethics Education. Using a multi-voiced and decolonial methodology, he focuses on wildlife taboos and totems to explore how heritage-based knowledges and practices in relation to wildlife conservation are understood by children in the Sebakwe resettlement area of Zimbabwe. The case study points to the value of a dialogical, Afrophilic 'Philosophy for Children' approach for developing children's ethical reasoning, agency and critical, reflexive thinking skills. The case study by **Hoare, Lemayian and Higgins** reflects on a qualitative community-based study of a conservation education programme with Maasai children in Kenya. The study, which explored the potential of "transforming attitudes" to human-wildlife conflict in Kenya, was conducted in a conservation management sector that has a complex history of power, control and contestation. The authors conclude that the wider context of conservation education needs to be considered when designing learning programmes, and they reflexively conclude that "as environmental educators and researchers, we need to critically ask ourselves why we are delivering conservation education and for whom".

Ziervogel and Pallitt's article turns our attention to higher education and the potential of a student video project to develop climate change literacy. Their project's carefully designed pedagogy was guided by an 'authentic learning' approach that requires collaboration and self-reflection in an authentic learning context. Besides developing filmmaking, research and fieldwork skills, the third-year university students reported gaining deeper understandings of the concept of vulnerability and were able to locate themselves as embodied, ethical agents in relation to climate change and water scarcity in Cape Town, South Africa.

Bopape reports on an exploratory qualitative case study of three primary schools in South Africa's Gauteng province. She undertook a SWOT analysis (strengths, weaknesses, opportunities, and threats) to understand the schools' greening efforts within their wider socio-economic context. Bopape's findings confirm well-documented but important trends in school greening efforts across the region, most especially regarding access to, and management of, resources (natural and financial). She further notes how school greening initiatives are influenced by macro contextual factors such as poverty, environmental pollution and ineffective management of non-renewable resources.

James offers an insightful review of the recently published book, *Teaching and Learning for Change: Education and sustainability in South Africa,* edited by Schudel, Songqwaru, Tshiningayamwe and Lotz-Sisitka. James applauds the book for its careful distillation of over 10 years of research and innovation in the Fundisa for Change programme, and she encourages readers to draw on it as a resource for "building ethically, politically, scientifically rigorous teaching practice". James outlines the four main sections of the book, reflecting on the contributions and challenges raised by researchers across the numerous chapters.

Preston's article is a response to an earlier paper by Kulundu-Bolus, McGarry and Lotz-Sisitka that was published in Volume 36 of this journal (2020). Working with their metaphor of 'call and response' in environmental and sustainability education, Preston offers her South African case study as a response to their call for "an approach to learning and education that is contextually responsive, adaptive and moves towards solidarity in this time of crisis" (2020, p. 113). Through a series of five vignettes from a four-year action research project, Preston shows how multimodal arts-based interventions can arouse and sustain community interest and involvement in environmental issues. She names this pedagogic approach 'transgressive eco arts-based pedagogy' (TEAP) and offers it as "a contribution to the conversation about learning, living and leading for sustained futures".

We conclude Volume 38 with an article by **Schramm, Salmones and Robischon** that offers a statistical basis from which to consider young people's attitudes towards the environment, as developed through the Handprint Initiative. The handprint concept, coined in India in 2007, has become an influential concept globally, including in many southern African countries. Schramm and her co-authors conducted a survey with 548 secondary school learners from South Mexico City. Their research instrument was a questionnaire designed to identify five environmental attitudes: ecocentrism, eco-apathy, pessimism, naturalism and scientism. The questionnaire was based on earlier research instruments and the pilot study sought to refine the drafted instrument for wider use in the Handprint Initiative.

The seven research papers in this issue of the *Southern African Journal of Environmental Education* (SAJEE) contribute to a global conversation around what type of education is needed for a viable future. None offers a complete picture, and not all the educational orientations, assumptions and pedagogies pit forward here are compatible with one another. It is important and necessary now, more than ever, that we review the diversity of environmental education praxis with clarity, wisdom, generosity, criticality and seriousness. This is because the consequences of our current theoretical and methodological debates far exceed the boundaries of academia. The polycrisis into which our educational praxis currently speaks – and hopefully intervenes – has been summarised by UNESCO (2021, p. 8) as follows:

> Widening social and economic inequality, climate change, biodiversity loss, resource use that exceeds planetary boundaries, democratic backsliding, disruptive technological automation, and violence are the hallmarks of our current historical juncture. … A global pandemic has further highlighted our many fragilities. These crises and challenges constrain our individual and collective human rights. And they are largely the result of human choices and actions. They derive from social, political, and economic systems of our creation, where the short-term is prioritized over the long-term, and the interests of the few allowed to override the interests of the many.

Commitments that we make this year regarding what types of educational approaches should be strengthened, abandoned, or creatively reimagined, and why, have very direct

and practical implications for the peoples of Africa, the world, and indeed for all forms of life on Earth.

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Transforming Education for Sustainable Futures: Intersecting dynamics of food, water, livelihoods and education in the COVID-19 pandemic

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Abstract

Since 2019, the COVID-19 pandemic has posed challenges to but also highlighted the urgent need for transforming education for sustainable futures. The purpose of this article is to share insights gained from a southern African study on intersecting influences of water, food, livelihoods and education, and what they mean for Education for Sustainable Development going forward. The interest is to learn from this study in ways that can inform transformation of education for sustainable futures in southern Africa going forward. The study involved a number of early career researchers in SADC countries, and was conducted via an online approach during the early days of the pandemic. It followed a qualitative research design, employed document analysis, interviews and questionnaires, and drew on a systems perspective to inform analysis. The findings are as relevant today as they were in the pandemic, and point to the importance of giving attention to intersecting issues that affect education. The study highlights six transformative praxis pathways for transforming education for sustainable futures.

Keywords: *COVID-19; education for sustainable development; systems thinking, intersectionality*

Introduction

COVID-19 erupted as a health pandemic (World Health Organization, 2020) that spread at an unprecedented rate across the world including Africa (SADC, 2020) where it changed the social and economic landscape of local communities (Association for the Development of Education in Africa, 2020; Thobega, 2020). It was immediately obvious that in Southern Africa, access to food, water, health services, the means to create livelihoods, and education were impacted by intermittent lockdown strategies implemented by governments to curtail the spread of the virus. The challenge observed in the early period of the pandemic, is that this resulted in the exacerbation of the inequalities that already existed in the region (Hobbs, 2020; Phakathi, 2020), especially with regard to education.

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At the time (June 2020), the Joint Education Trust, working with UNESCO's Regional Office for Southern Africa, called for a 'Researchers Challenge' constituted as a rapid study involving early career researchers from across southern African countries to investigate various dimensions of the COVID-19 pandemic and its implications for education. Our team decided to focus on intersecting perspectives on why water, food and livelihoods matter in transforming education for sustainable futures (Lotz-Sisitka, et al., 2021). As has been said by many, the COVID-19 pandemic required us to think in radically new ways about existing systems and how they have been operating. It required us to consider 'building forward better' giving attention to social justice and sustainability in recovering from the pandemic (ibid.). It continues to require us to act more collectively, systemically and inter- and multi-sectorally in response to the heightened sustainable development challenges revealed by the pandemic. In our research project, we were curious to interrogate how the COVID-19 pandemic and its impacts can provide educators and scholars with a unique generative opportunity to learn from the intersecting issues to inform transformation in education systems towards sustainable futures in southern Africa.

At the height of the pandemic, there was much uncertainty as to how the pandemic would play out in the Southern African Development Community (SADC). "The socio and economic impacts of COVID-19 in SADC may be unprecedented due to resource limitations and inadequacies in health systems in many of the Member States" (SADC, 2020, p. 2). Although authorities in Africa emphasised adherence to standardised safety protocols to reduce the spread of the virus, there was, and remains less clarity on how to respond to the longer term 'fall out' of the pandemic in terms of the intersecting issues raised here.

Intersecting perspectives: Food, water, livelihoods and education

One of the most immediate impacts around the COVID-19 pandemic was an increased threat of hunger in the southern African region. Jobs were lost in the hospitality and tourism industry (hotels, lodges, camps, and guesthouses) as airlines started cancelling scheduled routes. Local movement restrictions introduced during the COVID-19 pandemic left people with uncertain livelihood options, without safety nets (FAO, 2020). The resilience of the agricultural sector was also tested by the COVID-19 pandemic (FAO, 2020; Nicola et al., 2020). A global crash in demand from hotels and restaurants saw prices of agricultural commodities drop by 20% (Nicola et al., 2020). In Canada, South Africa, and the United Kingdom panic-buying complicated shortages beyond supermarket shelves (Hobbs, 2020; Viljoen, 2020). COVID-19 lockdown measures disrupted rural-urban agriculture supply chains. Zimbabwe Congress of Trade Unions (2020) noted that rural communities play a critical role in the production and supply of agricultural commodities such as vegetables to farmers' markets. This ecosystem sustains incomes and livelihoods for rural suppliers and urban buyers. However, one of the containment measures for the spread of the virus was curtailment of travel and strict measures for travel permits, which made it harder to travel from place to place. Electronic permit application systems created inequalities. Travel

restrictions, as well as quarantines and isolation measures, and during strict lockdowns, the complete suspension of non-essential social and economic activities by governments, resulted in loss of incomes and increased vulnerability to intense poverty particularly for women who rely on informal markets for their livelihoods.

Some governments initiated food relief packages for needy households. In Botswana, Tutume sub-district council distributed food relief packages across many of the sub-district's 29 local villages (Williams, 2020). Phakathi (2020) reported that during the partial lockdown in Eswatini, small-scale vegetable farmers started producing from backyard gardens. The produce was collected and sold on their behalf in a local farm stall.

SADC countries prioritised access to water in communities and schools in order to uphold the non-pharmaceutical COVID-19 practice of hand-washing. This exposed the fact that many schools do not have a consistent water supply. In Botswana, 88 emergency water delivery trucks were deployed in water scarce areas (Lebanna, 2020). The South African government used water tankers to deliver potable water to some schools (SADC, 2020). The lockdown in South Africa worsened existing inequalities in terms of access to water and sanitation. For example, Khayelitsha informal settlement in South Africa is home to roughly 20 000 people who share 380 communal toilets (Hara, Ncube & Sibanda, 2020). The sharing of communal standpipes and toilets, although still an everyday problem, was a critical problem in terms of dealing with the sanitation measures required to combat the pandemic.

UNESCO estimated that close to 900 million learners were affected by repeated closures of schools (UNESCO, 2020). COVID-19 affected all levels of the education system from pre-school to tertiary education (Nicola et al., 2020). Those in the most marginal of circumstances were the most affected. Schools were no longer able to provide school meals to children from low-income families. Women and girls were found to be more affected by the pandemic (Malala Fund, 2020). Digital access revealed another dimension of inequality. The Eswatini government introduced home learning programmes on television and radio, the Internet and national newspapers like *Eswatini Observer*, with lessons for external examination grades (Grade 7, Forms 3 and 5) (UNICEF, 2020). However, some communities in rural areas do not have frequent access to television and radio because of a lack of electricity. Even buying newspapers became a mammoth task if there were no shops open nearby (*Times of Eswatini*, 2020).

This brief review, which touches only on some of the dynamics of the pandemic, shows the intersecting nature of the issues, and their effects on education, which was the core focus of our research. To make sense of the complexity of these intersecting issues, we needed to develop or draw on a systemic perspective, discussed further below.

Theoretical framework and methodology

Our research project, conceptualised within the wider Joint Education Trust / UNESCO ROSA 'Researchers Challenge' took place over a six-month period, with most of the research done online and via literature review in a shorter period. In order to make sense

of the complexity of the situation we were witnessing, and that was being revealed in our data, we decided to draw on social-ecological system theory as an analytic lens in the study. Bronfenbrenner (1979) developed a social-ecological system framework that is widely used in educational research to explain interconnecting influences on teaching and learning of children (Figure 1). In drawing on this framework for our initial analyses, we reasoned that a systemic, relational approach would be essential to produce more integrated responses to the intersecting concerns that we were observing and investigating (Lotz-Sisitka et al., 2015; Lotz-Sisitka et al., 2021; Togo and Lotz-Sisitka, 2013). This required us to map our data relationally, taking account of the different dimensions of the system. Bronfenbrenner's social-ecological system explains differences between a Microsystem, Mesosystem, Exosystem, Macrosystem and Chronosystem as shown in Figure 2 below. This model was helpful for us to map out what we termed 'rich pictures' of the situations we were observing (see Figure 2), which was the first step in identifying sub-themes to map out possible responses and transformative pathways for transforming education for sustainable futures.

Figure 1: *Bronfenbrenner's social-ecological systems theory (Adapted from Bronfenbrenner, 1979)*

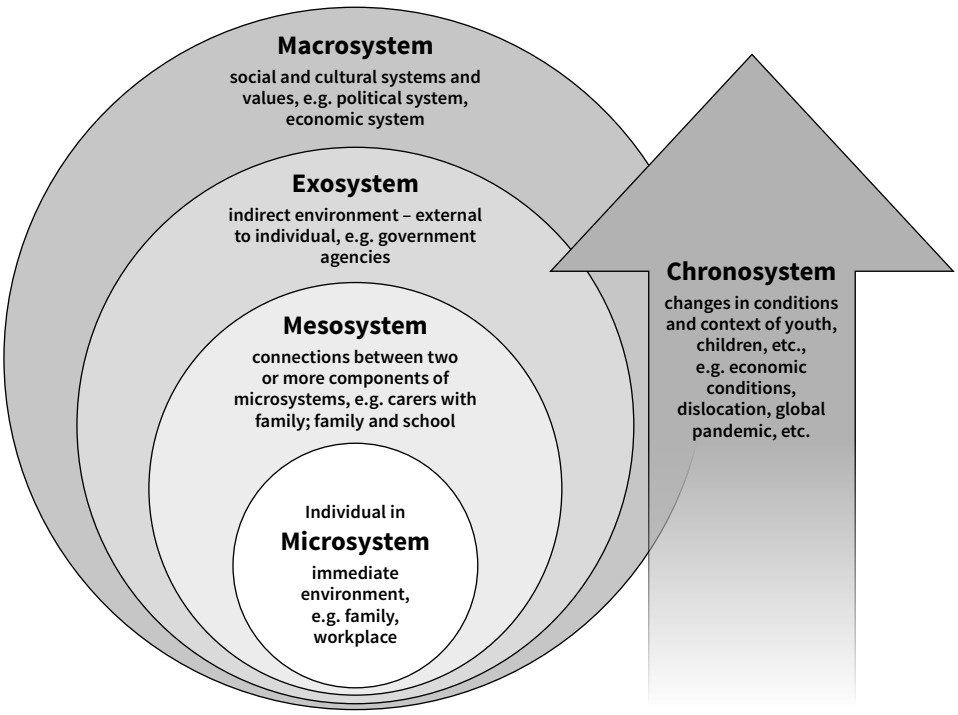
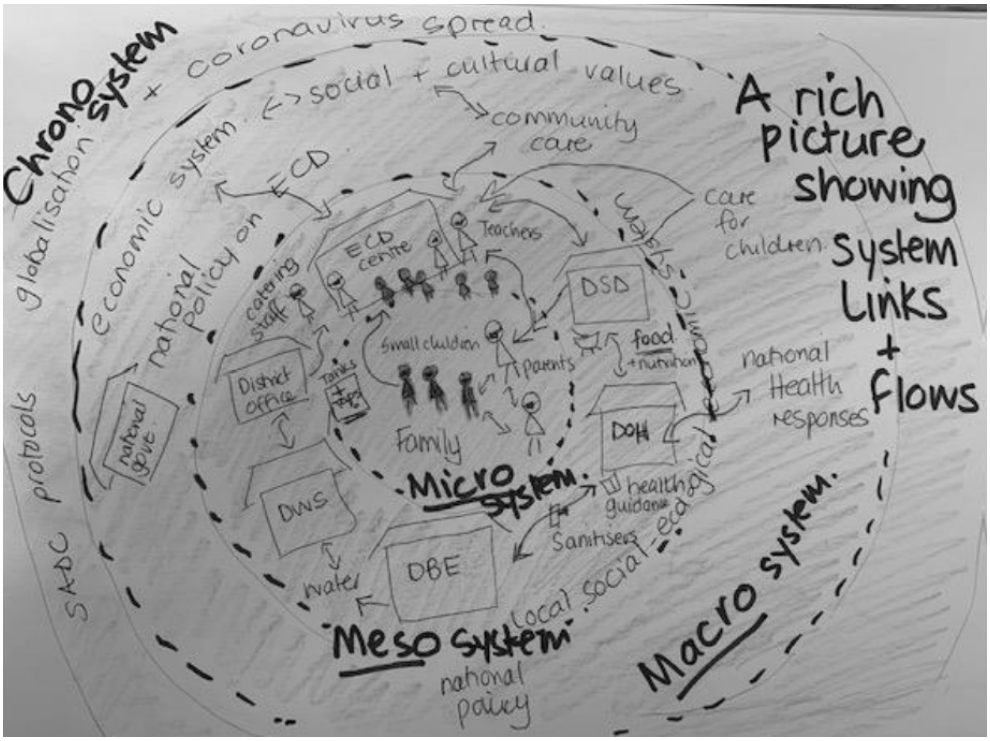


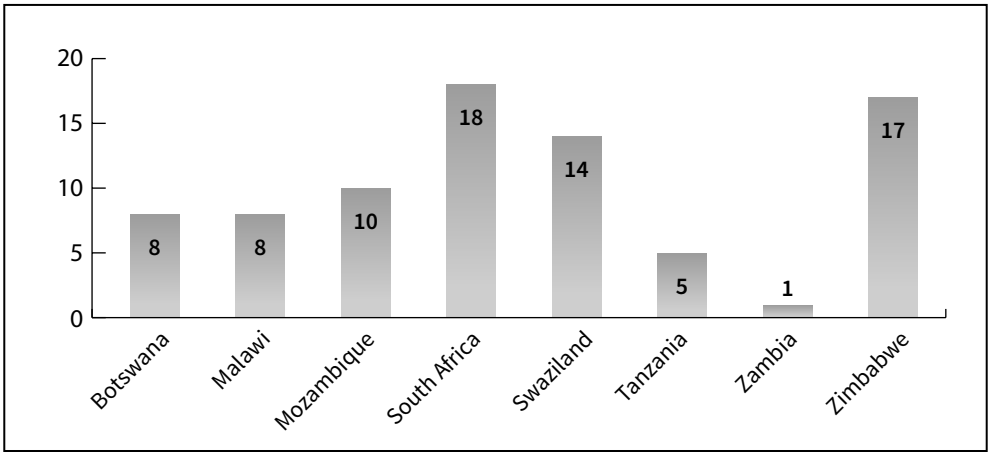
Figure 2: *One of the rich pictures showing system links and flows (Source: Authors' development)*



We used mainly qualitative research methods (Creswell & Poth, 2018) because we were trying to gain an understanding of a complex phenomenon. To contextualise and develop deeper understanding of the phenomena under study, we started the research by reflecting on our own experiences of the COVID-19 pandemic, and also reading and drawing on national and regional literature, seeking out insights into the intersecting concerns in focus. We mapped these initial experiences into a contextual profiling table that gave us a first level of understanding of the way in which the issues were intersecting. Following ethics clearance from Rhodes University, primary data was then collected through interviews and questionnaires while secondary data was gathered through document analysis. Documents analysed consisted of official SADC reports and national media articles with the aim of exploring from across SADC countries, focusing on the intersection of food, water, livelihoods and education. Semi-structured interviews (81) were conducted in June 2020 through face-to-face, virtual platforms such as Zoom, WhatsApp and Skype, telephone, and emailing (see Table 1 for the countries included in the sample). Interviewees came from eight countries (see Figure 3) and all key informants were local people, teachers, parents, learners, youth or government officials (Creswell & Poth, 2018). The interview questions were developed and informed by rich pictures (for example, see Figure 2) which provided

the first level of analysis using the Bronfenbrenner social-ecosystem model as explained above.

Figure 3: *Number of interviewees per country that responded to the interview*



A questionnaire survey (Newman & Hitchcock, 2011) was administered in June 2020 via email to recipients in the SADC Environment and Sustainability Education Community. The questionnaire reached about 400 people of whom 55 responded (13.7% response rate). Questionnaire respondents were from nine SADC countries; most were experienced educators from universities, non-governmental organisations (NGOs), other education institutions and government organisations. The purpose of the survey was to extend insights gained from the researchers' observations, the literature reviews, and interviews. Respondents offered rich data and an extended southern Africa understanding of the intersecting issues.

Data analysis included reading of transcripts to generate emerging examples, categories and themes responding to the key question (Miles, Huberman, & Saldana, 2019). Rich pictures from sub-themes enabled analysis of intersecting issues through Bronfenbrenner's socio-ecological systems lens which explains differences in Microsystem, Mesosystem, Exosystem, Macro and Chronosystem (cf. Figure 1 above). Researchers studied the rich pictures enhancing them with perspectives from literature and data. The initial focus was on analysing data in relation to the literature and data relevant to each theme with each team of researchers undertaking the first level of analysis. This fed into a second level of analysis which took place during the finalisation of the report. Thus the study employed an abductive analysis approach and analysed interconnecting issues relationally between different dimensions.

Findings reflecting the intersecting challenges as experienced by SADC communities in the early COVID-19 pandemic period

The qualitative data offered many interesting perspectives on the intersecting concerns, as briefly outlined below, and further elaborated in the final project report (Lotz-Sisitka et al., 2021). What was evident from across the data sets (interview and questionnaire) is that, like elsewhere around the world, the COVID-19 pandemic struck southern Africa with almost no warning, and across the southern African region the COVID-19 pandemic sadly exacerbated and starkly revealed many of the deep-seated historical and structural challenges in our societies. These are most evident in issues such as the rapid loss of economic security and livelihood access, deepening poverty and vulnerability, lack of access to clean water, hunger, food insecurity and nutrition challenges, increased educational inequalities exacerbated by the digital divide, increases in gender-based violence and challenges for the girl child especially. The following data reveals some of the dynamics identified in our study.

Food insecurity

Issues of price hikes on food products, shortage of food and long queues in shops emerged from data. Interviewees from Botswana and Eswatini stated that owners of grocery stores increased prices of food during the COVID-19 pandemic, thus initiating budgetary constraints. One of the interviewees in Botswana stated: "Food became expensive. Local dealers took advantage of the lockdown". FAO (2020) reported "the pandemic exacerbated price increases and analysis of food price trends showed that 20 of the 24 countries for which data are available recorded increases in staple food prices in June 2020 compared with February 2020" (p. 4). SADC (2020) also reported "Covid-19 has brought to the fore uncertainty in future demand which has led to weak commodity prices" (pp. 3-4). One of the interviewees in South Africa stated:

> I noticed that many people have lost their jobs due to the heavy lockdown period. This has led to food insecurity and large numbers of people in our community are reliant on food parcels which have been handed out by community organisations and Department of Social Development.

Shortage of food in most households was aggravated by the fact that people's movement was restricted. Even in rural places local people needed a permit to visit their farms which they used to visit all the time. An interviewee in Eswatini stated: "Our local shop provides fewer supplies. Residents consider buying from town. We were not able to get some food products locally". In Malawi, an Anglican Secondary School that raises broiler chickens for feeding students in the boarding school closed and it was left with many chickens and no students to feed. The school had to sell chickens at a low price to avoid losses. A primary school in Malawi also realised that due to school closure, the flour used for the school feeding programme was beginning to expire. COVID-19 revealed a significant crisis in food access and supply.

Water supply

While permanent water and sanitation systems are a distant hope in many learning institutions in the region, access to water during the pandemic became a key focus of some governments. For example, one interviewee stated: "Not experienced struggle in accessing water. Closed pipes were opened by Water Utilities Corporation to enable locals … easy access to water" and "Our area is characteristic of extreme lack of water, but since the eruption of COVID-19, water has been available". It seems that in these cases, the pandemic conditions urged governments to provide water to areas that would not normally have such access. For others sufficient water supply was not guaranteed; for example, this interviewee in Zambia stated that accessing water regularly to wash hands is a complicated process: "Even where I stay in Chilenje Township, we buy water every week from Lusaka Water and Sewerage Company. We are connected to this company, but we seldom receive water". An interviewee from Eswatini stated that the government failed in providing communities with running water. In Zimbabwe, the interviewee said, "I am working in a community involved in market gardening for livelihood, but experiencing water shortage even for domestic consumption".

Such intermittent water availability was reported to also link to food shortages and this intersection had further implications in the education system. Students were not able to practise hygiene to safeguard against infections, and they were not able to attend school due to lack of water, with reduced food at either home, or school, or both affecting their ability to learn. This questionnaire response from Zimbabwe, clearly outlines the interrelated nature of the concerns:

> Currently I am working in a community involved in market gardening for livelihood but experiences water shortage even for domestic consumption. Since the water required for hand washing is supposed to be moving, larger amounts of water are therefore required for WASH activities while the constant water is not available. The borehole supplying water to distant community garden is not yielding the required amount of water and the people usually augment this supply with hiring vehicles to source water from the nearest town. However, the town is now reserving all available water for the local residents as part of the town's strategy to combat COVID-19. At the end this community has lost its crop due to lack of water for irrigation while at the same time there is shortage of water to allow appropriate washing of hands. All of this is happening while children are out of school putting pressure on the little food and water supply available to the households.

Health

With regard to health, interviewees raised concerns varying from stigma, trauma, fear and social distancing, to commitment from health authorities, among others. A respondent working for an NGO in Zimbabwe stated that:

> During emergencies like the COVID-19, access to family planning is critical. Government must ensure that there is timely access to contraception, including emergency contraception to avoid unintended pregnancies, which can have significant impacts on women's lives and health.

A nutritional officer in Malawi stated:

> We need capacity building to volunteers such as care groups that pass messages to communities. Care groups are not aware of COVID-19. In case of a suspect, they would be aware on how to handle such cases. For girl child, they are at home. They can be supported with a ration like porridge they used to take at school. Otherwise girls will be malnourished potentially affecting performance at school.

The pandemic understandably affected health officials. A nurse in Botswana stated, "Even though it was a scary moment, I have pledged to help the nation in this kind of unforeseen health issues". Clinics and other health facilities encountered high number of patients seeking medical assistance. Due to crowding, social distancing was not always observed. An interviewee in Eswatini stated, "Because of social distancing, nurses were not able to attend to all of us, because of the restrictions of the number of patients". A nurse confirmed: "Access to health care services was negatively affected as few individuals were allowed [at the health facility] at a given point in time and patients came back later when they were now severely ill". Astonishingly, one interviewee reported that the local clinic provides health care services "only to their employees and their immediate family members. Minorities that stay in those villages had to travel to other places to access health care. Travel permits were not easy to get".

Education

COVID-19 caused changes to school calendars, discomfort among learners and teachers alike about going back to school, exacerbated inequalities in digital learning and the low quality of education. Even resourcing of schools was affected. An interviewee in Namibia stated: "Many of the issues are interrelated, for example, the tourism industry and education. Many schools and NGOs that provide education to school children receive donations from tourism companies. This has stopped".

COVID-19 negatively and unevenly impacted on opportunities for teaching and learning through school closures. Families had varying access to out-of-school learning resources such as the Internet, smart phones, television and even the radio, which may be affected by limited electricity supply. Some learners were not able to access online learning materials even if they had access to devices at home, due to poor telecommunication and information technology. One of the interviewees in Botswana stated: "The government tried to provide network then it became extremely slow due to overuse as many people rely on it for COVID-19 updates". In Eswatini, the interviewee stated:

> I had three platforms for communicating with students. First, we have a system that students use to access results and lecture notes. Second, I created a WhatsApp group where I posted what they should take a look at and allow them to post questions. Students submitted assignments through emails. Not all students participated due to insufficient funds for buying mobile data and also others complained of network coverage. Some students do not own smartphones.

The intersection of digital inequality, water scarcity, and food insecurity has major implications for transforming education. When schools closed, school nutrition programmes usually came to a halt as well. Halting of the school meals led to undesirable societal behaviour, as one interviewee noted: "Sometimes one sees children moving from house to house begging for food. They get exposed when going around and that could lead to more dangerous incidents like kidnapping and rape".

Furthermore, findings suggest that it was difficult to continue teaching, and learners forgot about school leading to silent drop out. "Our children suffered a lot. They did not receive any form of education. Standard seven, form three and form five students were given homework but they did not do because they needed further explanations from their teachers," said one of the interviewees.

Informal economies, different contexts and educational spaces:

Disruption in informal economies was evident in the data. High prevalence of women in informal economy (and in the health and care sectors) means that more women were at risk of infections. One of the researchers in this study described his country context:

> In Tanzania, the government said that everyone is supposed to wear a mask and every shop supposed to have a bucket of water with soap to handwash customers. Those who have money can buy sanitisers compared to water. Some schools don't have running water. Young girls face challenges on issues of hygiene. This was the challenge before COVID 19 … but after COVID-19 the challenge is becoming intense.

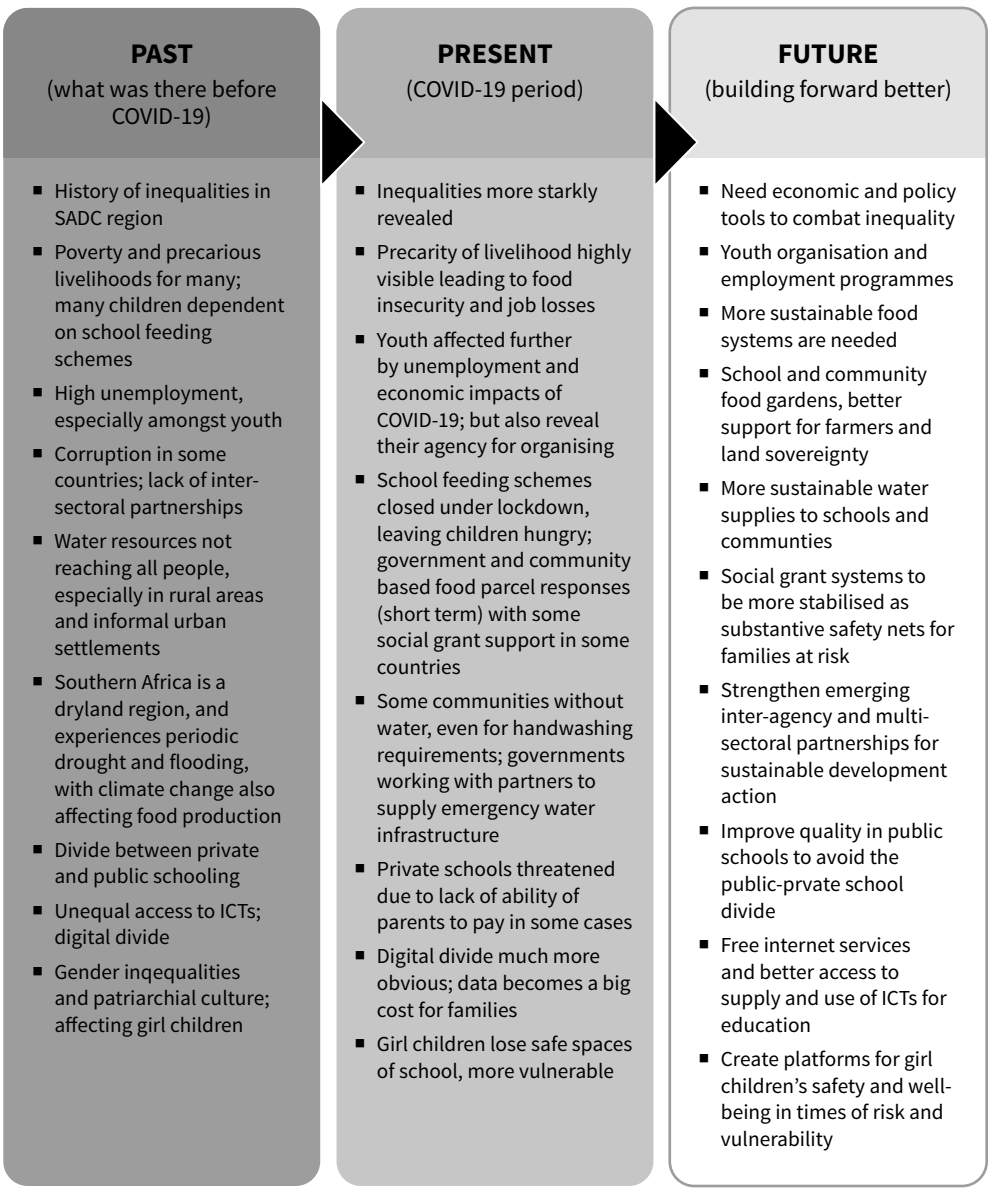
Another South African researcher in this study described her country context:

> My concern is around people who rely on informal economies … how they would manage? Many people have lost jobs. Businesses have shut down. A few people in my neighbourhood were concerned about the informal vegetable store. While supermarkets were able to continue operating, the vegetable store owner was not able to continue operating.

Two of the researchers revealed experiences of living in different contexts in their countries. They both attempted to use graffiti as a way to communicate about COVID-19. The experience revealed differences in the broader structures governing the two countries. In Tanzania, the researcher together with other young people created graffiti art that represented the COVID-19 pandemic. However, in South Africa, a researcher doing the same received a negative reaction. When she noted that COVID-19 positive cases were increasing in the neighbourhood and people barely wore masks, and did not adhere to social distancing, she decided on a chalk graffiti intervention. Without any volunteers to join her, she chalked a message on one of the main streets: "83 cases, Our response matters, Wash hands, Wear masks and Keep distance". While she was finishing up the work, a security officer approached and took her details down. The officer said it was his job to report any odd behaviour.

These and other detailed qualitative responses from across the SADC countries showed that there is a close relationship between the past and the experiences of communities across the region. Summatively, mapping these out as outlined in Figure 4 below, helped us to begin to see what could be done going forward. This informed our main recommendations from the study.

Figure 4: *An overview of the findings of the study from a past, present and future perspective*



Discussion and Recommendations

As indicated above, it was our interest in this research to explore the intersecting issues of water, food, education and livelihoods in order to identify what can be learned from the COVID-19 pandemic for transforming education for sustainable futures in southern Africa.

The findings show that COVID-19 clearly influenced the intersection of water, food, livelihood and education, but also that there are possibilities for transformation existing at the various levels of the system, that shape and influence each other. We identified that changes can be made at all levels of the system, most notably:

Macro- and meso-level involving government

1. School-community-government partnerships: Here we identified that school-community-government partnerships need to be strengthened, as our study revealed fissures between schools and communities or parents, and schools and government partners.

2. Inter-governmental collaboration on water, sanitation, nutrition: Here we identified that inter-governmental collaboration on water, sanitation and nutrition was crucial to provide safety nets for children when faced with exacerbated vulnerabilities such as those experienced in the COVID-19 pandemic.

Micro- and meso-level involving individuals and communities

1. Acceleration of sustainable solutions at community level: The pandemic showed the urgency of working with communities to accelerate sustainable solutions at local levels in response to the intersecting water, food, livelihoods and educational challenges experienced. Suggestions were to make better use of indigenous knowledge, grow more food locally and strengthen local systems of livelihood construction.

2. Roles of parents, teachers, community members: Parents, teachers and community members were very important responders in the pandemic, they were the ones that helped children to keep learning, and to make plans to manage the fallouts in livelihoods. Stronger solidarity relations between parents, teachers and community members were therefore found to be important in dealing with the intersecting vulnerabilities such as those produced in the pandemic.

3. Role of youth, informal learning and response-ability: Our study showed that youth are largely excluded from mainstream discussions on the responses in the pandemic, yet in many cases we found them to be the most agile and able to respond in their communities. This raised the importance of thinking about the response-ability of young people in our societies, and recognising the agency and strengths that they bring.

4. Role of gender (including safety of girl children): We noted in our findings that women were most heavily affected by the pandemic; this therefore highlights the importance of strengthening gender justice at local levels.

5. Implications for livelihoods (including SME start-ups, new economic opportunities surfacing, etc.): The massive fallout of livelihoods in the pandemic showed that there is

need for more flexible economies and more investment is needed for supporting start-ups and enterprises that work at local levels.

The findings summarised briefly above, show that micro-systems consists of individual and community experiences in relatively small-scale interactions, yet responses at this level are vitally important to strengthen relational solidarity and sustainable livelihoods. The meso-system consists of institutional forms, organisations, cultures, functions and roles and practices at, for example, a district level, and here we noted that there was need for improved partnerships and relationships. Exo- and macro-systems consists of larger institutions and structures at the national level (e.g. national governments' health responses) while the mega-system consists of global processes such as SADC protocols. It was evident that generative histories, structures and mechanisms influence each other at the above system levels. For example, observation of price hikes in food and of local dealers (at the micro-system level) taking advantage of lockdowns (emerging from the macro-system level) confirmed reports from the literature (FAO, 2020; Nicola et al., 2020) that consumers were paying more for food products. The hospitality and tourism industry (at all levels or systems) showed how local livelihoods were impacted by the macro-system level phenomena of the pandemic and globalised borders and trade relations. As shown in our qualitative data (see also Lotz-Sisitka et al., 2021), the pandemic reduced the well-being of people in multiple ways through loss of money to buy food and fewer opportunities to produce their own food. This was exacerbated by children losing access to school-based nutrition programmes and by water issues. Overall, this impacted in various ways at household level, and on educational possibilities and opportunities during the pandemic. But it is also here that people were mobilising themselves to respond to the pandemic in ways that they could.

Viewing the findings on past, present and future in Figure 4 above, it is also possible to see that what is needed in future is also an absence in the present; it is something that is 'not there yet' and needs to come into being within a just recovery or during the process of building forward on a better trajectory. This is necessary if we want to avoid sinking back into those aspects of the past that were not working well for people in southern Africa, and if we want to mobilise transforming education for sustainable futures work in ways that can help communities, teachers, government officials, business partners, and all societal actors to work out and put in place alternative ways out of contemporary ills as revealed by the COVID-19 pandemic, and if we want to strengthen our agency for change.

As indicated in the study overall (cf. Lotz-Sisitka et al., 2021), **agency for change** (individual and collective) was present in all research sites, despite the difficult histories and at times dire conditions. Parents took on the work of teachers, farmers helped each other, government officials formed new partnerships with each other, and people generally shared what they had in order to help others out. Youth played an important connecting role, and teachers adapted to the digital demands of new technologies, in spite of the many difficulties. Interestingly, one of the features of this agency for change during the pandemic was the **formation of new partnerships, relationships and coalitions at community**

level, but also at inter-governmental levels, for example in South Africa where the Department of Water Affairs assisted the Department of Education with water tanks for schools. Building forward better together based on this important finding can help to chart a pathway forward for transformative praxis that is grounded in the realities of people in the here and now, and that can be taken up at multiple levels of the system as per the conceptual framework guiding this study.

With this in mind, we identified six **'transformative praxis pathways' for transforming education for sustainable futures** going forward. These are:

- ***Transformative Praxis Pathway 1: Education, training and social learning that contributes to articulating economic models that are more inclusive and sustainable.*** There is a need to invest in education, training and social learning that is oriented towards more inclusive, sustainable economic models that leave no-one behind. Such economic models should be more strongly community-based and should strengthen local economies, as well as mobilise the potential of green, circular and re-generative economies. This transformative praxis pathway specifically impacts economics education curricula where new economic thinking needs urgent attention.
- ***Transformative Praxis Pathway 2: Education, training and social learning to contribute to the emergence of more sustainable food systems for all.*** Education, training and social learning is needed to develop knowledge of the entire food system and the food value chain, and this can help to develop active production praxis of farmers (including via education) to address land access and access to the resources and knowledge for improving farming, and food production at household and community levels. Additionally, there is need for education along the food value chain to strengthen ethics and accountability across the food value chain including in marketing, distribution and supply systems, not only the production system. A whole system approach is needed that is oriented towards sustainability, inclusivity, fairness, human dignity and access to adequate food. Agro-ecological approaches and food sovereignty principles need to be part of this approach to food system development, as do anti-corruption approaches and values. Such education and learning should include a stronger focus on climate change adaptation, indigenous knowledge and multiple forms of knowledge in education, training and social learning in the food system.
- ***Transformative Praxis Pathway 3: Education, training and social learning to strengthen inter-agency and multi-sectoral partnerships for sustainable development action and service delivery.*** As shown across our study (cf. Lotz-Sisitka et al., 2021 for further detail), lack of sustainable supply of clean water heavily impacted on communities and schools' abilities to respond adequately to the COVID-19 pandemic with many impacts across the system, including longer than necessary closures of schools which in turn impacted on the school nutrition schemes, and exacerbated food insecurity. This same problem also affected health workers, teachers, and families who are challenged with inadequate access to a clean, sustainable supply of water. New innovative strategies should be introduced into inter-agency and multi-sectoral partnerships such as use of solar pumps and rainwater

harvesting practices, that build on community knowledge and indigenous practices. Communities should be consulted in planning of interventions that are meant to facilitate sustainable development action and service delivery, and should be included in co-creating these solutions.

- ***Transformative Praxis Pathway 4: Strengthen quality education in the public education sector and facilitate access to ICTs and stronger parental participation.*** Our study showed that it was children in public schools that were most heavily affected by the pandemic in terms of learning continuity and access to resources (cf. Lotz-Sisitka et al., 2021). This indicates that there is a need to strengthen quality education in the public sector to address the current divide between public and private education. As reported across our study, one of the most obvious divides between public and private education is equitable access to and use of ICTs in education. This particularly affected children from poorer households and children in rural areas with access to and use of ICTs for online learning. This is a macro-level systemic issue that will require setting systems in place for providing free Internet services, and better supply and access to ICT devices and tools. It also involves providing support to teachers to design and develop online learning approaches. Community-based approaches to supporting children's education in times of crisis are also needed as not all parents are able to take on the role of educators.
- ***Transformative Praxis Pathway 5: Strengthen interventions that support the inclusion and safety of women and girl children, and youth agency for change.*** Women and girl children emerged as being some of the most vulnerable in society and were also most at risk of loss of economic security, and were most impacted due to their traditional roles as caregivers in society and in the health care sector. There is a need for strengthening of interventions that support the inclusion and safety of women and girl children in education and learning for sustainable futures, and that validate and create spaces for youth agency for organisation and change. In our study, young people were found to have capacity for imagining alternative futures, and agency for organising, crossing boundaries in their communities and contributing to multi-levelled and multi-facetted forms of awareness raising and public education (cf. Lotz-Sisitka et al., 2021). The study also showed that many young people are facing the spectre of permanent unemployment and there is therefore a need to give attention to programmes and spaces for young people to access resources, and platforms that can better support their agency for change. It is important especially to give attention to the boundary zones between formal and informal education and new modalities of learning that can be made available to young people, especially also through coalition building and use of ICTs.
- ***Transformative Praxis Pathway 6: Strengthen multi-levelled and multi-disciplinary policy interventions to strengthen sustainable development of society at all levels.*** The intersecting concerns in our study revealed that policy development processes for education for sustainable development and transforming education for sustainable futures going forward needs to be multi-sectoral and multi-disciplinary. Such policy development processes require that the range of stakeholders that were shown to have an important

response role in this study (including but not limited to education sector actors, water, food and livelihoods development actors, gender activists and other actors concerned with human well-being, social justice and wider concerns such as sustainable development in the SADC region) should be included in Education for Sustainable Development policy and practices. Co-operative governance and special efforts are needed to ensure policy synergy. As we saw across our study, policy disjuncture's between water and food systems, or water and education systems, or education and social welfare systems can have extreme adverse effects in times of crisis. For this reason, building forwards better, enabling just recovery and transforming education for sustainable futures moving forward should adopt multi-sectoral and joined-up approaches to policy within a wider social justice and sustainable development framework that is oriented towards addressing historical marginalisation and ensuring equity of opportunity for all.

This study (see also its more extended report: Lotz-Sisitka et al., 2021) has shed light on the complex systemic relationships that exist when we seek to transform education systems for sustainable futures. Overall, we sought to make recommendations that can help to frame transforming education for sustainable futures conceptualised within a socially just 'build forward better' together approach to creating a future out of the present and the past. Our intention was to identify what could be learned for transforming education for sustainable futures out of the current COVID-19 pandemic context.

Our study purposefully sought out the qualitative voices of those most affected by the pandemic from a diversity of perspectives and vantage points, of which we could only share a few in this article (refer to Lotz-Sisitka et al., 2021 for more detailed views and voices). We have offered recommendations that can inform a multi-levelled response and a wider systemic response to the intersecting challenges that were revealed so starkly in the pandemic, in ways that also offer clear transformative praxis pathways for transforming education for sustainable futures work going forward in the SADC region.

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Conception or design of the paper, theory or key argument	Velempini	18%
	Lotz-Sisitka	30%
	Kulundu	10%
	Maqwelane	9%
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	Mphepo	8%
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Data collection	Velempini	25%
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	Kulundu	0%
	Maqwelane	10%
	James	10%
	Mphepo	10 %
	Dyantyi	10%
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Analysis and interpretation	Velempini	20%
	Lotz-Sisitka	26%
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	Mphepo	9%
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	Dyantyi	8%
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	James	6%
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Enacting Environmental Ethics Education for Wildlife Conservation using an Afrophilic 'Philosophy for Children' approach

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Abstract

Environmental Ethics Education has in recent years emerged as a critical tool for wildlife conservation research. Despite this, Environmental Ethics Education is paradoxically predominated by traditional forms of western science such as the concept of the Anthropocene which appears to exclude aspects of African life-worlds where the natural environment is considered a heritage component and is linked to onto-ethical understandings of human existence. The purpose of this study is to explore how African heritage-based knowledges and practices are understood by children who identify and understand the relevance of their totems and taboos associated with them, in relation to wildlife conservation. The study from which this paper is derived utilised formative interventionist methodology complemented by a multi-voiced decolonial approach to explore whether children-participants aged 8 to 11 years understand the purposes of their totems and associated taboos. To achieve this I used an Afrophilic Philosophy for Children pedagogical approach, which foregrounds dialogical learning and development of critical reflexive thinking skills. Emerging findings indicated that children associated their totems and connected taboos as tools for protection against environmental pollution and for minimising resource over-extraction. Findings further demonstrated improved learner agency and development of ethical reasoning among children. As participants' respect for environmental conservation and sustainability was informed by the significance placed on their totems, I recommend the need for schools to develop generative curricula that take seriously context-based solutions to environmental problems. Future research should also consider understanding environmental conservation issues from a context-based perspective, which can inform existing heritage practices and pedagogies.

Keywords: *Environmental Ethics Education, Afrophilic Philosophy for Children, ethical reasoning, heritage-knowledges*

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Background and context

Since the 1970s, environmental ethics has been a fundamentally evolving part of formal education (Taneja & Gupta, 2015). Taneja and Gupta (2015) have defined environmental ethics as a sub-field of philosophy which focuses on environmental values that include cultural attitudes, practices and approaches to securing and supporting biodiversity and ecological frameworks. During the same period that environmental ethics was becoming a recognised component of formal education, a new educational approach emerged known as 'Philosophy for Children'. Mathew Lipman (2003) is among scholars who have been accredited for introducing this philosophy as an educational approach to promote critical thinking in children.

Research within the field of education has pointed to beneficial outcomes of the Philosophy for Children in enhancing learning in schools. D'Olimpio (2014) for instance has argued that it is useful as it exposes children to group dialogue thereby opening avenues for them to become active thinkers with the potential to develop a variety of critical reflexive thinking skills along the way. My research has shown that Philosophy for Children is a creative pedagogy that has potential to improve learner agency which conventional imperial colonial pedagogical approaches in Africa had previously excluded and obliterated from classroom activities (Bhurekeni, 2021a). Ristiniemi et al. (2018) have associated Philosophy for Children with a creative pedagogy of Environmental Ethics Education which could improve existing environmental sustainability practices.

International agencies such as the United Nations Educational, Scientific and Cultural Organisation (UNESCO) have also endorsed Philosophy for Children as an empowering pedagogy for learners. For instance, UNESCO (2005) has noted that Philosophy for Children could play an important role in meeting the expectations of the United Nations Sustainable Development Goals (UNSDGs). This is particularly relevant if we consider SDG 4 on 'inclusive and equitable quality education', SDG 13 on 'urgent action to combat climate change and its impacts', SDG 15 on 'sustainable ecosystems, re-forestation and increasing biodiversity'.

In many countries, the practice of Philosophy for Children is seen as an ideal pedagogical approach in shaping moral/ethical standard measures associated with environmental problems (Cam, 2011). Zimbabwe has policies in place that support the UNSDGs such as the Zimbabwe National Environmental Education Policy and Strategy of 2003 (Chimbodza et al., 2004). However, it appears as if little has been done to support the practical implementation of this policy. Against this background, the purpose of this paper is to explore how African heritage-based knowledges and practices are understood by children in Sebakwe resettlement area who identify and understand the relevance of their totems and associated taboos with regard to wildlife conservation. Wildlife conservation challenges in the Sebakwe resettlement area include an increase in uncontrolled poaching, destructive veld fires, and visible signs of human encroachment into wildlife areas. In the following section, I discuss literature on Philosophy for Children, situating it as a potential tool for

enacting Environmental Ethics Education, as well as literature on education philosophy that can support Environmental Ethics Education in schools.

Philosophy for Children and Environmental Ethics Education

The Philosophy for Children pedagogical approach utilised in this study was extended via Afrophilia learning artefacts. As explained in previous research (Bhurekeni, 2021b), the artefacts were selected during formative intervention workshops with parents and educators. The goal of selecting heritage-based learning lenses that are socially situated was to explore how children understand these knowledges and practices and as well as how they inspire development of critical reflexive thinking skills in children.

Over the years, practitioners have discovered that the 'community of inquiry' which supports pedagogical growth within a Philosophy for Children approach, exhibits the following characteristics: inclusiveness, participation, the quest for meaning, questioning, and discussion (Lipman, 2003; Mohr Lone & Isrealoff, 2012). The community of inquiry approach was used in this study as a collaborative learning process aimed at allowing learners to take responsibility for their own learning with support of parents and teachers. According to Harpaz (2005), learners assume more responsibility through working together as a community to discuss multiple viewpoints to reach an eventual conclusion as a "community of thinking" (p. 136). Within a community of inquiry, Philosophy for Children facilitators often use Jackson's 'Good Thinker's Toolkit' discussed in the methodology section below (Bhurekeni, 2021a; Jackson, 2013).

The community of inquiry approach is based on a nurturing social environment that provides participants space for co-engaged social innovation through philosophical exchange (Goering et al., 2013, O'Donoghue, 2016). Participant learners develop the tools for 'talking back' to the narrative of textbook-focused wildlife sustainability, and are assisted with developing what Scott (2010) referred to as intersubjective knowing. Intersubjective knowing refers to the exchange of experiences, thoughts, knowledges and understandings among a group of people informed by their indigenous philosophies and cultural history of practices (Scott, 2010).

Intersubjective knowledge could be socially situated, encouraging learners to acquire new information and knowledge while also becoming aware of their own prejudices (Mohr Lone & Isrealoff, 2012). This is significant because it allows a community of inquiry discussants to integrate and engage with a broader conception of knowledges as they engage with life's bigger questions (ibid.). In this case, the discussants are more likely to bring into the classroom knowledges that are not commonly found in their school curriculum. For example, the following questions guided the framing of the community of inquiry sessions considered in this paper: What heritage-knowledges influence children's perspectives on wildlife conservation? How can heritage practices like totem identification help to advance environmental education in schools?

By incorporating questions from the participant learners' life-world, the community of inquiry pedagogy positions itself as a context relevant approach to teaching and learning (Goering et al., 2013). During the Philosophy for Children sessions, it was usually observed that the community of inquiry had the potential to mediate socially oriented activities towards progressively sustainable ways of knowing and doing things together in a finite world (O'Donoghue, 2016). In this case, the discourse that emerged from a discussion of the questions such as those mentioned above, represents an ontological shift towards dialogic reasonableness (Lipman, 2003). In this study, an ontological shift occurred when learners and teachers re-conceptualised the traditional categorical structure of their classroom reality. According to Freire (1970), in traditional teaching-learning discourse, the teacher is typically regarded as the provider of knowledge to passive learners. However, as a result of the new direction ushered in by the practice of Philosophy for Children, teachers and learners may begin to recognise learning as a dialogue-based process in which they aspire to understand the views of others. In the section that follows, I establish the Afrophilia learning focal point by looking more deeply into the indigenous philosophy of 'unhu/ ubuntu' as an Afrophilic frame for Environmental Ethics Education.

Unhu/ubuntu frame for Environmental Ethics Education

The world (including the Sebakwe resettlement area) is looking for an alternative practice-based wildlife sustainability model that also ensures economically low carbon outputs (Clough, 2010). To accomplish this, a new mindset that underscores interdependence and an ethic of care as necessary components of existence, is required (Praeg, 2014). In southern Africa, where this study was conducted, it appeared that a potentially powerful mindset is embodied in unhu/ubuntu philosophy, which promotes human understanding within the unity-in-diversity of life's ecology (Le Grange, 2012). Emphasis in unhu/ubuntu philosophy is on the development of a social disposition of participating in-existence with others (both people and non-human animals). According to Le Grange (2012), the philosophy of unhu/ ubuntu emphasises the need to comprehend that being human entails thinking about the self in harmony with people and the entire biophysical world. This study's discussion of unhu/ubuntu is related to a conceptualisation of unhu/ubuntu philosophy as a decolonial philosophy of education. In this regard, unhu/ubuntu has an ecocentric leaning[1] as well as an ethical commitment that nurtures people to consider how they relate not only to themselves but to the entire universe.

According to Le Grange (2012), an ethical obligation is the benchmark that: "doing things for the good of others; to think of oneself as bound up with others; and to value family (in a broad sense of the term) **as well as wildlife (as it is inextricably bound to human beings)** for its own sake and not for its efficacy" (p. 331, emphasis added). Unlike more traditional forms in Western science which have created an abstracted nature-culture dichotomy by failing to connect with context-based heritage-knowledges and practices, unhu/ ubuntu has a unique perspective in shaping Environmental Ethics Education as a situated practice

(Maware, 2013). This positions unhu/ubuntu as a potentially interesting frame that differs from inherited colonial approaches, which appear to be biased toward more standard forms of Western science, because it takes a holistic approach to understanding human life and the environment (Le Grange, 2012; Maware, 2013). As a result, there are connections between education and African indigenous philosophy ontological concepts of the human person, which provides a nuanced understanding of a person as a being-in-becoming through 'doing' (here in onto-ethical mode of participation) in communion with others and the entire cosmos (Eze, 1997).

Tymieniecka (2007) proposed that education be asserted as an existential coordinate of the human condition, which in this case is echoed through unhu/ubuntu philosophy. Unhu/ubuntu embodies the existential experiences of indigenous people involved in my study (Bhurekeni, 2020; Praeg, 2014). Thus, the study's goals of Environmental Ethics Education were (re)imagined in this context using unhu/ubuntu philosophy. Unhu/Ubuntu ontology has strong synergies with the natural environment (wildlife), resonating a bond between African being and the natural environment, as stated by Mbeki (2015):

> I owe my being to the hills and the valleys, the mountains and the glades, the rivers, the deserts, the trees, the flowers, the seas, and the ever-changing seasons that define the face of our native land. (p. 1)

Mbeki's (2015) sentiments contain undertones of an affirmation that the African child's life world (heritage-based belief systems included) is inextricably linked to water, plants, and animals. This reflects an interdependence between humans and wildlife (Maware, 2013). According to Clough (2010), the interdependence of humans and nature influences eco-friendly behaviours. Thus, the interdependence illustrated here, as embedded in unhu/ubuntu philosophy, creates spaces for a collective sense of responsibility and consolidating active participation with concrete experience and reflection. Unhu/ubuntu offers an ecosophical treatise that acknowledges the interconnected co-existence of humans, the Earth, and other sentient beings (Le Grange, 2012). In the section that follows, I highlight the study's problem statement.

Research problem

As an educational approach, Philosophy for Children has done little to tap into heritage knowledges and practices drawn from southern Africa, such as totems and their associated taboos, to develop a framework for context-based Environmental Ethics Education. As a result, little is known about how such African heritage-based knowledges and practices are understood by children who identify and comprehend the significance of their totems and associated taboos in terms of wildlife conservation. This gap presents a challenge when it comes to implementing a context-relevant Environmental Ethics Education plan.

Research methodology

Philosophy for Children community of inquiry sessions were conducted in Sebakwe Resettlement Primary School and 15 grade 3 children were involved. My role as a researcher and teacher in the study to which this paper contributes was to support the development of a sociocultural approach to context-based Philosophy for Children in Zimbabwe, which translates into the development of a learning culture in schools and critical reflexive thinking in children (Bhurekeni, 2021a). As a result, the research was conducted within the context of formative intervention work, as I worked to investigate a generative curriculum transformation process that was co-led and owned by the participants (Engeström & Sannino, 2010).

According to Engeström and Sannino (2010), formative intervention methodology considers culture and history with the goal of creating a space where researchers and their participants can form collective concepts. In the context of my research, I as the researcher together with participants worked as a collective entity committed to curriculum transformation. I was present in Sebakwe resettlement area as a full-time teacher and later as part-time PhD scholar[2] over a period of 16 years. Over the last four years, I led formative intervention workshops, participated in community of inquiry sessions, and conducted reflexive interviews with teachers, children, education inspectors and parents. Jackson's 'Good Thinker's Toolkit' (Appendix A), often used in Philosophy for Children, was used to analyse data that was transcribed for this paper (Bhurekeni, 2021a; Jackson, 2013). The toolkit consists of seven letters, W-R-A-I-T-E-C, each of which represents a cognitive skill that is part of becoming a good thinker (Jackson, 2013). According to Goering et al. (2013), the toolkit was designed to facilitate the development of higher order thinking by measuring and fostering progress in an inquiry. Transcriptions and preliminary analyses of these data were also utilised to aid the processes of generative curriculum transformation by being presented to and deliberated with teachers, parents and education inspectors.

This study forms part of a more extensive PhD project that involved an in-depth literature review to scope the history of curriculum in Zimbabwe, and three formative intervention workshops with parents, teachers and education inspectors. These activities were followed by ten community of inquiry sessions with learners and then a sequence of reflexive interviews with parents (seven interviews), education inspectors (three interviews), learners (six interviews) and teachers (seven interviews) over a period of four years. Part of the data that surfaced in this study has previously been published in academic journals (Bhurekeni 2020, 2021a, 2021b). This paper is focused on a need to understand how African heritage-based knowledges and practices are understood by children who identify and understand the relevance of their totems and associated taboos in relation to wildlife conservation.

Children were given start-up activities that influenced dialogical engagement during the community of inquiry sessions. The activities intended to elicit children's understanding of their heritage-based knowledges and practices. In Table 1, I describe two heritage-based

activities that informed the community of inquiry sessions that motivated this paper. The activities are derived from weeks 5 and 6 of the ten community of inquiry sessions I conducted with learners.

Table 1: *Heritage-based activities that informed the community of inquiry sessions held in weeks 5 and 6 with children*

Activity 1: Totems and their purpose	Activity 2: Conservation related taboos
Objective: Participant-children will engage in a discussion about the significance of totems (as a heritage practice) in wildlife conservation.	**Objective:** Participant-children will create a list of wildlife conservation taboos and discuss their importance in and for conservation education.
Description: Learners were asked to draw an animal or totem pole symbol. The drawings were inspired by the imagination of the learners, but some learners knew the animals because they live near a wildlife ranch (Iwaba ranch). This activity falls under the topic: Identity, Family History and Local Heritage in the Family and Heritage Studies Primary School syllabus (2015-2022), see also activities in the Family and Heritage studies grade 3 textbook pp. 3-5.	**Description:** During the activity learners listed conservation taboos, which we divided into aquatic taboos and those aimed at flora and fauna preservation. The list was done in the learners' home language (Shona), and later translated into English for the purpose of this publication. Henceforth, they are presented below giving first the original words and then the English equivalent of the taboo.

Findings

The activities and community of inquiry sessions stimulated learners' interest while also demonstrating their understanding of and ability to apply heritage-based knowledges and experiences in formal education. The findings highlighted how heritage-based practices mobilised learners' agency during formal classroom sessions, as well as how they can be used to protect against pollution and reduce resource over-extraction. In addition, learner participation in community of inquiry sessions appears to have led to a discussion in this study that resonated with Clough's (2010) concept of 'responsible lifestyle learning'. This is because findings of the study point to the emergence of an onto-ethical mode of participation in environmental education. This mode of participation is shaped by questions about how children use the heritage-knowledges and practices with which they identify to influence how they interact with their natural environment. In the next section, I discuss the findings that emerged from the activities and philosophical discussions that took place during the community of inquiry sessions.

Context-based Philosophy for Children activities mobilise learners' agency

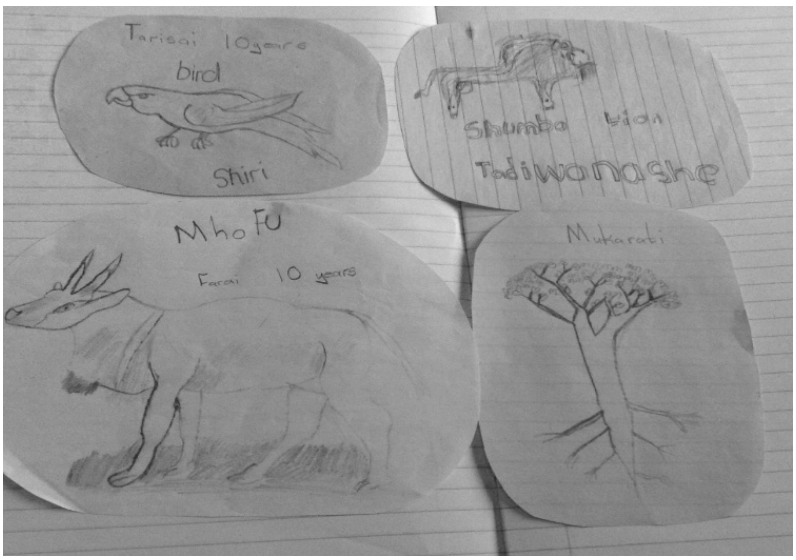
The heritage-based activities were transposed to a problem-posing approach that seemed to connect well with the community of inquiry approach because it drew on experiences from the learners' life world. This mobilised learners' agency as they were able to draw their own totem pole symbols and list aquatic, flora, and fauna taboos, as illustrated in Figures 1,

2A and 2B and Table 2. The lesson observations and data sets show that learners' active involvement was a result of their agency being mobilised. According to Freire (1970), this empowers learners to initiate, manage and sustain their own learning. The agency reflected in learners' drawings, participation in dialogue in community of inquiry sessions, and their listing of flora, aquatic, and fauna taboos allowed learners to critically reflect on their role in the world and their interdependence with nature. An example of this can be found in one of the learners' responses during the community of inquiry session in week 5:

> **Teacher:** Is it possible for humans and wild animals to live side by side without causing problems?
>
> **Arnold:** I think it is possible because we are all animals, and because we as humans can use our brains, we are the ones who must think of what to do with the animals. … Before the people removed the fence that fenced Iwaba ranch, we lived next to the animals without even noticing them, but now that the fence has been removed, they are causing us problems…

Arnold's response demonstrated that he knew that humans play a role in determining how they co-exist with wild animals by deciding how and where wild animals can live. However, it is important to note that, while the learners' responses are important in demonstrating how they critically reflect on their role in the world and their interdependence with nature, Arnold's assumption raises ethical questions. Figures 1, 2A and 2B illustrate the learners' mobilised agency, as mentioned earlier.

Figure 1:
A selection of learners' drawings of totem pole animals and or symbols (from Week, 5 session 5): fish eagle (hungwe/nyoni)*; lion* (shumba/sibanda)*; eland* (mhofu/mpofu) *and Burkea tree* (mukarati/umnondo)



In connection with the totems pole symbols, learners were also asked to list taboos as shown in the table below and also in their work in Figures 2A and 2B. While the children's work simply identifies the taboos and their implications, the table below illuminates some of the scientific concepts explained in the children's formal school curriculum textbooks.

Figure 2A: *Learner's work on aquatic taboos*

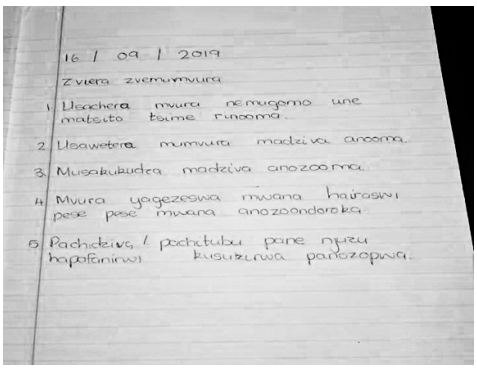
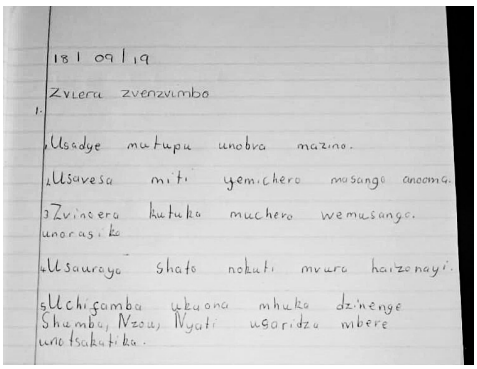


Figure 2B: *Learner's work on flora and fauna*



The taboos in Figures 2A and 2B are also presented in Table 2 with an English translation for readers who are unfamiliar with the Shona language. The work was part of the activities leading to the community of inquiry session of week 6.

Table 2: *Children's list of aquatic (*A), flora, and fauna (*F) taboos (see Figures 2A and 2B). The table was developed to demonstrate the connections between the taboos and scientific concepts in the learners' books.*

Taboo	Category		Minimise against
	A*	F*	
Usachera mvura nemugomo une matsito tsime rinooma. *(If you use ash-tainted tins to get water, the well will dry up)*	X		**Pollution:** Ash can cause chemical changes that affects water quality **Cruelty and bad behaviour:** It is bad behaviour to add a substance that make water taste unpleasant
Usawetera mumvura madziva anooma. *(If you urinate in rivers, the water will dry up)*	X		**Pollution:** Urine can introduce bacteria, toxins and other harmful substances **Cruelty and bad behaviour:** It is a sign of both cruelty and bad behaviour to urinate in water
Musakukudza madziva anozooma *(Don't use nets when fishing, the rivers will dry up)*	X		**Resource over-extraction:** To avoid extinction of some fish species **Accidents:** To avoid drowning in rivers

Taboo	Category		Minimise against
	A*	F*	
Mvura yagezeswa mwana hairaswi pese pese nekuti mwana anozoondoroka. *(If you dispose the baby's wash water everywhere, the baby will become thin)*	X		**Pollution:** Soaps and detergents can affect the soil chemical composition and cause plants to wilt
Pachidziva/chitubu pane njuzu hapafanirwi kusukirwa nekuti panozopwa. *(People should avoid washing dishes in springs or pools that inhabit mermaids as the water may dry)*	X		**Pollution:** Soaps can decrease the breeding ability of aquatic organisms **Resource over-extraction:** Avoid extinction of organisms
Usadye mutupo unobva mazino. *(You will lose your teeth if you eat your totem)*		X	**Resource over-extraction:** Avoid extinction of organisms. Minimise extinction of some species
Usavesa miti yemichero, masango anooma. *(Fruit trees should not be used as forests will droop)*		X	**Resource over-extraction:** Avoid extinction of organisms. Minimise extinction of tree species
Zvinoera kutuka muchero wemusango, unorasika. *(It is a taboo to curse indigenous fruit trees while in the wild as you may get lost)*		X	**Cruelty and bad behaviour:** It is cruelty and bad behaviour to show disrespect
Ukaitira tsvina muzhira unoita mamota pamagaro. *(If you defecate on walkways you will have boils on your buttocks)*		X	**Pollution:** Human waste can cause excessive growth of algae and weeds **Cruelty and bad behaviour:** It is cruelty and bad behaviour to expose human waste openly
Usauraya shato nokuti mvura haizonai. *(Do not kill a python, or it will not rain)*	X	X	**Resource over-extraction:** Pythons are are a protected species under the Zimbabwe Parks Wildlife Authority **Cruelty and bad behaviour:** It is cruel to kill something that one does not eat
Ukadya hwowa mupengo unopenga. *(If you eat wild mushrooms you will suffer from mental illness)*		X	**Accidents:** To avoid human poisoning through eating mushrooms
Uchifamba ukaona mhuka dzinenge Shumba, Nzou neNyati usaridza mhere unotsakatika. *(If you come across lion, elephant and buffalo - the Big Five - in the wild, do not scream or you will disappear)*		X	**Pollution:** To protect the numbers of the Big Five from declining **Accidents:** To avoid death through direct conflict with wild animals
Ukasenga mwenje musango unozoita muroyi. *(If you carry a burning light in the forest, you may become a witch or wizard)*		X	**Accidents:** To avoid causing veld fires **Cruelty and bad behaviour:** It is cruel to intentionally cause veld fires as this exposes animals to danger
Ukatasva imbwa unoita muroyi. *(If you sit on your dog's back, you will become a witch or wizard)*		X	**Cruelty and bad behaviour:** It is cruel to abuse other animals

Taboo	Category		Minimise against
	A*	F*	
Ukauraya rwaivhi unozofa uchifunuka muviri. *(If you kill a chameleon, you will die from scale rot)*		X	**Pollution:** To protect the numbers of chameleon species from declining **Cruelty and bad behaviour:** It is cruel to kill animals especially those one does not eat
Ukauraya datya hakuzonayi. *(If you kill a frog it will not rain)*	X		**Resource over-extraction:** Avoid the over-harvesting of frogs **Cruelty and bad behaviour:** It is cruel to kill animals that you do not eat

Context-based Philosophy for Children practices minimise pollution and resource over-extraction

From the list of taboos provided above (Table 2, Figures 2A and 2B) and the dialogue that followed, it is evident that the taboos suggested by children appear to have the potential to govern how people interact with their environment by prohibiting use of items perceived as sacred. Children listed the following trees as some of the species that should not be cut down for material (e.g. fencing poles, furniture and firewood) or harvested if fruits are not yet ripe:

- Muzhanje (Sugar plum *Uapaca kirkiana*)
- Muhacha (Mobola plum *Parinari curatellifolia*)
- Mutamba (Natal orange *Strychnos spinosa*)
- Mutohwe (Snot apple *Azanza garckeana*)
- Munhengeni (Sourplum *Ximenia caffra*)
- Muuyu (Baobab tree *Adansonia digitata*)

According to Farai, one of the learners during the community of inquiry (Week 5 – Session 5: Exploring the purpose of aquatic, flora and fauna taboos), it is illegal to use fruit trees such as those mentioned above as this may lead to serving a jail term. Below is a dialogue from the community of inquiry session highlighting some of the consequences of not observing the stipulated taboos.

> **Farai:** If you use some of those trees as firewood or fencing poles you may be arrested.
>
> **Tinevimbo:** … especially Muuyu, Chief said anyone caught cutting down the tree will be arrested.
>
> **Teacher:** Besides being arrested what else could happen if you use these trees as firewood or as fencing poles?

Tinevimbo: I was told that if we fence our garden with poles from these trees our crops will be destroyed by baboons or other wild animals.

Tadiwanashe: … we were told by my grandmother if we don't obey the rules there won't be rain and people will start experiencing so many diseases.

It is evident from the excerpt above that both the learners and the teacher were capable of inferring the consequences of disobeying taboos, as well as offering examples, counter-examples and reasons as they engaged in an inquiry process. This demonstrates how the W-R-A-I-T-E-C (Appendix A) can be used in community of inquiry sessions and how it may potentially improve higher-order thinking skills. Furthermore, it is evident that taboos govern the types of indigenous trees used in the Sebakwe resettlement community and children understand the function and purposes of these taboos. According to Mubaiwa (parent, interviewed on 17 July 2019), such cultural values are aimed at monitoring human behaviour especially in children when they play alone without the supervision of the elders. She went on to explain:

Mubaiwa: Zviera (taboos) help to transmit to the children the social values expected in the society. It's a way of teaching that forbids bad behaviour in both the young and the old as it warns them of the likely consequences that can befall them or the whole community if not obeyed.

The idea of monitoring human behaviour, particularly that of the younger generation, also surfaced during the community of inquiry session. The following excerpt is a continuation of the above dialogue from week 5 community of inquiry session.

Teacher: If I understand you correctly, it appears that when people break these taboos, bad things happen. Is it always true that bad things happen when people break rules?

Abel: I don't think it's true, last week elephants destroyed crops in our field but we haven't done anything.

Tarisai: What Abel is saying is true, baboons always come to destroy our maize field even when we haven't done anything. Our parents just tell us these things so that we won't behave badly… 'Hanzi ukagara munzira unoita mamota' *You will get boils if you sit on the road*. But it's not true, their fear is just that you may be run over by a car.

Tadiwanashe: I think adults teach us about these things because they only want us to think on our own what really happens if you do something like what Tarisai has said.

The findings demonstrate how taboos that are observed in the Sebakwe community are passed on from one generation to the other for purposes of protecting the environment and also regulating human behaviour. This concurs with the definition of taboos given by Makamure and Chimininge (2015) that taboos are avoidance rules that forbid members of Shona communities from performing certain actions, such as eating some kinds of foods. However, beyond this, taboos also help enhance children's development of critical reflexive

thinking skills as well as development of ethical reasoning as demonstrated in the next section.

Context-based Philosophy for Children activities help children develop ethical reasoning

Findings also show that children were also capable of weighing multiple perspectives in order to make informed decisions. This demonstrates that children understand and can reason about ethical issues related to their life experiences. According to W-R-A-I-T-E-C in Jackson's Good Thinker Toolkit, it is possible that children may offer reasons in support of their opinions (Jackson, 2013). The following extract is based on the week 4 lesson on ethics, exploring the topic 'What makes an action right or wrong?' Here children were positioning themselves as knowledgeable with ethical reasoning to solve problems:

> **Abel:** It is not good to start veld fires or even to put up wire snares because that will kill other animals, even our cattle could be killed…
>
> **Tadiwanashe:** Yes, I think Abel is right, animals also need food. How would you feel when someone burns your granary?
>
> **Tatenda:** But can we blame someone who might have caused the veld fire by mistake, if you are clearing your land and then the fire is blown away by the wind. My father also said we must burn grass so that our cattle can have fresh grass when it germinates.
>
> **Abel:** But when you burn grass you may kill some small animals and insects that live under grass.

Tatenda tried to give what could be regarded as a self-serving justification of an unethical behaviour, but other learners were quick to question him:

> **Tarisai:** So how do we know that it was a mistake because someone can just set a fire alight and claim that it was a mistake?
>
> **Tatenda:** I think when someone does something bad intentionally, they don't feel bad about it, but when I apologise or try to correct the mistake it shows that that was not what I wanted to do.
>
> **Merriam:** If that is the case then no one will go to jail because people will just apologise, I think we have to look at what you would have done or caused to happen otherwise people would just give excuses.
>
> **Abel:** So, Merriam are you saying what could have happened is wrong?

From the excerpt above it could be seen that children contended with a variety of ethical positions as they tried to come up with possible solutions. It could be inferred that the learners' discussion followed the ethical reasoning definition of looking at the right and wrong conduct or approaching the issue from a moral point of view (as when Tadiwanashe asked others how they would feel if their food storage were destroyed). It is easy to see

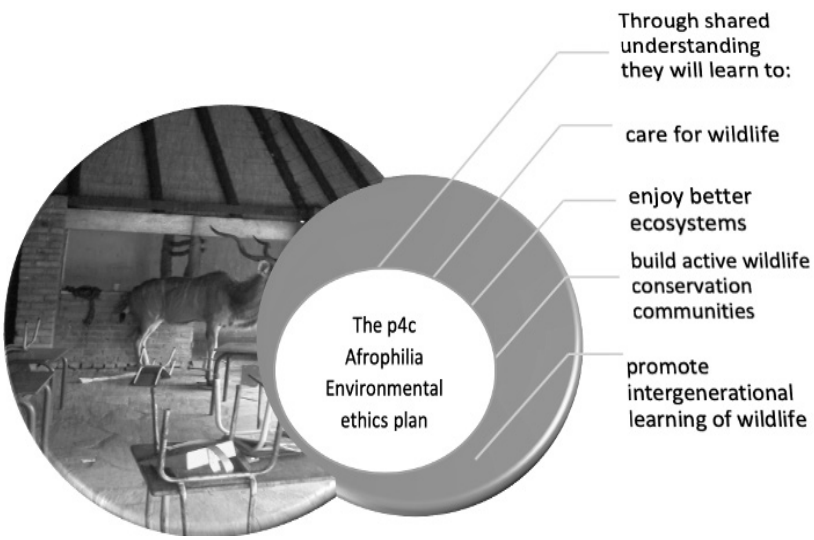
how the dialogue accords with the W-R-A-I-T-E-C letters of the Good Thinker Toolkit (Appendix A). Learners, for example, were able to provide Reasons to support their claims or assumptions. Abel provided reasons for why he thought it is undesirable to cause veld fires at the start of the dialogue, and others were capable of making Inferences like Tarisai and Merriam did. The findings expand on and deliberate a key dimension of the broader study, namely that of situated-intergenerational-significant learning. The next section reflects on this aspect of the study.

Discussion

Nexus between unhu/ubuntu, Philosophy for Children and Environmental Ethics Education

This nexus is illustrated in Figure 3. An onto-ethical mode of wildlife conservation participation emerged through the study which supported the ability to enhance development of ethical reasoning and facilitate a shared understanding of the purpose of heritage-based practices. The figure also shows a kudu that was photographed in the classroom after escaping from dogs that were chasing it, disrupting an ongoing community of inquiry session.

Figure 3: *Nexus between unhu/ubuntu, Philosophy for Children (p4c) and Environmental Ethics Education*



The findings, especially the learner dialogues, indicated the need for integrating into the school curriculum knowledges that are significant to the learners' life world as these

potentially allow children to make sense of the world around them (Clough, 2010). This was reinforced through use of culturally oriented artefacts such as totems and taboos drawn from the learners' life-world (Table 2) that were aimed at stimulating the learners' imagination, which Vygotsky (2004) described as an essential aspect of one's cultural life and thought system. Furthermore, the dialogues demonstrated how learners learn to care for wildlife as they build toward a shared understanding on the function of totems and taboos (see Figure 3).

The philosophical dialogue through the community of inquiry enabled the learners to make use of the shared understanding of their learning through totems and taboos. Emphasis in the learning activities was not on enhancing individual understanding, but on enhancing knowledge-building within the group that resulted from joint meaning-making in a shared context such as the community of inquiry (Stahl, 2015). This and the fact that the activities were drawn from the learners' everyday experiences point to the fact that learning need not be opposed to the social practice in which it is taking place (Engeström, 1996). Thus, learning, or education in general, should take root in the context in which it is meant to be utilised in order to ensure its relevance. This also helps teachers to avoid curriculum abstraction.

For the activities reported in this paper and in the broader study, the learning process was based on Vygotsky's three key themes: culture, language, and the zone of proximal development[3] (Vygotsky, 1978). As an example, the Afrophilia artefacts (totems and taboos) that were used evolved and emerged from the cultural histories of practice of the people in the Sebakwe community in the study. These practices subsequently broadened the knowledge base of the learners involved because the community of inquiry process allowed them to approach the discussion from a broader conception of knowledges as shown in Table 2 above where the learners' assumptions are linked to the formal curriculum knowledges.

According to participants such as Mubaiwa quoted above, part of the knowledge and conservation techniques that were shared in the study are inherited from the ancestry of the people in the area and are passed from one generation to the next. These inherited heritage knowledges such as taboos (*zviera*) and totems (*mitupo/isibongo*) utilised in the community of inquiry resemble what Masuku (2018) referred to as trans-generational impartation of knowledge. This, according to Masuku (2018), is essential in helping learners recognise their own epistemological backgrounds.

The generative onto-ethical mode, as well as the dimension of situated-intergenerational-significant learning, represents a relational and interactive achievement because the learning is not hierarchical but rather synergistic, with success in one strand of learning resulting in success in other strands. Learner participation in a community of inquiry makes it easier for them to share their experiences (learning as shared understanding) and as a result, they can make sense of their own world (situated learning). This creates space for critical reflection on how they exist in the world (reflexive learner agency) potentially allowing them to care for wildlife, enjoy better ecosystems, build active wildlife conservation

communities, and promote intergenerational wildlife learning. The implications of this for teaching and planning are that teachers should not prioritise one strand of learning over another strand, nor should they prioritise one goal of the generative onto-ethical mode of wildlife conservation participation over another.

Concluding reflections

Children actively participated in community of inquiry sessions in which it was revealed that totems and taboos play a number of roles in the Sebakwe community in Zimbabwe. According to Tadiwanashe, a learner-participant during a community of inquiry, totems "help them learn about their relatives and family history" (week 5, session 5). This is consistent with literature stating that totems represent the clan's history and are used during rituals to communicate with ancestors (Shoko, 2007). As evidenced by the findings, members of the Sebakwe resettlement area are expected not to eat or abuse the plants or animals from which they received their totems in particular.

The Afrophilia activities illustrated in the research as start-up capital for philosophical dialogue in a community of inquiry demonstrated how the pedagogical approach was compatible with the local context and could be a useful strategy for supporting wildlife conservation (Kideghesho, 2008). In this regard, the paper suggests that Environmental Ethics Education emerges when local community heritage knowledges and practices are integrated into the curriculum through enacting pedagogical approaches that are compatible with their application. The research has revealed that the community of inquiry pedagogy and the Afrophilia experiences create space for generative and networked epistemic engagement with a broader conception of knowledges.

While this research is based on only one case, it reveals some implications for re-thinking school-based conservation education. As shown in the case, school-based conservation policies and Environmental Ethics Education can be enriched via considering the potential role those indigenous cultural histories of conservation practice play in shaping future conservation research, education, and practice.

The implications of this case also point to the potential for exposing more teachers, parents and learners to the theory and practice of Afrophilia-based Philosophy for Children, which, as demonstrated in this paper, is a "critical pedagogy and methodology, not only of teaching but also as a mode of general inquiry and research" (Gregory et al., 2017). In this way, education could be practised in a way that differs from the teacher-textbook-based form of teaching and learning that places a strong emphasis on examination success. As shown in this case, implementing an inquiry-based approach to teaching and learning will ensure that school activities are focused on assisting learners in making sense of the world around them by gaining deeper understanding of their immediate context and broadening the curriculum to include other relevant knowledges and practices.

Notes on Contributor

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John Bhurekeni holds a M.Ed (Philosophy of Education) and has recently submitted his final PhD thesis for examination at Rhodes University, South Africa, where he was is studying Philosophy for Children and Afrophilia learning processes. John is passionate about philosophy, environmental ethics and the decolonisation of knowledges.

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Endnotes

1 Le Grange (2012) used the concept 'ukama' (relatedness) to sharpen his argument that ubuntu is not limited to the anthropocentric definition, but that it also embodies ecocentric leanings.

2 The Rhodes University ethics approval tracking number for this study is 2017.12.08.04, and I also received approval letters from the MoPSE head office on 9 May 2017, and the Midlands provincial office on 22 May 2017. I also received consent letters from all the participants.

3 The Zone of Proximal Development is defined as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86). In this study the connection between the Vygotskian zone of proximal development and the indigenous heritage-based practices demonstrates how these facilitate the development of higher-order thinking.

APPENDIX A: Jackson's Good Thinker Toolkit WRAITEC *(Adopted from Jackson, 2013)*

Good Thinker's Letter	What is it used for?	Question Stems & Claim Starters
W What do you mean by…?	*Seeking clarity* - "W" is essentially meant to capture the aspect of thinking that involves sensitivity to complexity, possible ambiguity, and multiplicity of meanings. "W" questions are clarifying questions.	• What do you mean by…? • What does the author mean by? • What is the…? • What have I forgotten to ask? • What else do I need to know?
R Reasons	*Thinking about why* - "R" reflects that for a philosophical thinker it is not enough to simply offer an opinion. Opinions need to be supported by reasons. Are some reasons better than others? When we want to know WHY we ask reason questions.	• Are reasons being offered to support claims? • What are the reasons…? • One of the reasons…
A Assumptions	*Acknowledging/making clear what we take for granted* - "A" recognizes that an important part of philosophical thinking is becoming aware of and making explicit assumptions that underlie a discussion, position, argument or presentation. Identify assumptions, recognize how those assumptions are influencing what we are seeing and judging, and identify other assumptions that can be made.	• Is it reasonable to assume…? • Are we aware of and identifying key assumptions being made? • An assumption embedded in this argument/claim is… • The author is assuming…
I Inferences	*Thinking about "if…then"*-"I" represents "If … then's…", inferences, and implications. IF, for example, we do, or don't pursue a particular line of action, THEN what follows? What are the consequences? Inferences have a starting point (something seen, heard, smelled tasted or touched) and an ending point (a "place" the mind "moves" to that is beyond what was presented at the starting point). I may see a person frown (STARTING POINT) and infer they are sad (ENDING POINT).	• Is it reasonable to infer _____ from _____? • If _____ then is it reasonable to infer _____? • From _____ I infer_____.
T Truth	*Thinking about what is true, and the implications of what we think is true* - "T" concerns is what's being asserted in fact true? How can we find out? What we take for granted as true must meet certain standards? What are those standards? How do we measure what's true? Even if we aren't sure if something is true can we imagine what might be the implications if it is true?	• Is what's being said true, and what are the implications if it is true? • If _____ is true, then what does that imply? • If _____ is true does that imply _____? • When _____ is true it implies_____.
E Examples Evidence	*Offering evidence to prove a claim is true* - "E" is one way in which clarification of a position or assertion can be accomplished. It is a way of making a general claim specific or testing a claim by presenting an illustrative example. Equally important is the offering of evidence to support assertions. What is the evidence? Evidence looks different depending on the discipline you are in. What does evidence look like in science? Social studies? Math? Language Arts?	What are some examples of _____? Are EXAMPLES being given or is EVIDENCE being offered to support or illustrate claims? _____is an example of _____.
C Counter – Examples	*Offering counter-evidence to prove a claim is not true* - "C" reflects the important task of testing the limits of a claim or position by searching for a way to prove it false or at least to test the limits of the claim.	What are some counter-examples to _____? Are there any COUNTER – EXAMPLES to the claim being made? _____is a counter-example to _____.

Wildlife and Indigenous Communities in Kenya: The influence of conservation education in supporting co-existence between wildlife and a Maasai community

Georgina Hoare, University of Edinburgh; **Kennedy Leneuiyia**, University of Kent; **Peter Higgins**, University of Edinburgh

Abstract

Human-wildlife conflict in Kenya is a complex issue with environmental, social, and economic dimensions. Conservation education can raise awareness of environmental issues, by increasing knowledge, promoting positive attitudes, leading to pro-environmental behaviours. Educated youth can become 'conservation ambassadors' who help spread messages through the community. This qualitative study critically examined the extent to which this took place using the Wildlife Warriors Kids education programme, in areas of human-wildlife conflict in Kenya. Data were collected on students' knowledge, attitudes and practice in three primary schools in Maasai areas; in one of these school areas, interviews and a focus group were also held with Maasai community members. The influence on students was evident, regarding knowledge about wildlife, positive attitudes and an understanding of pro-environmental behaviours. The filtration of knowledge and pro-environmental behaviours to the community level was positive but limited. Culture and human wildlife conflict were the predominant factors influencing attitudes. It was evident there is a need to include intergenerational learning, and focus attention on cultural and environmental challenges, to enhance the filtration of conservation education to the community.

Keywords: *conservation education, Maasai, human wildlife conflict, indigenous knowledge, culture*

Introduction

Human-wildlife conflict (HWC) is a significant issue globally, affecting communities in Africa especially; it is also a major factor in determining attitudes towards conservation (Redpath et al., 2013). In East Africa, human-carnivore conflict results in strong, negative views of these species (Romanach, Lindsey, & Woodroffe, 2011). In Tanzania, psychological factors such as past trauma, education level and demographics were more significant in causing negative attitudes than economic factors in HWC (Koziarski, Kissui, & Kiffner,

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2016). Communities in close proximity to megaherbivores/ carnivores must deal with the associated daily challenges of living alongside 'problem' species. For example, the illegal killing of elephants in Kenya due to crop raiding is a persistent problem, and mitigating damage can be expensive and difficult (Tiller et al., 2022). Negative attitudes towards problem species have become deeply embedded into many cultures. Maasai people consider carnivores as enemies because of their persistent livestock predation. These communities depend on livestock for their livelihoods, currency, nourishment, and cultural status (Hampson et al., 2015). While wildlife is seen to be important in generating income for local governments from tourism, in many cases the benefits are not equally distributed and local communities miss out (Kieti, Manono, & Momanyi, 2013). This can add resentment to the devastating impact HWC can have on communities. Given these issues of conflict, it is important to consider the local context, community needs, cultural values, and indigenous ways of life when designing conservation education programmes.

Global conservation management has shifted over the last two decades to include local initiatives in bigger conservation programmes. This is known as community-based conservation (Reyes-Garcia et al., 2013). This 'community conservation paradigm' has emerged because of poaching, biodiversity loss and the resentment of local communities towards protected areas (Kieti et al., 2013). This approach assumes that when communities are engaged, informed and supported to manage natural areas effectively, they will protect local natural resources (Kieti et al., 2013; Van der Duim et al., 2011; Western & Wright, 1994). Numerous African countries have applied Community-Based Natural Resource Management schemes that focus on biodiversity conservation and community development, although with increased wildlife populations this can increase HWC if close to farms and inhabited areas (Gargallo, 2021).

Conservation education is a response to environmental issues, which aims to teach ways to protect, nurture and appreciate nature (Sherrow, 2010). Conservation education programmes aim to develop long-term pro-environmental behaviours and informed decision-making about conservation and climate change (Wi & Chang, 2019). However, successful conservation education cannot take place in a vacuum, as local culture strongly influences social learning (Wostl et al., 2008). African youth can reach their potential and ensure the sustainability of future generations, by developing skills, knowledge and values inspired by the African continent's vast natural resources and cultures (Lotz-Sisitka & Lupele, 2017). Many conservation organisations assume that if they educate the youth to care for the environment, they will become 'conservation ambassadors' who will spread the message to the community. This study explored the potential contribution of conservation education in reducing HWC by transforming attitudes. More specifically, the study addressed a lack of literature in this area, by focusing on the knowledge, attitudes and practices (KAP) of primary-school Wildlife Warrior (WW) students, and whether their conservation messages were reaching the community.

The role of Maasai culture and indigenous knowledge in conservation education

The importance of culture in supporting conservation education is central to this research. We begin by reviewing the key features of Maasai beliefs and customs that are relevant to their relationship with wildlife and to the role of conservation ambassadors.

The Maasai are a pastoral semi-nomadic community, with many different clans organised in age-sets (Spencer, 2014). Livestock keeping is the source of livelihood and cultural identity, therefore these are people intimately connected to the environment, and dependent on preserving their land for their animals (Spencer, 2014). Maasai culture has a rich oral tradition; stories from elders are not only a source of entertainment but also nurture positive attitudes towards the land and pass down moral messages from generation to generation. Children sit at dusk around a fire and grandparents share stories about wildlife, and this is a key part of education. The warriors (men) go herding with the young boys until they are of right age (normally teenagers) and have enough knowledge of handling livestock alone in the bush (Spencer, 2014). Warriors protect livestock from being stolen by other people and from wildlife (Ameso et al., 2018).

Beliefs, practices, myths and taboos play a critical role in guiding individuals' relationships with the environment. In Maasai culture, for example, it is forbidden to hunt pregnant animals. These beliefs and practices, passed down from one generation to another, develop the community's relationships and interactions with wildlife and the land (Kieti et al., 2013). It is important not to romanticise the indigenous way of life through the lens of environmental idealism, by implying culture only has value if it shows positive environmental teachings (Ryan & Ferreira, 2019). The Maasai tradition previously required a boy to show strength by killing a lion before he could be considered a warrior, though this has had to change due to this being illegal (Hazzah et al., 2017).

Maasai communities face many environmental issues, including overgrazing, which is a result of reduced pasture because of population growth, encroachment and climate change. The Maasai lifestyle of living in proximity to wildlife, both in national parks and community lands, means HWC is a highly significant issue for these communities. Negative attitudes result from negative experiences with wildlife, especially when humans are injured or killed and/or livelihoods are destroyed (Bencin et al., 2016). With low literacy rates, many struggle to get the compensation the government offers, and, as HWC creates a real financial burden, this further reinforces negative attitudes towards wildlife. Livestock killing by predators can cause significant losses, for example, one ranch in Kenya experienced a loss of $US 8749 per year which was 2.6% of the value of the herd (Patterson et al., 2004). Consequently, losing livestock can often result in retaliatory killings of wildlife (Hazzah et al., 2017). Generally, these issues are highly complex including land use, environmental degradation, community socio-economic challenges and cultural breakdown. There is no simple 'silver bullet' solution; however there are ways to address some of the challenges.

Target programme: Wildlife Warriors

Wildlife Warriors Kids (WW) is a national conservation education primary school programme based in Nairobi, Kenya, that started in 2018, run by the non-governmental organisation WildlifeDirect. WW aims are to "educate, connect students with nature and to inspire students to act for wildlife and be stewards of their environment" (WildlifeDirect, 2020).

This research explored the knowledge, attitudes and practice (KAP) of WW primary-aged students, and then investigated if these conservation lessons were reaching the community. Data were collected from three primary schools in the Maasai areas of Kenya where HWC exists (see Figure 1). The school with the community case study was in the Laikipia region, and the other two schools were in the Amboseli region. In all three, KAP data were collected from the students in WW groups containing an average of 50 students aged 10-15 years-old. Within Maasai culture, warriors are only male but 'Wildlife Warriors' in schools are both genders.

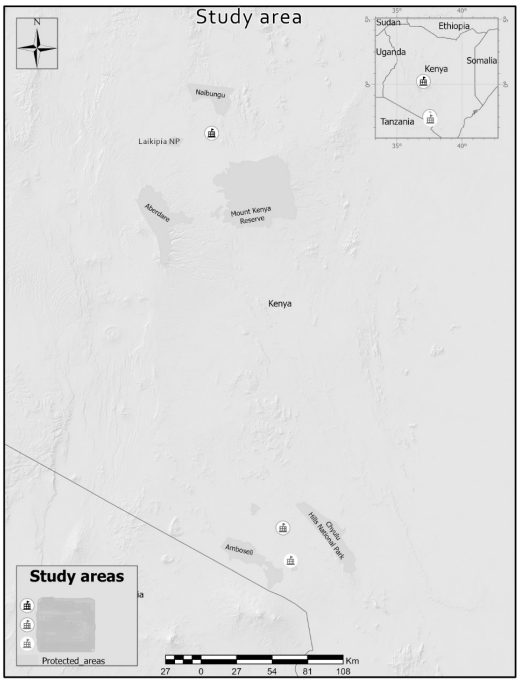

Figure 1: *Map showing the location of the three study schools (Laikipia Area School - LAS, Amboseli Area 1 - AA1, Amboseli Area 2 - AA2). The LAS is situated in a village 23 km from the town of Nanyuki and is home to mainly Maasai people and also includes other pastoralist communities.*

Methodology

Research design

More social science data is needed in conservation research in Africa (Browne-Nunez & Jonker, 2008). A social science qualitative methodology was used to explore the topic of

conservation education and its influence in depth (Denzin & Lincoln, 2011). Qualitative research provides insight into human experience, relying on the empathic skills of the researcher to present these concepts (Silverman, 2016). This design included a community case study within a broader participatory action research focus, in order to understand the social dimensions of conservation education to make social change (Franquesa-Soler, Sales, & Silva-Silva, 2022). This enabled situations and contexts to be viewed from the perspectives of many participants, within their mutual relationships (Cohen, Manion, & Morrison, 2013). To understand if students can be ambassadors for spreading conservation messages into the community, the study was split into two parts: schools and community. The schools were chosen based on their location in areas of HWC and their active participation in the WW programme. The chosen community was the extended village that was served by one of the schools that welcomed the research team.

Methods

Part One focused on answering this research question: What are the knowledge, attitudes and practices (KAPs) of school students exposed to the WW programme concerning wildlife and the environment? Participatory methods were used including oral, written and visual techniques which were child-centred, giving students the opportunity to input their data collaboratively (Ekhoff, 2019). Data were collected through three activities (see Table 1). A Wildlife Warrior bingo game was designed and played, to gain an understanding of the students' knowledge. A drawing questionnaire collected data about students' attitudes. Role plays/ dramas were used to collect data on behaviours/ practices.

Table 1: *Methods of student data collection to discover knowledge, attitudes and practice*

	Method	**Instructions**
Knowledge	Wildlife bingo game	Questions came from WW passports based on 12 endangered species: lion, giraffe, colobus monkey, pangolin, rhino, Grevy's zebra, cheetah, hawksbill turtle, elephant, honeybee, mountain bongo, vulture
Attitudes	Drawings and explanations as a questionnaire	1) Draw a picture of what the natural environment looks like near your school. 2) What is a perfect natural environment to you? 3) What has been easy or hard about Wildlife Warriors? 4) What do you like about wildlife and the environment? 5) What do you not like about wildlife and the environment?
Practice	Dramas/ role plays	Students to role play showing what they do to protect the environment at their school or homes, based on what they have learnt in WW. Give alternative drama idea too.

The questions and pictures used in the bingo game were based on the information written in the students' WW passports. After playing the bingo game, students chose another activity: either drawing or drama, to give them some agency over the process. Drawing as a research method can empower children to use their imaginations and freely express their opinions and values (Bland, 2018). For the same reason, it is also suited for cross-cultural research. Students were asked to write a sentence explaining their drawing to ensure correct interpretation of the data (Bland, 2018).

Part Two of the study focused on answering the second research question: To what degree does this programme affect KAP at the local community level? Data were collected from a case study using interviews and a focus group. The case study included different members of the Maasai community such as parents of WW students, warriors, elders, teachers, community members and a KWS (Kenya Wildlife Service) researcher. Appropriate participants were identified and recruited through a snowball sampling technique, starting with one community member who helped to find others (Parker, Scott, & Geddes, 2019). To ensure a sample best represented the different views of the community, participants were drawn from the three main stakeholder groups: parents, teachers and community members. Although those identities are not mutually exclusive, this was an approach demonstrated by Nthiga et al. (2015) in Kenya. Gender and age were also considered, since women and men play different roles. Data were generated through:

- Fifteen interviews: ten in Kiswahili, two in Maa (local Maasai language) and three in English; and
- A focus group discussion, in Kiswahili.

Translations from Kiswahili to English and transcriptions were done by the lead author (Georgina Hoare) and a Kenyan research assistant from the wider Maa community (Maasai and Samburu). To maintain quality in translations, member checking was done with other group participants before transcriptions into English were completed (MacKenzie, 2016).

Thematic analysis included theme development and coding of drawings, drama scripts, interviews and the focus group discussion (Gibbs, 2010). The data triangulation process involved reading government Kenya Wildlife Service (KWS) reports, and conducting an interview with the KWS personnel to gain deeper understanding and other perspectives on HWC issues. Secondly, one of the authors (Kennedy Leneuiyia) provided background, insights, and interpretations of some of the cultural data and issues from the field, on account of being from the same indigenous group. Ethical procedures for researching children were strictly followed and pseudonyms were created for all participants and schools. Contributors had a choice to participate freely.

Research findings

Discussions of students' data

The potential of students to spread messages into the community was evident. The average level of student knowledge of the WW endangered species was relatively high (Laikipia Area School-LAS 70%, Amboseli Area 2- AA2 65% and Amboseli Area 1-AA1 64%). In student drawings, positive attitudes towards wildlife and the environment were apparent. Many drawings showed students' dislike of HWC and human exploitation of the environment – for example, tree-cutting and littering. The dramas showed understanding of pro-environmental behaviours students can adopt. These included reporting/ arresting poachers, reporting people responsible for deforestation and planting trees. They served as a chance to explore a conservation message through students working together, redefining identities, showing values and perspectives in an inclusive and creative way (Heras & Tabara, 2014).

A clear and recurrent theme through the student data was the importance of culture. Many students drew their perfect environment containing livestock and, significantly, livestock with wildlife. This suggests students want co-existence in their lives. In these drawings, thoughts and opinions of culture were clearly expressed beyond the boundary of language and literacy (Esson & Moss, 2016). In addition, students drew mountains, rivers, trees, rocks and animals, showing that they value nature, and they see water and rain as crucial for their lives, livestock and wildlife (see Figure 2 for example).

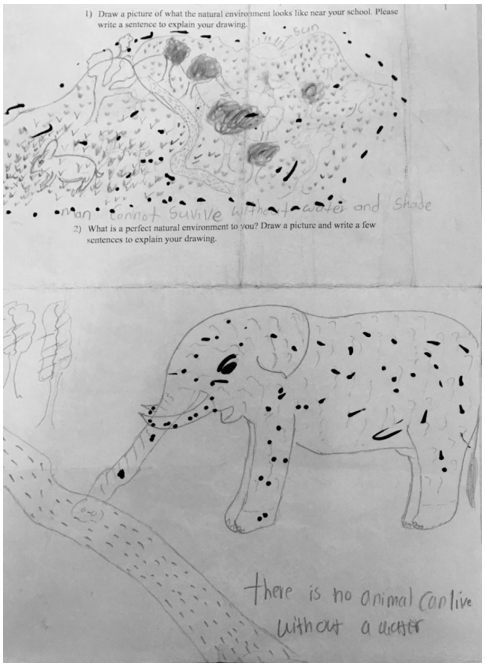

Figure 2: *An example drawing from AA2 school*

Many students expressed a hatred of hyenas and other predators due to conflict (see Figure 3). This reflected the dominant narratives within their community.

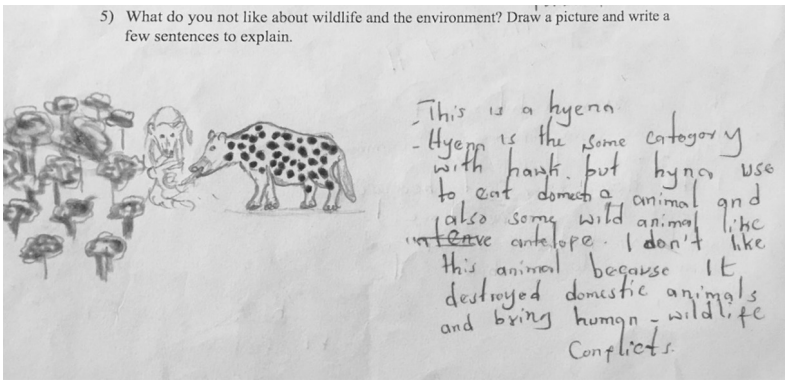

Figure 3: *An example of a HWC drawing from AA1 school*

This hatred could be exacerbated by traditional stories that often depict hyenas in a bad light, as being gluttonous and destructive. In other drawings, students showed it is illegal to hunt wildlife, for example, in a drawing of a man killing a hare (see Figure 4). In this case, conservation education has created a positive impact, as the student learnt through WW that killing wildlife is immoral and illegal, despite the fact that killing hares is a common practice. This drawing gives a lens into the student's newly formed understanding of the world through the WW programme.

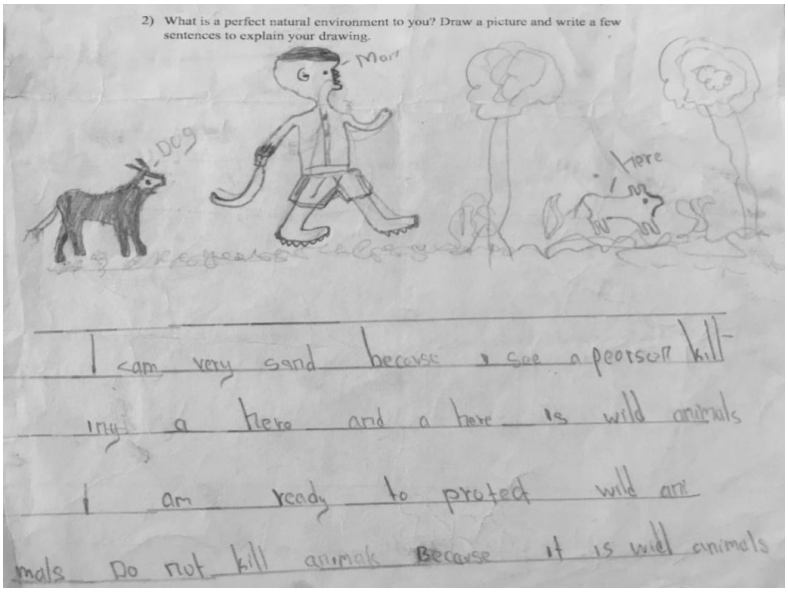

Figure 4: *An example of a drawing from a student at LAS*

Many students drew practical activities included in their WW lessons, such as planting trees around the school. Some had transferred the practice back home, growing trees in their compounds. From the drawings, students clearly understood the threats facing wildlife, for example deforestation and HWC, and the ecological role that animals play in the ecosystem. This demonstrated how practically WW has influenced the attitudes, knowledge and practice of the students, in addition to basic school curriculum teachings and their traditional way of life.

Knowledge transfer to community level

There was clear evidence of the students spreading messages to their parents, and the parents sharing these with others. It is important here, to present the 'stories' of some individual students as they demonstrated how WW impacted on their home lives. Participant KT, who became the student leader of WW, was determined to spread the messages of conservation to her family, for whom she wrote a song: '*I tell my parents we need to protect wildlife*'. The father of another said: "*My son PT brings back stories about the WW kitchen garden and it helps me plant and improve my own garden*". A mother said: "*My daughter KR suggested we make a kitchen garden after learning about it at school, and now at home it is doing well!*" These student stories, corroborated by community member interviews, show how WW actions are seen in the community through the messages they have spread.

Community discussion

Human Wildlife Conflict (HWC)

Loss was a major community theme that came up with every person in the research when discussing the challenges of living with wildlife. "*Hyenas come so often you can be losing livestock three times a month"* (Mr A) and "*When a hyena comes and meets a goat, for us it is war"* (Mr B). Elephant crop raiding is another issue, as some people are diversifying their livelihoods away from only livestock. *"Elephants killed my best friend. I will never recover"* (Mr C). Mr D said, *"I have given up on planting crops this year because of elephants*". Negative attitudes were obvious from statements like *"I hate hyenas"* (Mr E) and *"There is no benefit of wildlife, especially elephants*"(Mr D). Added to this was a frustration with the lack of compensation and slow process thereof for HWC incidences. High illiteracy rates exacerbate this challenge. Yet literacy is also directly impacted by HWC: "*Children getting to school is a big risk, as elephants block the way"* (Mrs F, Mrs G, Mr D). Sitati and Ipara (2012) discussed the issue of students facing elephants on the school route in a Maasai region in Kenya, and student exam results being lower in schools in elephant areas. However, teacher Mrs H said, *"grades are not a problem here because the elephants come seasonally"*.

Amongst these challenges, people also noted the following regarding human losses from wildlife *"[They] are just part of life, part of our culture of living with wildlife"* (Mr H) and *"Maybe the attack on humans was an accident, or the animal was provoked, as sometimes there is another reason"* (Mr I). There was a clear lack of knowledge transfer from WW students to

adults about the importance of elephants. Many focus group members complained about elephants destroying trees, clearly showing a lack of understanding of their role in ecology. Such an understanding may not necessarily change attitudes (Herberlein, 2012), especially if elephants have caused emotional pain through loss of a friend or family member. It is possible, however, to change attitudes if people experience wildlife in a non-threatening situation if they can start to understand them (Ballouard et al., 2012; Randler, Hummel, & Prokop, 2012). Mr D discussed 'just letting elephants be' while they are not a threat. An indigenous interpretation could be that he saw the animals as fellow tribe members. Even if he was not part of the specific elephant clan, he would not want to disrespect people from that clan by killing an elephant (Kuriyan, 2002). Elephants are respected by the Maa people who put green branches on their heads if they come across dead elephants in the bush (Kuriyan, 2002). This further demonstrates a desire for co-existence.

Cultural importance of the environment

The community results, added to the student data, suggest culture is an obvious recurrent theme. Maasai communities are intimately connected with their environment despite the challenges they face. Many people discussed how important the environment is for the use of water, pasture and traditional medicine. It was stated by a community member, and verified by the KWS, that areas of Maasai land have the most wildlife in Kenya: *"Maasai people have evolved to live with wildlife, they use wildlife as indicators of changing seasons, and show where good pasture and water are"* (Mr K). This shows the value of indigenous ecological knowledge of wildlife (Sitati & Ipara, 2012). Despite the challenges, community members declared opinions of optimism and shared the significance of the environment: *"My opinion about wildlife is, we are creatures that God created with better brains than all animals, it is our duty to protect wild animals"* (Mr J). This and many other encouraging statements demonstrated an appreciation of wildlife and a wish for co-existence.

This research was also concerned with discovering how much of the information and attitudes covered in the WW programme were transferred from students to the community level. The KAP of students were positive, however while some messages (e.g., no poaching and the importance of trees) did filter into individuals in the community, the knowledge transfer was limited, and to understand potential reasons why, it is important to return to the Maasai culture.

Cultural barriers

The Maasai community is organised by age set and gender. Each has specific roles, for example elders pass on knowledge to the rest of community (Spencer, 2014). It is difficult for the young generations to challenge the behaviour of elders. This proved particularly true when witnessing an incident of HWC, where an elder killed a snake that was threatening his livestock. This elder's daughter was part of the WW programme and had recently learnt about snake conservation. Deep respect is given to elders (parents) and the younger generation cannot go against their word. Gender issues are at play here too as men are

the decision-makers in the household, meaning their word is the strongest (Loos & Zeller, 2014). The negative interaction with wildlife, regular predation and some crop raiding have shaped attitudes negatively, hence the "*I hate …*" response in most of interviews to certain species. To change these practices and attitudes, conservation education should not only target schools, but also the wider community, especially elders. Elders are the authority and voice of the community. This means information could trickle down much faster working with them as leaders to speak to other community members, as opposed to working with students to pass on information. Aside from kitchen gardens and students planting trees, it became evident there was limited filtering of information from the school to the community taking place. Overcoming cultural barriers remains a significant challenge, for example killing snakes because of negative cultural beliefs and conflict, and not protecting planted trees from livestock. Therefore, tangible solutions to the existing challenges of HWC are needed, as it is difficult to cultivate positive attitudes without resolving conflict and cultural issues in the community.

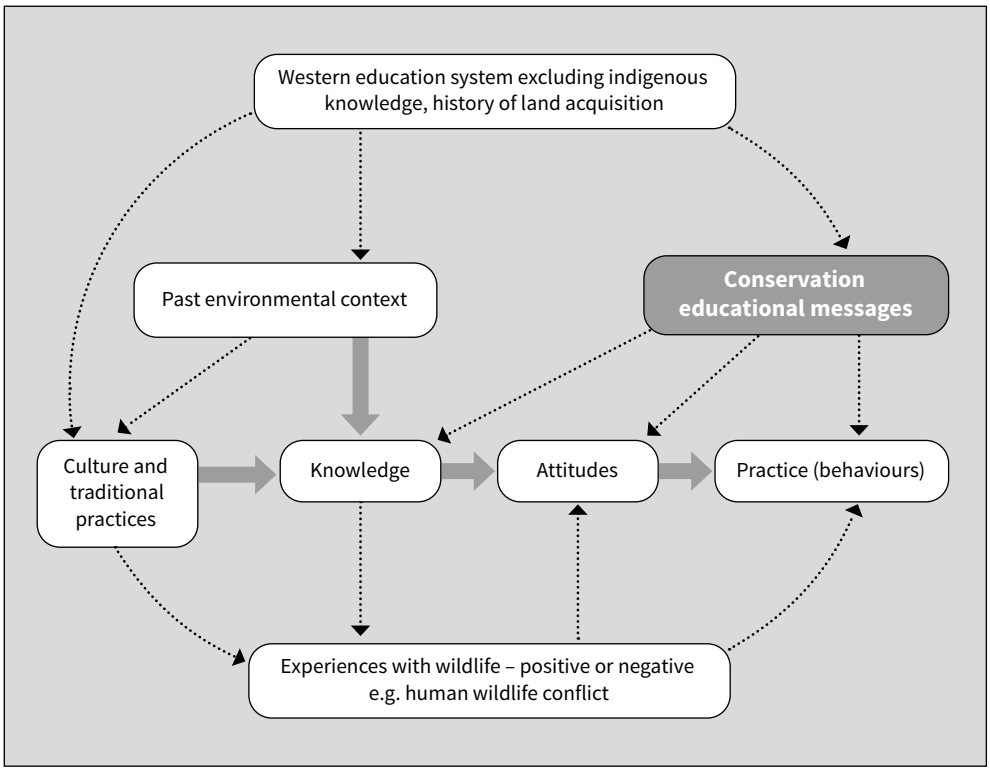

Figure 5: *The greater context and complexity of issues showing how factors are interconnected and influence or inform attitudes and behaviours towards conservation action. Thickness of the arrow shows relative importance in accordance with what was discussed with research participants, combined with literature (Bencin et al., 2016; Bonini, 2006; Charamba & Mutasa, 2014). The aim would be to increase conservation educational messages in the context of local culture.*

Figure 5 is a conceptual theoretical framework showing how conservation education fits within the broader context of society; culture, individual experiences and HWC. This originated from the research findings and many of the factors that became evident in this project. It is important to note the findings of this study were considered in the context of the local environment, culture, and community challenges – all of which are included in Figure 5. Culture is very significant in informing knowledge, attitudes and practice, for example when Maasai people value the environment as their provider of life. The greater context is key as arguably a Western colonial education system is limited in its capacity to meet the needs and complex issues of indigenous people on the ground (Omolewa, 2006). Culture is also linked to having direct experiences with wildlife, for example, when Maasai boys herd livestock – negative or positive experiences will have an effect on KAP.

Recommendations for conservation education programmes

Based on the findings discussed, three recommendations should be considered to improve the impact of conservation education in communities in Kenya:

1. Make conservation education goals and subjects culturally relevant to benefit communities.
2. Harness stories and suggest beneficial indigenous knowledge (IK) to cultivate positive attitudes to wildlife between generations and encourage intergenerational learning.
3. Discourage negative practices and myths about wildlife by using IK stories and conservation education.

Conservation education needs to target community issues on the ground in the context of culture. This will help address actual challenges instead of theoretical challenges, which are different depending on the area in which the community is living. Incorporating positive IK in conservation education curricula would make education more relatable/relevant for students and could be critical for local and global sustainability (Opoku & James, 2020). This could mean using sayings from the elders in teachings and telling stories. For example, there is a famous Maa cultural story that children are told when growing up, of how wildlife ran into the bushes away from humans, as they were disrespected and had not received enough care from the woman of the homestead. Since then, the relationship is not as close as it once was. That is why women are chased by elephants and buffalos when they go about their chores fetching water and collecting firewood. This is still emphasised today, as children are told off when livestock are lost and told not to let them run away like the wildlife did. It is important to discourage negative attitudes about wildlife, for example, hyenas being gluttonous and snakes being evil. The three recommendations above could be used with the example of a hyena in an educational programme. It is important to acknowledge HWC experiences and negative views and myths in the communities. However, the education focus could be on ecological significance. The stories can be harnessed, for example, to teach

that being gluttonous is a benefit as hyenas scavenging on dead animals can reduce disease risk, and can therefore ultimately protect the community and livestock. When harnessing stories, it is important to do this respectfully and not to directly challenge indigenous knowledge in a negative way (Ryan & Ferreira, 2019).

Recommendations for the future of Wildlife Warriors

Based on this research, improvements were suggested for WW to move forward. It is vital that culture be used in WW activities. It would benefit community learning if a HWC mitigation handbook for students was created and taken into the community to help with literacy issues. WW students can be involved in creating this handbook co-designed with the community. It would be helpful for the community including elders to be involved in workshops on specific HWC issues with appropriate mitigation methods. Taking community members into the bush to exchange knowledge and appreciation of wildlife in non-threatening situations could help to make attitudes more positive (Ballouard et al., 2012; Randler et al., 2012).

Conclusion and reflections concerning future research

The students in schools were actively engaged in the WW programme and had acquired knowledge, positive attitudes and understanding of some pro-environmental behaviours. The degree to which the WW messages reached the community was, however, limited. The wider context in which conservation education is taught is crucial, as the threats to the environment in each local place will differ and people's negative experiences with wildlife will be unique. The idea of student ambassadors for change in their community is dependent on the culture they live in. As environmental educators and researchers, we need to critically ask ourselves why we are delivering conservation education and for whom. For example, are we doing it to spread messages from students in schools to the community to foster positive relationships between students and nature to then target adults? Are we focused on the younger future generation to reap the benefit in fifteen years when they can be decision-makers, or given the current biodiversity and climate crisis, will this be too late? Cultural and gender issues may be significant barriers to community uptake of conservation practices. It is possible to get students to plant trees at home, as this is schoolwork parents will allow. However, parents will not necessarily be actively engaged in this as they have many responsibilities. The cultural beliefs of the Maasai are based on living from the land and it is challenging having to adapt to a modern world and modern Western education (Wangui, 2008). There is a clear need to navigate a way through this, to achieve co-existence of an indigenous culture with working to protect wildlife. As Kayira (2018) stated, it is important to design conservation education programmes in a specific local context to consider and allow for differences in learners' backgrounds. This is because each student has their own understanding of the world and their own story based on place, experience and culture, which needs to be considered in planning educational engagements. This study

has shown that conservation education has great potential for sustainable change, if the cultural context and the community way of life are taken into account.

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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	Hoare	70%
	Leneuiyia	20%
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Data collection	Hoare	100%
Analysis and interpretation	Hoare	65%
	Leneuiyia	20%
	Higgins	15%
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Critical review of paper	Hoare	40%
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Student-Created Videos of Climate Change Vulnerability: Opportunity for connection and care

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Abstract

Climate change is increasingly being seen as a complex problem that requires a change in personal and practical dimensions. To support this, climate change educators need to make use of pedagogic approaches that enable students to engage in relational values of care, empathy and connection alongside understanding the problem and potential responses. Participatory approaches, whereby students engage with members of local communities to understand climate change vulnerability, have the potential to create opportunities for connection between students, communities, universities and society in theory and practice. We describe a student video project that took place in a third-year course *Sustainability and the Environment* in the Department of Environmental and Geographical Science at the University of Cape Town (UCT), South Africa. Students worked in groups to undertake and film a vulnerability assessment with individuals or organisations around Cape Town in relation to the city's water crisis. Their group submission, a documentary video, needed to tell a story about social vulnerability and adaptation to the water crisis. Through a carefully scaffolded process, students' reflections indicated that the vulnerability video process helped them to understand the concept of vulnerability and strengthen their care for and connection to those 'vulnerable' to climate impacts. This kind of process-oriented authentic learning experience holds potential for increasing climate change literacy that other educators might consider.

Keywords: *climate change education; video and film; climate change vulnerability; authentic learning; ethics and care*

Introduction

Given the urgency of climate change action, the topic is increasingly being included in university teaching curricula. To ensure that teaching and learning on climate change have the desired impact of understanding and lead to action, it is important that authentic learning opportunities are created. Filmmaking is one method of science learning that can support learners to take ownership of their learning related to climate and environmental change (Gold et al., 2018). As Chang and Pascua (2017, p. 177) suggested, students who cannot engage in climate change discourse are likely to "lose out in a climate changing

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world" both in terms of engaging in debates and in taking action. Lutz, Muttarak and Striessnig (2014) supported this, arguing that giving funding to educators rather than engineers might be more efficient and effective for adapting to climate change impacts.

In the South African context, with high levels of inequality and a highly variable climate, a socially responsive understanding of climate change vulnerability is particularly important (Ziervogel et al., 2014). Climate change impacts most on those who are highly sensitive to climate hazards and have less ability to adapt. Ensuring that students understand how climate vulnerability might differ in different cases and making them aware of the agency and adaptive capacity of people, is one way for students to understand the concept of climate change vulnerability better. Linked to this, it is important that students are able to reflect on their own vulnerability as well. These concepts are the foundation for understanding vulnerability, building adaptive capacity and strengthening climate adaptation (Adger, 2006).

This article uses the case of student-created videos of climate change vulnerability to illustrate how a student video project in a South African university context was able to build care and enable meaningful learning experiences for students. Students were able to enrich their theoretical understanding of social vulnerability through undertaking a vulnerability assessment in practice and capturing it through short digital videos. Through the process, students reflected on their own positionality and vulnerability and that of others, deepening their care for others and their understanding of vulnerability and adaptive capacity. This article starts with a short literature review of student video projects and their potential to contribute to authentic learning, after which the educational context and assessment design of the video project is explained. This is followed by an analysis of students' reflections on the process and a discussion of emerging themes. The article, targeted at environmental and climate change educators in higher education, seeks to unpack the process to inform and/or inspire others.

Student video projects and authentic learning

Digital videos, created by students for educational purposes, take various forms and are defined in different ways. The literature refers to student media production or projects (Rooney-Varga et al., 2014), digital media assignments and Learner-Generated Digital Media (LGDM) (Reyna & Meier, 2018), place-based filmmaking (Littrell et al., 2020) as well as digital storytelling (Gachago & Livingstone, 2020). Diverse theoretical orientations guide how educators approach the design of the purpose, process and genre of such videos.

Rooney-Varga et al. (2014) used student media projects where American science majors in an advanced university course on climate change created public service announcements (PSAs) as a culminating assignment. This was part of a broader project, the Climate Education in an Age of Media Project that involved various phases, from pre- to post-production. The aim of their project was to "elicit active, affective, social, and analytic learning of climate change science content, with the goals of increasing engagement and intrinsic motivation

and fostering deeper learning about climate change through students' efforts to educate others" (Rooney-Varga et al., 2014, p. 598). Rooney-Varga et al. (2014, p. 598) reported that student producers and viewers showed gains in climate literacy and their "qualitative analysis of student experiences revealed high levels of intrinsic motivation and engagement with the project, critical thinking, social learning, an interest in climate change that reached beyond the course, and a sense of empowerment and agency". A study with high school students who made short videos about the impacts of climate change on their communities also found it allowed students to make "personally meaningful connections with climate change" and that this can "inspire a sense of responsibility and agency among students" (Littrell et al., 2020).

While digital storytelling (DST) has multiple definitions as well, it most often takes the form of personal narratives and involves particular processes and ethical practices that educators and students need to consider (Gachago & Livingstone, 2020). As explained by Gachago and Livingstone (2020), there is a specific flavour of personal DST that is widely adopted in higher education contexts, some having found a niche as a qualitative research methodology in fields such as health sciences and health education and teacher education. As will be discussed later in this article, while this project was aimed at getting students to make videos using different vulnerability assessments methods, the process of making videos as a group project became a methodology in itself. Sometimes the digital storytelling processes can be embedded alongside other approaches. Gachago et al. (2013) piloted an approach that combined a digital storytelling process with participatory learning and action techniques and a reflective essay for teaching on and with difference in a final-year South African pre-service teacher education programme. Their aim was for students to share and listen to each other's stories of difference. Gachago et al. (2013) found that through sharing and listening to each other's stories, students began to engage with the unspoken power dynamics that govern classrooms and their lives and this provided the opportunity to disrupt some of their assumptions.

There are often overlaps between different approaches to student video projects, with a common interest in the educational value of the process rather than videos as final products. Another commonality is the intersection of curriculum content, pedagogical design, technology and ethical practice although some scholars may emphasise some dimensions more than others. This article focuses on scaffolding student reflection in particular, where students were supported in thinking through their learning and implications of their engagement in the vulnerability assessment and video process. For the purposes of this study, we use the term 'student video projects'. Among the various approaches to student-created videos, it is uncommon to find student video projects that emphasise positionality as part of a scaffolded reflective process focused on community voices rather than personal narratives of students.

We found authentic learning principles (Herrington & Oliver, 2000) and connected authentic learning (Herrington, Parker & Boase-Jelinek, 2014) useful for informing the design of the project. Authentic learning principles involve an authentic context and tasks

and activities that reflect the way knowledge will be used in real life. Authentic learning expects students to engage in constructing knowledge collaboratively through these tasks and experience the different roles and perspectives of people. Central to this approach is promoting reflection and articulation that makes tacit knowledge explicit. To support this, students need coaching and scaffolding as well as opportunities for authentic assessment.

We argue that explicit attention to positionality can help to enrich reflection as part of authentic learning. While reflection is a popular pedagogic strategy, reflective learning activities can sometimes be quite superficial. Such activities can be more meaningful and authentic if students engage with their own positionalities in relation to others. Positionality and reflection are entangled, requiring students to question their world view and the position they adopt about a research task and its social and political context (Holmes, 2020). Engaging with one's positionality, central to climate change adaptation, is an ongoing process that requires both self-reflection and reflexivity.

Educational context and assessment design

Course background

Around 75 students take the third-year course, *Sustainability and the Environment*, in the Department of Environmental and Geographical Science at the University of Cape Town (UCT), South Africa. About half the students come from the Science faculty and the other half from Humanities. There are usually about 10 international students from outside Africa, 15 African students and the rest are South African.

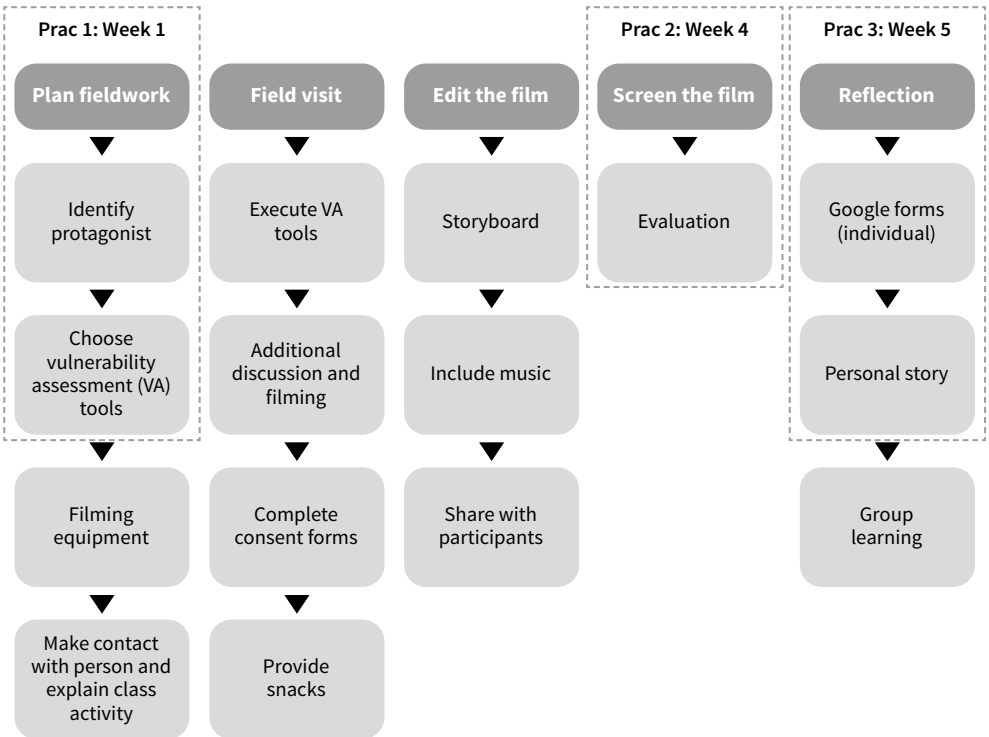
One of the three sections of the course focuses on vulnerability and adaptation to climate change. The concept of vulnerability taught draws on the Intergovernmental Panel on Climate Change (IPCC) framing that includes understanding sensitivity to climate hazards and adaptive capacity to reduce exposure to climate risk (Pörtner et al., 2022).

In order to get students to engage with the theoretical topic of climate vulnerability from a personal level, a vulnerability video project was assigned as their practical. This included a series of two-hour sessions that enabled students to engage with lecture material in a hands-on manner. Students were required to work in groups to undertake a vulnerability assessment with individuals or organisations around Cape Town and produce a short video from this. From 2016 to 2022 (apart from two years of online teaching during COVID-19), the groups were required to make a video that captured a story of vulnerability. This article focuses on the video process and draws on the 2018 assignment to illustrate the process in detail. The 2018 assignment was chosen because the class was asked to focus on stories around the recent drought, providing good examples of climate change impacts, vulnerability and adaptation.

Class vulnerability video assignment

The vulnerability video assignment was run over five weeks as shown in Figure 1. In the first two-hour classroom practical session, students were introduced to the task (see open access assessment guideline). They then had three weeks to do the vulnerability assessment filming and editing, after which there was another two-hour practical session where all the videos were screened to the class and assessed during a 'video festival'with prizes for the top three films. During the following week they were asked to fill in an online form individually to reflect on the process (with questions outlined in Box 1) and then at the subsequent practical, they engaged in a series of activities to explore their individual and group learning.

Figure 1: *The video assignment process (boxes represent the time spent in the classroom during the practical sessions)*



Box 1: Questions that students responded to individually before the final practical

- What did you learn and/or gain from doing the vulnerability video exercise?
- What were the challenges with the process (including resources, experience, access, topic, group dynamics, etc)?
- Would you recommend this as an exercise in future? If so, why? If not, why not?
- How did it help you understand the concept of vulnerability (if not covered above)?
- At any point in the process did you reflect on your own vulnerability, either in relation to the people you were filming or in relation to your role in the group? If so, please can you share.

In 2018, the groups were asked to focus specifically on assessing vulnerability of an individual or group to the Cape Town drought. In 2017 and early 2018, the drought crisis intensified in Cape Town making everyone aware of it as individuals were expected to use only 50 litres per person per day and heavy restrictions were put in place for businesses (Ziervogel, 2019). This resulted in everyone being impacted by the crisis in some way.

Groups were instructed to choose two participatory vulnerability assessment tools to use in their video process, from a range that were presented during class and in the first practical, including focus groups, transect walks, pair-wise ranking, mind mapping, role-play and oral histories. A second presentation was given on digital storytelling and how to make a short film, including getting informed consent from participants (see consent form). The licensing of multimedia was discussed in relation to finding openly licensed and royalty free multimedia to use in their videos and sharing their video publicly online, if appropriate. While videos were encouraged to be shared publicly, this depended on the preferences of the participants and their consent to sharing the video beyond the classroom space. Those videos that were shared publicly were uploaded onto the UCT Future Water YouTube channel because of the drought focus. The Future Water Institute conducts engaged research on water sensitive approaches and promotes collaboration and knowledge sharing across various sectors of society and thus encouraged the sharing of the videos.

Students were asked to work in groups of four, resulting in 19 groups in total. They were actively encouraged to find and work with classmates they did not know. While students of different social backgrounds occupy South African classroom spaces, their friendships and relationships are still often based on common social backgrounds, shared language and culture, and deeply rooted beliefs and assumptions that impact on their conscious or unconscious choice of social engagements (Gachago et al., 2013). For this assignment we told them that being with people different to themselves was part of the learning experience and would strengthen their video as it would help to bring in diverse perspectives. Once groups had formed, they discussed the focus of their video, who they thought they would

like to meet with, and piloted two vulnerability assessment methods. They then planned the process and the steps they thought would be needed to produce a two-minute video.

After the first practical, students were expected to organise their own field visits. Many drew on their personal networks to link with individuals or groups to interview, making the fieldwork less daunting. Ethical research practice was discussed in the first session, detailing protocol around participatory research and the importance of reciprocity. Students were encouraged to discuss their concerns, such as safety or how to adapt their projects, with the lecturer during class or when planning fieldwork. Because many groups reached out to personal contacts, safety was not a concern for most. Consent forms, adapted from a student video project in a Film and Media Studies course at UCT, were shared with students. All people that were filmed were required to fill in these forms to capture their preferences around confidentiality.

All videos were required to be uploaded before the second practical. The practical session took the form of a 'video festival' with popcorn and prizes. All evaluations were done online using Google forms. The 'judges' comprised the co-authors who were running the project and two guest postdoctoral fellows. Each video group evaluated the other groups' videos as well, with these marks being used to select a 'people's prize'. Rubrics of how the video would be marked were circulated before and used as the criteria for assessing the video.

Between the second and third practical, students were asked to fill in a Google form reflecting on what they had learned individually. The third session started with the students graphically documenting their individual reflections, before they worked in groups to respond to several questions on three themes, namely, understanding vulnerability in theory and practice, the process of doing fieldwork and talking to 'vulnerable groups' and their role in the process. Lastly, they were asked to present their findings on a flip chart to the class and have a brief conversation on lessons learned with other groups.

Creating a video as a learning experience

The videos that students produced reflected a diversity of spaces across Cape Town. 'Vulnerable' individuals included a grandmother, a landlord, traditional healers, farm workers, car washers, flower sellers, animal carers, waitresses, guest house staff and people collecting spring water. Even when similar activities were chosen, these tended to be from different perspectives. For example, one group selected a township-based car wash and another group chose to focus on a commercial car wash in a shopping mall. One group interviewed a flower seller while another focused on a man whose family business is growing flowers for the flower sellers.

Videos depicted middle-class residential areas, informal housing in township areas, farms as well as the racial and linguistic diversity among people residing in these spaces. Some groups filmed people speaking in their home language and then used English subtitles. The videos all foregrounded the people and spent little time emphasising assessment tools and the students themselves. The majority of the videos had a main protagonist and therefore, an individual and personal narrative.

One of the videos was about Mama Moehale's informal township business, in which she makes ginger beer. Linked to the drought, water management devices were installed in some households including Mama Moehale's, which reduced the amount of water available. Despite this, Mama Moehale, who is a pensioner, made a plan to ensure her business could carry on. The students used oral histories and brainstorming as tools to document this story and created a video that showed Mama Moehale as personable and resourceful. It was an excellent video because it captured the everyday story of an elderly person doing her best during a crisis and valued her unique perspective.

Another video showed Moses, whose business, 'Fresh cut flowers', was impacted by the drought. It started with him sharing photos of his mother who had run the business before and also showed the area where there used to be a river flowing that was now dry. In three minutes the video was able to tell a story about the challenge of maintaining the business finding ways to adapt despite water shortages.

While students were encouraged to not be concerned with producing technically sophisticated videos, we were surprised by the standard of videos. Improved camera quality on mobile phones and the variety of user-friendly free software are factors that contributed to the success of the project. Students did not request additional technical assistance and few students reported experiencing technical issues.

Student reflections of vulnerability video assignment

Learning from the process

Students enjoyed the opportunity to engage in a novel activity. One student shared that "it was lovely to be able to represent vulnerability not in yet another essay but by using a video". Another shared that it assisted them to recognise their own abilities and gave them the opportunity to do their own research, which is often limited at undergraduate level: "I learnt that I am capable of doing research without the facilitation of my lecturers if I really put my mind to it".

Some expressed concern about the film medium from an ethical perspective and were aware of the politics involved in representation:

> I've always loved filming and photography but at the same time I've always been aware of how it may be exploitive to walk into someone's life and film them like an animal in a zoo. It's important to learn how to do it respectfully and always get consent.
>
> I learned that it's important to let those that are vulnerable take charge in how they want their story to be told.

Contesting binaries: Theory and practice, university and beyond

Students saw the fieldwork process and videos as closer to 'real life' than the classroom. This facilitated their understanding of the theory in a way that was different to the kind of

knowledge traditionally experienced and valued in academia. This is captured by some of their quotes:

> Learning about real life vulnerability issues from relevant people who experienced its effects allowed me to have a deeper understanding of the concept of vulnerability as compared to just learning it through lectures.
>
> The exercise certainly helped put the theory we learnt in class into a real-life perspective. The essay we did on the approaches helped too but this video assignment helped more as you were physically involved.
>
> I got to see vulnerability more in action and also through this video approach knowledge was not restricted to academia.

Students' choice of words such as 'real life' and 'in action' suggests that they learnt to value knowledge beyond the university and see it in a way that offers something different to university 'lectures' and 'academia'. This opportunity to engage with and value local knowledge is very important. Calls to decolonise curricula in South African universities (Hlatshwayo et al., 2022) and elsewhere have emphasised the role of recognising and including marginalised perspectives and local knowledge (Ngcoza, 2019). In the context of climate change adaptation, appreciating the complexity of social vulnerability and the importance of local knowledge is really important too (Naess, 2013). Students reflected as follows:

> We usually read other people's examples that explain concepts as fairly black and white. What we learned was that the concept of vulnerability, coping and resilience is incredibly complex and different for everyone.
>
> The practical gave us an opportunity to have discussions with various types of people we normally would have never met and walk on land we've seen on maps, but would never have visited. As such, the exercise gave us a much broader and in-depth insight into the topic. Ultimately, we learned, at least in our case, that the situation was way more complex and grey.
>
> The complexities of the concept and how it's hard to combat because vulnerability is a very individual lived experience. It showed me what a vulnerable place looks like and how someone living there feels and interprets their situation. It showed me that vulnerability is not just an academic topic but a real-world problem.

Care and connection

Students experienced the video assignment as an embodied, authentic and experiential learning opportunity which included social interaction between group members and community participants:

> I sometimes find learning at UCT can get lonely and it's great that we could do an exercise that was fun and interactive.

> It was really fun to film and get outside the bubble of UCT student life. We had to wake up really early to catch the Philippi farmers.

Student reflections expressed an appreciation for the affective and the connection between emotional work and knowledge. They also appreciated the academic topic of valuing local knowledge and diverse perspectives:

> I really learned first-hand from the people themselves, what they are vulnerable to and how they feel their vulnerability may be reduced. It offered a new perspective to the ones being offered in class and that is extremely valuable. I realised the importance of gathering information from the local residents themselves. The emotional connectivity to their vulnerability was also really eye-opening.
>
> How to approach and learn from people who may not be in the academic field, but have great insight to world issues. I learned the indescribable value of knowledge from indigenous, hands-on people.

Privilege and perspective

Student reflections suggest that many of 'the vulnerable' who were videoed were in a less privileged class position in society than the students. Many students reflected on their own privilege and how they gained a greater awareness of their positionalities and assumptions:

> The group of students we interviewed didn't have access to clean drinking water or flushing toilets at their schools – something I take for granted every day. It was definitely a very moving experience.
>
> None of us have been so financially vulnerable that we have had to choose between washing or making an income. It is not a choice that any of us thought that people would have to make.
>
> A lot of the environmental or health risks that were discussed in these videos are hazards that I myself am exposed to every day, however because of my fortunate position and background, I am less affected by these hazards than other people may be.

However, some students' privileged positionalities also made them feel vulnerable in other ways:

> I still felt uneasy about the power that I had as a university student and the way I was invading and interrogating her personal life in order to conclude how sad her living conditions were. The fear of being robbed crept in at times.

The assignment enabled them to learn things in practice through a relational experience, that had been shared during class intellectually but not viscerally:

> Initially starting the exercise, I thought that a topic such as 'vulnerability' would lead us to dealing with people in miserable situations where we as a group would be able to do next to nothing to help. However, after interviewing Mama Pat, I learned and experienced the

> extreme capability that people can have in facing vulnerability. Her situation is extraordinary and was a source of inspiration to me and my group.
>
> I had the opportunity of going into an informal settlement and inside a 'shack' for the first time. It gave me a more realistic idea of the lived experiences of people living under those circumstances. We study the conditions and speak about 'informal' living a lot in class, but experiencing it first hand is very different and essential.
>
> Assessing the Philippi Horticultural Area that provides Cape Town with 70% of fresh vegetables shows how dependent, but also unaware we are of the farmers that feed us. I realised that no matter how hard I try, I can never fully know what it would be like to have grown up in a township, live on the streets or face so many challenges to your day-to-day life. It was definitely a humbling experience.

Some of the reflections indicate a reciprocal learning experience with the individuals they worked with:

> When interviewing and filming the people in the video I realised that while I had preconceived notions about them, they also had preconceived notions about me. While we were filming a video of their vulnerabilities, they were learning about some of ours both through communication and how we worked.

In their group reflections, some students mentioned feeling uncomfortable with taking participants' time and that they thought the benefits for them were insufficient. Others talked about the importance of their interviewees being pleased to have these videos, that they would use in other circumstances. These issues were discussed as part of the research process and ethics. These personal reflections, related to positionality, power and ethics are such an important part of learning, yet are often hard to achieve in a classroom setting. Combining the classroom theory with the practical fieldwork and video-making process provided a number of opportunities to combine personal and academic reflection and authentic learning.

Discussion

Educators and students need to be open to new modes of learning and engagement to care for, connect with and understand diverse perspectives and contextually relevant environmental issues. In the context of the global challenge of climate change, responses are required across scales from the individual, to household, to business, to city to country. At the same time a change in personal values and practical responses is required, making it more critical than ever to build connection and care.

While it is tempting to celebrate student videos and students' uses of technology as a final product, if we want to be response-able educators we need to think about such learning activities as part of an intentionally designed process that can facilitate meaningful and authentic learning experiences for students. Students' feedback in the UCT example demonstrates that they appreciated the video assignment as an alternative to the

conventional essay format, but this cannot be viewed in isolation. The scaffolding of the task, structured reflections, fieldwork experience and learning from community members played equally important roles in deepening students' understandings of concepts central to climate change literacy.

Teaching students about what it means to be vulnerable to climate change and how different people might adapt is hard in a classroom setting. Similarly, teaching ethics and fieldwork 'skills' in a classroom is not enough. Vulnerability and adaptation to climate change can feel quite abstract to students. Despite examples being given, it is often hard for students to identify with climate change vulnerability, meaning they have a limited literacy of the complexity of climate change and how best to respond. Through this video exercise, students experienced a range of people's stories around particular social vulnerability to the drought, both through watching all the videos and their group's in-depth process. This place-based learning through filmmaking has been identified as a way of making science more accessible to learners as an important part of climate change education (Gold et al., 2018).

In many of the videos, people's ability to adapt and take responsibility came through. The students were really touched by this and many spoke of how their perceptions changed, about capacity or privilege. The assignment required engagement with individuals who were vulnerable to drought. By its nature, it encouraged students to connect with other people across Cape Town.

O'Brien (2018) argued that in order for adaptation to have the desired goal of reducing climate risk and positive societal transformation, it needs to be supported by three spheres of change, namely the practical (behaviour and technical responses), political (systems and structures) and personal (beliefs, values and worldviews). In a classroom, it is easy to teach about the practical responses and there is growing literature on how systems and structures and beliefs and values need to change. Of course, getting change to happen is harder in practice than in theory. Through experiential and authentic learning, such as the climate change vulnerability video project, students actively reflected on their beliefs and values around vulnerability and adaptation. This helped them to build empathy that Chang (2015) argued is a critical component of climate change education. It is the hope that these students are likely to be sympathetic to the urgency and importance of understanding vulnerability and adaptation to climate change because they understand it conceptually, theoretically and experientially.

We argue that as part of their tertiary education, students need to be provided with more opportunities for authentic engagements with communities and people beyond their networks. Opportunities are needed that help students to recognise the importance of diverse positionalities and for discomforts to surface, as this strengthens learning. In the context of climate change as a wicked problem (Rittel & Webber, 1973), different perspectives and solutions need to be appreciated at both the intellectual and personal level. Educators need to engage with approaches that attend to positionality and empathy as part of designing such learning activities (Gachago et al., 2022; Segal, 2011). Herrington

et al. (2014) argued that making the reflective process personally meaningful to students is a key challenge. Feedback from students suggests that we were able to achieve this through the scaffolding of the vulnerability video project. We suggest that incorporating more attention to positionality in reflection activities can further expand Herrington's authentic learning principles. On reflection, we feel that we might make the concept of positionality more explicit in future vulnerability video projects, to extend this learning further.

Interestingly, the initial goal of getting students to apply vulnerability assessment methods through this video project, was only partially achieved. Although the students did choose methodologies, practise them during the practical and implement them with the participants they worked with, these methods did not feature much in the videos. The students focused more on the protagonists and their stories, with the video being the actual vulnerability assessment method. In subsequent years, the use of different vulnerability assessment tools has been dropped and the students have been asked to focus on understanding and sharing stories of vulnerability and adaptive capacity, more broadly, which aligns better with the video format.

Conclusion

This paper has provided insight into a third-year student video project that enabled students to understand the theoretical and embodied concept of vulnerability in an applied context, while strengthening their research and fieldwork skills. The fieldwork, filmmaking process and scaffolded reflections enabled students to engage in a more holistic learning experience. While students appreciated the novelty of the video project, they reported the depth of their learning as a complex entanglement of theory and practice, personal and 'other'. Students' reflections communicate feelings of care and discomfort around engaging with participants, the logistics of group work and fieldwork, ethics and positionality and less around technology.

Climate change is a growing challenge that requires the education sector to contribute significantly. Many students can be overwhelmed by the topic. Designing authentic learning activities that incorporate positionality explicitly as part of reflection is one way to help create care and connection and deepen understanding of the topic. Although action and social change is something that was beyond the vulnerability video project presented here, the reflexivity that was developed can help students to locate themselves in the challenge. Although the students could see that they could not change the lives of the people whose stories they were documenting, they could appreciate how their videos had the ability to surface climate challenges and responses and potentially be used to inspire collective action in various ways.

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	Ziervogel	50 %
	Pallitt	50 %
Data collection	Ziervogel	70 %
	Pallitt	30 %
Analysis and interpretation	Ziervogel	50 %
	Pallitt	50 %
Drafting the paper	Ziervogel	50 %
	Pallitt	50 %
Critical review of paper	Ziervogel	50 %
	Pallitt	50 %

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SWOT Analysis of Selected Schools involved in Greening and Sustainable Development Programmes

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Abstract

This study aimed to explore the strengths, weaknesses, opportunities and threats in greening schools for sustainable development in Tshwane North District in Gauteng Province of South Africa. The research considered whether contextual factors hinder schools from effectively greening their schools for sustainable development. This research is qualitative and employed focus group interviews and observation. The study was undertaken with purposefully sampled members of the school management team and school governing body at three primary schools. Data was analysed through thematic content analysis. The major finding of the study was that school funds were swiftly depleted on resources such as water, energy, paper and equipment. Furthermore, contextual factors emerged emanating from little knowledge of greening and sustainability practices by school role players and a lack of policy framework on how sustainable development and greening schools should be implemented. The findings suggest the creation of an integrative assessment of greening school policies and strategies that embrace a practical activity plan for curriculum and infrastructure to monitor school resource management.

Keywords: *green school; sustainable development, school role players; Sustainable Development Goals*

Introduction

This environmental study is situated within a series of nested frameworks, namely, school role players, sustainable development and greening schools. Internationally, the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the United Nations Development Programme (UNDP) are instrumental in assisting the United Nations (UN) teams to achieve the 17 Sustainable Development Goals (SDGs) set by UN 2030 Agenda for Sustainable Development (UNESCO & World Bank, 2021). UNESCO, as the UN specialised agency for education, is entrusted to lead and coordinate Education 2030 Agenda, which is part of a global movement to eradicate poverty through the 17 SDGs by 2030 (Leicht et al., 2018). Education for Sustainable Development (ESD) is explicitly mentioned in Target 4.7 of SDG 4 which aims to ensure that all learners acquire the knowledge and skills to promote sustainable development, and is understood as an important means to

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achieve all other 16 SDGs (Leicht et al., 2018; Xia et al., 2020). Education is at the heart of sustainable development (Loubser, 2014, p. 133); it is ranked among the top four (after food, water and energy) and is central to any sustainable development agenda (Leicht et al., 2018). It provides opportunities for enriching and enhancing the lives of young people to develop capabilities beyond knowledge acquisition (Kidman & Chang, 2021). Education is UNESCO's top priority because it is a basic human right and the foundation on which to build peace and drive sustainable development (Leicht et al., 2018). It seeks to ensure that all learners acquire the knowledge and skills needed to promote sustainable development, through, among others, ESD and sustainable lifestyles (Leicht et al., 2018).

The National Development Plan (NDP) of South Africa (SA) identified slow progress on sustainable resources utilisation (National Planning Committee [NPC], 2013, p. 15) and has emphasised the importance of building environmental sustainability and resilience (NPC, 2013, p. 27). Resilience is the ability of a system to prepare for threats, absorb impacts, recover and adapt following persistent stress or a disruptive event (Machese et al., 2017). Recycling, reusing and reducing waste resources promotes greening, which supports resilience to zero-waste. With these sustainability plans emerging, the emphasis was on moving towards a green economy for efficient delivery of services (Department of Environmental Affairs [DEA], 2012a). A green economy is oriented towards ecological sustainability, economic profitability and social inclusion; it is an economy that is low-carbon, resource-efficient and socially inclusive (BMZ Federal Ministry for Economic Cooperation and Development, 2013). It is also a framework for achieving sustainable development, eradicating poverty and inequality, as well as for creating jobs and providing skills in, for example, renewable energy efficiency, natural resource management, waste management and green urban transport infrastructure programmes (Nhamo, 2014). The Rio+20 outcome document *The Future We Want* subsequently contained strong arguments for education as important for a green ecology, for work and social protection, and for sustainability generally (Leicht et al., 2018). A green school promotes zero-waste to create a healthy environment that is conducive to learning, saves energy, money and has a small carbon footprint (Earthman, 2009; Kensler, 2012). A green school strives to be free of toxins, use resources sustainably, and create a healthy place for learners (National Association of Independent Schools, n.d.). It also aims to use less fuel, utilise solar energy power and practise rainwater catchment (Kerlin et al., 2015). From the South African context, the day-to-day school activities and programmes are the shared responsibility of the school management team (SMT) and the school governing body (SGB) who are both key role players and gatekeepers at the school level. They are often not knowledgeable about green schools and sustainable development, however, and need opportunities to explore how they can support green and sustainable behaviours in their schools. The findings of this study revealed contextual factors that hindered greening schools and sustainability practices by these role players.

Literature review

Sustainable development is "development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs" (Foo, 2013; Kensler, 2012, p. 792; Ogenokokwo, 2017). This definition contains two key concepts related to *needs*, namely, *needs* of the present generation and *needs* of future generations. The needs referred to are not only human needs, but also of ecological processes such as maintaining a breathable atmosphere by reducing carbon footprints. The concept 'needs' in particular includes the essential needs of the world's poor to which overriding priority should be given (SDG 1) with reducing inequity (SDG 5) by 2030. This implies development that meets social, economic, health, environmental and political needs without compromising the basis on which human needs depend (Le Grange et al. in Loubser, 2014). Furthermore, sustainable development is "the will to improve everyone's quality of life … including that of future generations, by reconciling economic growth, social development, and environmental protection" (Kensler, 2012, pp. 791-792). Economics and politicians refer to sustainable development as types of developments that are economically viable, do not harm the environment and are socially just (Botkin & Keller, 2012). Sustainable development needs are those factors that enhance the health, knowledge of ecosystems, address ecological and social challenges that humanity faces now and in the future (Foo, 2013). Factors found to be influencing sustainability are reported to be environmental (planet Earth), economic (prosperity), social (people) (Le Roux, 2014; Loubser, 2014; Spooner, 2012) and ecological in nature (Kensler, 2012). Needs of institutions such as schools must be sustained for future school generations. Basic needs like air, water, sanitation, energy and food, must be met, otherwise future school generations will suffer (Le Grange in Stevenson et al., 2013). Future generations should not pay the price for what has been caused by the present generation. Sustainable development was highlighted as integrated knowledge (Songqwaru, 2012) by the Department of Basic Education (DBE) through Curriculum Assessment Policy Statement (CAPS) (DBE, 2014), which included environmental and sustainability related content references across a number of phases and grades (DEA, 2012b). In this regard, environmental education is a cross-cutting principle and content area contributor in the curriculum (DEA, 2010). Taking into consideration global and local reports in South Africa, it is imperative that school key role players, lead and manage resources effectively by transforming towards sustainable development through green school initiatives.

Many efforts directed towards saving the environment are green, sustainable and also save money in operational costs (Gordon, 2010; Ramli et al., 2012). A green school is a loose label for other environmental initiatives managed by various non-profit non-governmental organisations such as the Wildlife Environment Society of South Africa (WESSA, 2018) and government departments. Schools' labels such as eco-schools, enviro-schools, green schools and sustainable schools can collectively be referred to as green schools (Kensler, 2012). It is however important to consider the following: "Green development is not about the way the environment is managed, but about who has the power to decide how it is

managed" (Adams, 2009, p. 379). To green the school, the SGB and the SMT need to ensure that the school's operational budget is managed carefully and responsibly so that the school has money for all its programmes and activities, and they should communicate regularly and efficiently with all stakeholders (DBE, 2015) and within the school.

A green school includes efficient use of resources, healthy operations, an ecological curriculum, nutritious food and sustainable community practices (Chapman, 2012). Research by Dr Joseph Allen and fellow researchers of the Harvard T. H. Chan School of Public Health in the US focused on green buildings and summarised the health benefits for the people who work in them (Medical Health Report, 2015). They reported that occupants of green buildings have less exposure to allergens, pollutants and environmental contaminants, which lowers absenteeism due to asthma and allergies (Medical Health Report, 2015). Most studies view green schools as healthy (Kensler, 2012; Kerlin et al., 2015; Strife, 2010) and as supporting curricula and building teacher morale (Kerlin et al., 2015). A green school promotes environmental and sustainable development knowledge, since it includes the following components: efficient use of resources, healthy operations, ecological curriculum, nutritious food and sustainable community practices (Chapman, 2012). Environmental management and resource protection should be a cross-cutting issue, requiring action by a range of school role players (DEA, 2010).

Problem statement

The research problem of this study emanates from experience in teaching linked to resource depletion and shortages as problems in schools. Schools consume a considerable amount of non-renewable energy and waste resources like water, stationery and photocopying paper. Resource depletion problems are exacerbated by funding that is not consistent. Green schools save money because they are healthy, reduce absenteeism and are cost-effective (Chapman, 2012; Kerlin et al., 2015). Future school generations are at risk if the present generation does not take action and efforts are essential to ensure that better environmental learning and actions are sustained and become part of how schools are managed (Ringdahl, 2008). Taking into consideration the need to address these problems in schools, this study explored answers to the main research question: "What are the strengths, weaknesses, opportunities and threats in greening a school for sustainable development?" and the following sub-question: "How do the contextual factors in the school shape the greening of the school?" A SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) was chosen to derive meaningful results from data to answer the main research question.

Conceptual and theoretical framework

Sustainable development involves ensuring that while one uses resources one has, one will have these resources for longer (Jobo, 2013). Spooner (2012) maintained that sustainability is the idea that humans can use and manage natural resources so that those resources

can provide for human needs for as long as possible (potentially forever). Sustainable development involves sustainability of resources and sustainability of the ecosystem (Foo, 2013; Kensler, 2012). As Sauve (1999) pointed out, sustainable development is the ultimate goal of environmental education (EE), hence the term education for sustainable development (Gough, in Stevenson et al., 2013). The continuous usage and development of natural resources without compromising future existence is sustainable development (Msezane, 2014). The concept of 'green' is polysemous and is inextricably intertwined with ESD, sustainability and EE (Jobo, 2013). Green schools focus on sustainability (Kensler, 2012) and can be seen as a pathway to sustainability (Ramsarup & Ward, 2017) and as a sustainable approach towards EE (Somwaru, 2016). Green buildings are designed to meet EE objectives such as using energy, water and other resources more efficiently by reducing the overall impact on the environment (Ramli et al., 2012).

Ecological democracy, sustainability and school leadership complexity theories were useful in this study to analyse and interpret collected data. The theoretical framework informed the choice of the literature reviewed, data collection methods, data analysis and interpretation (Kawulich, 2012). Given this research's emphasis on greening schools and sustainable development, the first level of the theoretical framework adopted ecological democracy theory, which integrated ecology, democracy and greening school phenomena. This study then proceeded to utilise sustainability theory to understand how green schools seek to find sustainable consumption patterns regarding schools' ever-growing demands for learner and teacher support material related to energy, transport etc. In addition, the study considered how greening schools and sustainable development are also located in sustainability theory. This study further attempted to understand how economic, social and environmental aspects are considered when responsibility is taken for these at school. Finally, leadership complexity theory was employed since the complexities that arise in the educational endeavour concern not only the physical (attributes or resource use depletion and consumption), but also normative questions of how leaders' responsibility is taken and assigned at schools. Ecological democracy theory is eco-centric (Kensler, 2012). The need for sustaining school resources by ensuring that all stakeholders participate is embedded in sustainability theory (DEA, 2012a; Jenkins, 2009), which is concerned with sustaining the present school generation resources for future school generations to thrive too. School leadership complexity theory is concerned with the complex, non-linear, unpredictable systems that significantly impact school key role players, relationships and communication within them (Lichtenstein et al., 2006).

Research methodology

This study viewed sustainable development and green schools as the central phenomena requiring exploration and understanding; therefore this study was qualitative and exploratory since both these approaches provide significant contributions to both theory and practice (McMillan & Schumacher, 2014, p. 344). An interpretivism paradigm was

adopted since interpretivism argues that scientific methods (positivism) are not often suitable for the study of organisations (such as schools) and not often appropriate for study of human behaviour, actions and experiences (Creswell, 2014). A case study design was employed by collecting data from members of the SMT and SGB of selected schools in Tshwane North District who participated in focus groups and observations. A case study design takes into consideration a broad range of contextual and complex conditions which are likely to come from multiple and not singular sources of evidence (Yin, 2012).

Population and sampling

The population studied emanated from three purposefully and conveniently sampled SMT and SGB members from three Tshwane North District public primary schools in Gauteng Province of South Africa. Schools were conveniently sampled due to their geographical proximity to the researcher in order to be cost effective in terms of travelling. Purposeful sampling was selected as a small, targeted sampling group was required (Creswell, 2013; Maree, 2012; McMillan & Schumacher, 2014). Tshwane North District was selected as it has a range of populations in different settings and a city, township and village school were selected. The SMT and SGB members were sampled because they are key role players and gatekeepers at the school level. The SGB is allocated financial powers and plays a role in staffing and promotion of teachers (South African Schools Act [SASA], 1996). The SMT manage professional matters of the school and advise the SGB on resources needed to provide quality teaching and learning (Employment of Educators Act [EEA], 1998). There were 15 SGB and seven SMT members in the city school, 12 SGB and five SMT members in the township school and eight SGB and four SMT members in the village school. The components of the SMT and SGB members are listed in Table 1.

Table 1: *Components of the participants (Source: EEA, 1998; SASA, 1996)*

SGB members	SMT members
Principal (as ex-officio)	Principal (Site manager)
Parents or guardians of learners	Deputy principal
Teacher representatives	Heads of departments
Learner representatives	Senior teachers
Co-opted members	
Non-teaching staff	

Data collection instruments

The data was collected from two sources, namely, focus group interviews in phase one and semi-structured observation in phase two to achieve triangulation and increase trustworthiness (Brundrett & Rhodes, 2014) and to verify information collected in the participants' interviews (Hancock & Algozzine, 2011). Four to six participants from each school participated in semi-structured web-based focus group interviews (Bolderston, 2013) using Internet platforms such as email and WhatsApp. The larger the number of participants in a focus group, the more data can be collected. Thus in this study, the most data came from the township school with six participants followed by the village and city schools with five and four participants respectively. The open ended questions consisted of five thematic areas extracted from the literature; probing questions led to clarity. To protect the privacy, dignity and beneficence of the participants (Ruane, 2005), ethical clearance was submitted to and received from the Ethics Review Committee of the University of South Africa. Necessary permission was also obtained from the Gauteng Department of Education prior to data collection.

Data presentation

The results are presented to answer the main research question and sub-questions, firstly according to what was discovered in the focus group interviews in phase one, and secondly according to the semi-structured observations in phase two of each participating school.

Focus group interviews

The participants were interviewed as a group, rather than individually (McMillan & Schumacher, 2014). All online and text-based interviews were transcribed verbatim and organised according to the pre-determined themes in the interview guide. A setting code was used to identify participating schools: S1 (city school), S2 (township school) and S3 (village school). Each participant was coded as P1, P2, P3. The focus group interviews mainly explored the contextual factors that shaped the greening of the school (research sub-question).

Contextual factors in the school that shape the greening of the school

Contextual factors identified were categorised as (a) contextual factors as a result of school context; and (b) contextual factors due to bad planning by schools.

a) Contextual factors as a result of school contexts

The findings clearly indicated that the sources of funding in schools were government funding (S2 and S3), payment of school fees (S1), NGOs and fundraising (all schools). The fact that all schools need extra funding indicates that that there are contextual factors linked to schools operating efficiently. As P1 (S1) stated: "Parents are persuaded to pay school fees through constant letter reminders and during the Annual General Meetings. However, many of them still struggle to pay or no payment at all is made." This case study revealed that the current methods used to generate funding are not sufficient to cover schools' needs and the methods used to collect funds are not sustainable. There was, however, a high level of disparity, based on the schools' quintiles, among these schools with S3 and S2 having limited resources while S1 had sufficient resources.

b) Contextual factors as a result of bad planning by schools

P3 (S2) claimed they borrow resources from neighbouring schools. P2 (S1) stated that "sometimes we have to out-source from other schools" while according to P3 (S3), "we struggle to get donations and we get some little funds from fundraising". Water, electricity and paper are, according to P1 (S1), "a nightmare", with these resources running out and parents "still struggle to pay". Participants in S2 named issues such as burglary, under-resourcing and misuse of learner and teacher materials as causing constraints to the school, whereas S3 participants reported theft, vandalism and expensive services (electricity, telephone, gas refilling) as factors that deplete school resources swiftly. P3 (S2) reported that he had observed considerable misuse of resources like books, chalk and markers, though they try their best to use these carefully. P5 (S3) reiterated that "schools need proper planning, sharing of ideas, teamwork, time management and making estimates when running fundraising projects". It is evident from the group in this research that the constraints and challenges that all schools faced were contextual factors due to poor planning.

Observation results

The researchers used field notes based on observations at each school in order to achieve triangulation and hence increase trustworthiness (Brundrett & Rhodes, 2014). Ultimately a SWOT analysis was developed based on the interviews and observations.

SWOT analysis on greening the school

This section focuses on answering the main research question. Research data was organised by means of deductive thematic content analysis with five pre-determined thematic areas drawn from South African Green Schools Programme (SAGSP) (Bizcommunity, 2017). A SWOT analysis was employed for each participating school using these thematic areas to explore sustainable development approaches implemented in the schools. Areas that show evidence of positive or best practices were interpreted as strengths, the negative or worst environmental practices as weaknesses, and those practices that could guide or provide local planning approaches to achieve sustainable development as opportunities. Finally, those practices that were dangerous and could lead to health and safety risks were interpreted as threats. The findings across all cases are summarised in Tables 2, 3, 4, 5 and 6 below according to the themes of waste management; energy efficiency; water conservation; landscaping, tree planting and beautification; and institutional management.

Table 2: *SWOT analysis on waste management*

Strengths	Weaknesses	Opportunities	Threats
All schools were clean, litter-free and odour-free. Waste is sorted for recycling (S2). Organic waste is composted for use on lawn and in flower, fruit and vegetable gardens (S3).	No reuse, composting or recycling of any waste (S1 & S3). Lack of gardens, sufficient lawns and trees around the premises (S2).	Recycling of waste materials could generate money for S1 and S3. Grass could be composted for fertilising fruit and vegetable gardens in S1 and S2.	Refuse removal solely by the municipality in S1 and S2 puts a strain on municipal landfill sites and results in financial loss to the school.

Table 3: *SWOT analysis on energy efficiency*

Strengths	Weaknesses	Opportunities	Threats
Laptops are put on safe mode after school and a generator used as a backup during power failures and load shedding (S1); electrical appliances switched off after school to save costs periods (S2, S3); gas stoves used for cooking in the school kitchen which saves money in the long run (S3).	No energy efficient lights and non-renewable energy source (all cases). Outside lights are switched on the entire night due to theft and vandalism (S2). It is costly to use non-renewable energy sources (all cases).	Solar energy and energy generated by renewable sources such as wind energy can be used as a clean, free and renewable alternative to electricity that is very costly. Fossil fuels could be used during power failures and load shedding (all cases).	Non-renewable energy sources are taxing schools heavily on electricity bills (all cases); safe mode for electronics is still costly, rather switch off (S1); no energy conservation action plans implemented (all cases).

Table 4: *SWOT analysis on water conservation*

Strengths	Weaknesses	Opportunities	Threats
Use of clean municipal water and leaking taps and pipes repaired (all cases); switching off taps; using water containers and basins in all classes for drinking and washing hands (S2); harvesting rainwater in water tanks for backup during municipal water stoppages (S2 and S3); using borehole water for backup purposes (S1 and S3). Reusing of dripping and used water to water the lawn and gardens leads to positive conservation of water, and using jerry cans as water containers for drinking in classes also conserves water (S3).	No harvesting of rainwater (S1); municipal water is costly (all cases); no surveys to monitor water usage (all cases); no water testing kits for borehole water (S1 and S3); no testing or purification kits for rainwater (S2 and S3).	S1 could install water tanks to harvest rainwater to save money and the environment at the same time. S2 could dig boreholes to use its water for backup purposes; water needs to be purified for safety and health purposes.	Lack of harvesting rainwater can cause soil erosion and floods (S1), lack of testing and purification kits for rainwater (S2 and S3) and borehole water (S1 and S3) poses safety and health risk to the occupants.

Table 5: *SWOT analysis on landscaping, tree planting and beautification*

Strengths	Weaknesses	Opportunities	Threats
Plants surrounded the school buildings to allow rainwater runoff, fresh air, shade, promote healthy air quality, are used as learning tools in Natural Sciences, provide beautification, act as wind breakers and prevent soil erosion (all cases); building was surrounded by few trees, lawn and paving bricks (S2).	Lack of indigenous medicinal plants; plants are not labelled for educational purposes (all cases); insufficient space for lawns and tree planting (S2). Lack of indoor plants (all cases). Visibility of weed plants (S3).	Indoor plants need to be promoted because they improve air quality in classrooms. S2 needs to participate in more tree planting programmes.	Lack of indoor plants and geo-thermal air conditioners in classrooms pose a health and safety risk (all cases); weed plant species pose a health risk and could damage the school ecosystem (S3).

Table 6: *SWOT analysis on institutional management*

Strengths	Weaknesses	Opportunities	Threats
Parents pay school fees (S1); the state is the main funder of the schools (S2 and S3); school community support funding and participates in fund raising; employment of local people leads to positive attitudes in the local community regarding job creation and alleviation of poverty (all cases).	Some parents unable to pay school funds due to loss of jobs (S1); all schools not registered as Eco-Schools; schools are predominantly dependent on state funding (S1 and S2); problems with theft and vandalism (S2).	Parents who are unable to pay school funds need to volunteer to provide other services to the school (S1); security systems such as alarm systems need to be installed to reduce loss of resources (S2); network tower installed by a private company at the school will assist the school in future when it adopts a paperless mode of teaching (S3).	Increase in unemployment rate propels parents to apply for school fund exemption (S1). State funding is unreliable especially after Covid-19 pandemic (S2 and S3). Some buildings are very old and pose a health and safety risk.

Data analysis

This study employed deductive thematic content analysis using pre-determined themes. The thematic framework of this study was developed deductively using concepts with pre-determined themes from the three theories underpinning the study to create themes for interview questions. The deductive thematic content approach involves using predetermined frameworks to analyse data (Burnard et al., 2008) informed by literature. The five pre-determined themes discussed above were used for observations. Theoretically, this study is environmental in nature, integrating ecological democracy (Kensler, 2012), sustainability (DEA, 2012a; Jenkins, 2009) and complexity leadership theories in education (Lichtenstein et al., 2006; Morison, 2002). Data collected were transcribed, and codes were used to identify both setting and participants. The focus group interviews mainly explored the contextual factors that shaped the greening of the school (research sub-question).

Many South African learners, particularly black learners, are still based in disadvantaged locations pre-designed by the apartheid regime, such as impoverished townships and villages where service delivery remains problematic (Le Roux, 2014). The state has categorised schools into quintiles whereby disadvantaged school communities at the mercy of the state are in quintile one. The state has declared them non-fee paying schools and they are funded according to the National Norms and Standards for School Funding (NNSSF, 2018). S1 is in quintile four and is situated in the city of Pretoria and was a whites-only school during the apartheid regime. S1 charges school fees as determined by the SGB according to SASA (2007). S2 and S3 are in quintile one and struggle to be on a par with their counterparts in S1. The codes for the open-ended questions in interviews were organised according to five pre-determined themes, namely, (1) sources of funding; (2) experience with resource depletion; (3) experience of using school resources; (4) educational experience on resource

use; (5) sustainable development. Finally, a SWOT analysis was employed to answer the main research question.

Rigour

Credibility was enhanced through the researcher's prolonged stay in the field until data saturation; triangulating focus group interviews with observations; member checks; and pilot-testing. Selecting participants with the best knowledge regarding the research topic enhanced transferability and increased trustworthiness. Asking the same questions to all participants in interviews and observations enhanced dependability. Transcribing the interviews verbatim with manifest content enhanced confirmability. Manifest content implies that the data collected accurately represented the information that the participants provided and was not invented by the researcher (Elo et al., 2014).

Discussion of results

Focus group interviews

The group, rather than the individual, was the fundamental unit of analysis. Focus group interview results were presented according to the pre-determined themes below.

Theme 1: Sources of school funding

The schools' data revealed that all three sampled schools predominantly relied on government funding to survive, although in unequal contributions due to different school quintiles. This is evident in the statement of S1-P4 that "We are quintile 4 school, therefore, our learners are paying school fund. We also had some bit from state funds." The data also revealed that S1 is well-resourced when compared to S2 and S3 which are less well-resourced and are no-fee paying schools. The school context of S1 and S2 revealed serious socio-economic problems. Data revealed that greening schools is a necessity for all the schools to achieve sustainable consumption of resources. This is evident in some of their responses to the open-ended questionnaire: "Every year prices of resources like electricity and equipment go up, nothing goes down … infrastructure maintenance and machines are expensive to replace, to service equipment or buy new ones is also expensive (S1-P3). S2-P6 stated that "these resources need to be sustained as they are significant for teaching and learning … We want them to last longer." S3-P2 asserted that "without electricity, there won't be any power for copying machine; without paper, the school won't be able to make copies of activities; without books, there won't be any effective teaching and learning; and without water, there won't be any life at school". All participants acknowledged that fundraising and donations were not sufficient nor effective in covering the schools' needs, and noted that it is difficult to generate school funds, providing reasons such as: "not all organisations donate money, some donate school uniform to needy learners" (S3-P3).

Theme 2: Experiences with resource depletion

All schools collectively reported issues linked to maintenance, infrastructure improvement, electricity, water bills, transportation, catering, stationery as services that depleted school funding. S2-P5 reported over-admission, lack of security, burglary, theft and educators' transportation for workshops as causes of depletion of school finances and resources. S1-P3 reported that the Department of Education provided assistance with furniture, stationery, books, maintenance and nutrition. According to the participants, the funding is not sufficient and once depleted, the Department does not entertain any further requisitions.

Theme 3: Experience of using school resources

With regard to infrastructure, the participants noted lack of maintenance linked to broken windows and doors; problems with electrical appliances and cables; sewage blockages; theft and burglary. To save water, S2 and S3 noted that teachers monitor how the children pour water into glasses in the classrooms. According to S2-P2, rainwater is stored in water tanks for standby and recycling is also taking place, and S3 used gas for cooking. Contrary to these positive behaviours, P3, P5 and P6 in S2 were concerned about not servicing resources, using cheap resources that deplete faster, lack of water and electricity policies, leaving dripping taps, not switching lights off after school use, and theft of electrical cables. It was evident that schools do not have policies to manage resources like water, electricity and usage, though some school members try to save these resources irrespective of policy endorsements.

Theme 4: Educational experience on resource use

S1 stated that they taught their learners how to be responsible towards school property (P2); they use resources sparingly and improvise where there is a shortage or lack of resources (P4). S2 participants reported that they learnt "proper stock taking, high level of retrieving and replacing system of lost books". S3 participants reported that they learnt "new strategies to recover depleted resources, that waste can make money".

Theme 5: Sustainable development

S1 reported that resources to be sustained are "infrastructure (buildings, sports grounds, fencing, school hall, computer room and swimming pool), natural resources (water, vegetation, land or soil, atmosphere), teaching and learning materials (textbooks, paper, machines, furniture, equipment, desks, chalkboards) lights and electricity. S2 listed "furniture, laptops, photocopying machines, infrastructure (fence, gate, building) and water". These were regarded as "the engine of the school" (S2-P6). All focus groups overlooked natural resources like trees, plants and electricity. In general, the group seemed not to consider as resources knowledge, experiences and expertise of staff and students, nor that these also need to be sustained to ensure future availability rather than depletion

(Graham et al., 2015). The focus groups did not realise that human resources (expertise and knowledge) needed to be sustained so as to provide for human needs for as long as possible (Spooner, 2012).

Observation results

Observation of school sites by means of an observation schedule was used to enhance rigour. Water tanks had been installed to harvest water for different purposes. S1 did not harvest rainwater, used mainly municipal water but stored borehole water in water tanks for backup purposes during municipal water stoppages so the school would never run short of water. S2 also relied on municipal water but harvested rainwater in two tanks for the same reasons as S1. S3 relied entirely on borehole water and used harvested rainwater for watering the school garden, cleaning toilets and classrooms. Water recycling kits were not used in any cases. Rainwater runoffs in S1 and S2 were not directed and used for watering the gardens and lawn as in S3. The school garden in S3 was used to supply the school feeding scheme with fresh organic fruit and vegetables. Leaking taps were addressed since there was no visibility of water leakages in any of the schools. For monitoring and reducing water usage, S2 placed water containers in every classroom to limit frequent journeys to taps and S3 used jerry water cans (plastic 20l containers with taps). Basins were placed underneath these water containers and cans to collect dripping water which was later reused for cleaning or washing hands.

For sanitation, all schools in this research used flushing toilets and S3 had additional chemical toilets for backup purposes when water was insufficient. Pit toilets in S3 were closed and reused for storage of learner teacher support material, garden equipment and old school furniture for future recycling. A new toilet construction in S3 had employed local people. Security personnel and cleaners were also employed in all cases for screening visitors, learners and staff for Covid-19 compliance.

Landscaping of S1 and S3 was evident and grounds were well maintained with flowers, indigenous lawn and trees surrounding the building to provide outside shade, natural thermal comfort and positive carbon offsetting, whereas few plants were visible in S2. There were no indoor plants and air-conditioners in classrooms and staffrooms, though these were visible and operational in offices. Plant waste was not reused in S1 and S2, whereas S3 composted this and used it to fertilise the gardens. Recycling bins were visible (S1 and S3) for municipal waste removal, and in S2 this was sorted for recycling. It appears that recycling of paper, metals, plastics and tins was not regularly practised in S3.

There was no evidence of any solar panels or energy measuring units or energy saving lighting systems in all cases. All cases relied entirely on non-renewable electrical power. In S1 and S3 public transport was far from the schools' premises whereas in S2 public transport close to the school gate caused noise and air pollution.

Summary

SWOT analysis on greening and sustainable development of schools

The SWOT analysis on greening and sustainable development of schools enabled the identification of contextual factors that hinder sustainable development processes to shape greening of schools.

Strengths

Efficient water conservation strategies like storage of water in tanks and addressing leaking taps to reduce water wastage was visible in all cases. Borehole water (S1 and S3); rainwater catchment (S2 and S3); and collection of dripping water (S2 and S3) promoted positive sustainable development. Water conservation not only has an enormous positive effect on the environment due to ongoing shortages of water, it is also cost-effective for schools. Organic composters, water run-offs to gardens and agricultural products (S3) are helpful and relatively easy means of conserving water. School food gardens (S3) also supplied the school feeding scheme with fresh fruit and vegetables – a good example of sustainable food production that enables learners to eat cost-effective organic healthy food from the garden. These sustainable gardens also promoted habitat diversity, are butterfly- and bird-friendly and increase populations of other species in the school environment. Municipal water used in S1 and S2 is clean and healthy; it is tested for viruses after recycling before distribution to the community. At the policy level, the DBE has integrated EE and ESD content into the school curriculum. CAPS has included environmental and sustainability related subjects across all phases and subjects. This means that EE and sustainable development are integrated into the school curriculum (DBE, 2011). Therefore, education is a means that is utilised to achieve SDGs.

Indigenous plants, trees and flowers provided shade for the school buildings and playgrounds, beautified school environments, and also improved air quality (S1 and S3). Trees around the school buildings contribute to a positive carbon footprint since their waste products are oxygen, which all life depends on, and one of the waste products of humans is carbon dioxide, which plants depend on for survival. Plants improve habitats; promote diversity; increase populations of other species in the school environment; and assist learners in the study of Natural Sciences – for example "Indigenous Knowledge in relation to biodiversity" is covered in the Grade 4 curriculum (DEA, 2012). In addition, plants provide shelter to people and habitats to biodiversity, help to maintain global climate and are sources of medicines and clean water as well as being the lungs of the Earth, which add to the oxygen content of the atmosphere (South African National Biodiversity Institute [SANBI], 2018). This resonates with the findings of Carvello (2009), who established that vegetation supports the ecosystem within a school with curricular benefits for biodiversity study and is also aligned with global SDGs, eco-school themes of nature and biodiversity, and healthy living. Le Roux (2014) stressed that the environment should not be exploited,

and plants need to be protected for atmospheric stability to improve air quality, provide shade in school playgrounds, reduce water runoff, stormwater pollution, and improve the appearance of the school. Plants also produce clean, breathable outdoor air for the school community, which reduces health risks. Reusing pit toilets as storage and dripping water for cleaning and watering the school garden (S3) are notable sustainable practices. Employment of local people was positive for the local community with job creation and alleviation of poverty ultimately promoting SDGs. Public transport away from the school premises (S1 and S3) prevented noise and air pollution.

Waste reduction is a key factor in ensuring sustainable practices. All school premises were clean, clear of litter and odour-free. Waste reduction methods (such as composting solid waste from the garden and food waste – S3) that minimise waste going to landfills are positive sustainable practices that do not harm the environment. Food waste can be recycled into ultimately contributing to the production of fresh and organic food. Bins for sorting recycling (S2) promoted waste reduction and income to schools. Wastewater was reused for watering the lawn in S3. Reusing of both garden refuse and used water were environmentally friendly waste management strategies evident in S3.

Weaknesses

There were no sustainable conservation measures for water in any of the schools in this study – no water recycling, purification kits or water saving devices. There is a need for responsible sustainable water conservation strategies since water is costly. Water has to be used in a sustainable way and wastage needs to be prevented (Somwaru, 2016) at all costs due the ongoing shortage of water in South Africa. Water is a lifesaving resource and needs to be protected from pollution and any sort of contamination for health reasons. Conserving rainwater saves a significant amount of money. Schools and communities "that conserve water resources enrich learners' quality of life at schools" (Foo, 2013, p. 8) and communities. The fact that rainwater runoffs were not directed and used (S1 and S2) for watering the garden, the lawn, in fountains or towards wetlands revealed that these schools have little knowledge about creating and maintaining their own diverse local ecosystems (such as a wetland with frogs and reeds for biodiversity). Limited space for plants in the school environment (S2) posed a negative health risk to the occupants. The lack of medicinal plants in all cases deprived learners of indigenous medicine knowledge and their usage and does not promote greening and sustainable development behaviour.

Although all school premises were clean, use of green projects for sustainable development like recycling, reusing and reducing waste were not sufficient. The waste reduction methods of relying only on municipal waste removal (S1) are unsustainable. Public transport close to the school gate (S2) caused noise and air pollution. Weaknesses were also evident regarding sanitation – no water conservation was associated with flushing toilets such as flush limiting devices.

Although there are national resource management departments and legislation in SA, this is not effective since implementation does not take place at a national level (Makokotlela, 2016, p. 55). One of the duties of the institutional district support officers is to "assist principals and educators to improve the quality of teaching and learning in their institutions" (DBE, 2012) not sustainable development. The majority of role players did not specialise in water, energy, waste or forestry management. This study revealed that schools are struggling with resource management as traces of negative resource management were visible. Lack of renewable energy like wind or solar systems and not using energy-efficient lights in all cases means that electricity bills were costly for all schools. This is evident in the response of S1-P3: "money is depleted by services such as electricity bills on photocopying machines."

Opportunities

Facilities can be built with recycling water systems which take water from cooling systems and recycle that water so it is not wasted. Water from some systems can be collected at discharge, treated and reused in the same system or cycled into another system altogether. Solar panels can be installed and non-energy efficient light bulbs can be replaced with energy-saving globes which are cheap and last longer. Schools need to request resource management support from specialists in NGOs such as the Wildlife and Environment Society of South Africa (WESSA) to help manage their resources sustainably. Schools could register with WESSA's Eco-School programme which supports learners to work towards positive sustainable development behaviour. This programme is aimed at creating awareness and action around environmental sustainability at schools and their surrounding communities. Eco-Schools operates with themes such as community and heritage; biodiversity and nature; health and well-being; marine and coastal; climate change; waste; school grounds; eco-tourism; and water transport in order to support environmental learning in the classroom (WESSA, n.d). These themes support ESD in the national curriculum, with 50% of the content in some CAPS subjects being environmental. Eco-Schools need to celebrate environmental commemoration days such as National Arbor Day and Water Week to promote and encourage activism in schools and communities. DEA could roll out its specialists to schools so that more schools could be given opportunities to register for Eco-School programmes. The DEA, through the Fundisa for Change partnership programme, has continued to support transformative environmental learning to introduce teachers to relevant environment and sustainability content knowledge, teaching methods and assessment practices that will enable teachers to teach existing environmental content in the CAPS curriculum more confidently and effectively (Songqwaru, 2012).

Threats

Borehole water not tested for viruses could pose a health risk (S3). Socio-economic conditions such as unemployment constrains school funds and this might result in some schools becoming bankrupt. The air quality in the classrooms due to lack of air conditioners

and indoor plants poses a potential health hazard, which can lead to increased absenteeism and ultimately to poor performance. Schools are the backbone of society and can change the well-being of the society through green programmes and projects. Educating learners about the importance of water conservation means the school creates water-saving advocates for a future society that supports sustainable and responsible water use. The lack of non-renewable energy use through wind or solar generated power poses a threat. High levels of greenhouse gas emissions and catastrophic climate change impacts are inevitable since South Africa still uses coal generated electricity as its main source of power.

Contextual factors that shape the greening of schools

'Shape' in this study implies transforming schools in terms of positive environmental practices. Contextual factors revealed that the methods used by schools with regard to funding, learner and teacher support material and maintenance of infrastructures were not sustainable. Table 7 below shows a summary of the current state of the contextual factors according to the three pillars of sustainability in the cases studied.

Table 7: *Summary of contextual factors in study schools*

Social	Economic	Environmental
Poverty, high unemployment rate and inequities in terms of social income (all cases)	Ineffective use of non-renewable resources (all cases) Lack of economic knowledge (all cases)	Diminishing natural resources and pollution (all cases) Limited space (S2) Lack of e-waste recycling (all cases)

Addressing these contextual factors could shape the greening of the school if initiated by the DBE as an organ of the state. South Africa is bound by the United Nations Development Programme (UNDP) and the National Development Plan (NDP) to promote SDGs at the centre of its policies. South Africa is a member of UNESCO (Carvello, 2009) and DBE has successfully integrated ESD in the Curriculum Assessment Policy Statements (CAPS) (DBE, 2011). The focus should now be to put these policies into practice effectively within the entire school community to align and apply the current SDGs. These practices could shape and transform schools into sustainable, self-reliant entities.

Limitations of the study

This study, like any other study, has several limiting factors. The collection of data through face-to-face focus group interviews was interrupted by the unprecedented COVID-19 pandemic. As a result, it was difficult to approach participants and schools. This study ignored behavioural and political factors that may have had an influence. Financial

constraints limited the inclusion of all provinces, districts and independent schools, who could have been investigated quantitatively to reflect the socio-economic background to the research.

Recommendations

This study recommends the introduction of school awareness campaigns on greening schools programmes with initiatives such as solar energy which reduces greenhouse emissions. Secondly, an integrative assessment of green schools in South Africa is important that supports practical activity plans in curricula, infrastructure and research in greening schools. The green school concept is relatively new in many South African schools, and assistance is required in designing school-based sustainability programmes that involve collective decision-making from a South African context. Thirdly, green school experts in schools with a history of green school projects are important. The findings clearly pointed to the need for training and capacity building of role players in sustainable development. This study further recommends more studies using quantitative and mixed-method approaches at primary and high schools, Technical, Vocational, Education and Training (TVET) colleges and other districts, provinces and countries.

Conclusion

In conclusion, EE and ESD are the best vessels to bring about a paradigm shift from unsustainable behaviour to green, efficient, sustainable schools. In the school context, reducing, reusing, recycling and rethinking about resource efficiency is key to sustainable development and crucial for greening schools. The study revealed that all cases relied predominantly on government funding to survive, although this funding is unequal due to different quintiles. S1 was well-resourced compared to S2 and S3. There was a high level of information technology disparity among these schools with only S1 parents having sufficient resources to fund computer technology lessons. The least resourced schools are unable to access the Internet for online learning and are discouraged due to the disparity at different levels on the use of this all-important computing technology referred to as the 'digital divide' (Eyo, 2014). The Internet is often costly and networks are frequently not available. Green technology machines such as computers and laptops are paperless and use online services through the Internet thus reducing pollution as less waste is produced. The new path of technological solutions remains the best hope for a sustainable future imbued with faith in the possibility of solving environmental problems (Knutsson, 2018) such as littering. This is exaggerated by the fact that the two least resourced schools are no-fee paying schools and serious socio-economic problems were revealed. This study did not elaborate on technology in schools since current schooling is not yet paperless. There is a trail of e-waste generated from old technology that still needs to be addressed; less than 20% of e-waste is recycled, resulting in global health risks, environmental risks and loss of scarce and valuable natural materials (World Economic Forum Annual Meeting, 2020).

SDG 4 aims to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all people" (Leicht et al., 2018; Xia et al., 2020). Society needs to be provided with decent jobs (SDG 8) to reduce inequity (SDG 5) and inequity among nations with emphasis on girls and women (SDG 10) by 2030. One of the duties of the institutional district support officers is to "assist principals and educators to improve the quality of teaching and learning in schools" (DBE, 2015).

This research revealed that greening is a necessity for schools to achieve sustainable consumption of resources. In this sense, greening the school should form part of any decision-making process undertaken by role players for effective sustainable resources. Greening schools is a comprehensive concept emanating from EE and ESD and it cuts across all SDGs (Leicht et al., 2018). Since ESD is integrated in the CAPS curriculum, education is at the centre of sustainable development and drives it by ensuring that content knowledge in the curriculum provides skills to learners on how school resources such as water, paper or energy might be used sustainably to promote the 2030 sustainable development agenda. Greening the school is a sustainable approach towards EE that aims to support the biodiversity of the school environment in a sustainable manner (Somwaru, 2016). SDGs, as reported by the UN member states, indicate that green schools are central in decreasing the vulnerability of SDGs 1, 2, 3, 4, 6, 7, 10, 14,16 and increase the effectiveness of SDGs 5, 8, 9, 11, 12, 13, 15, 17 (Oghenekokwo, 2017). SDGs 1, 2, 3, 6, 7, 12, 13 and 15 directly influence the green sustainable schools on which this study focuses. Reducing over-consumption of fossil fuels and pollution in schools is green, health-driven and embraces SDG 3. Greening schoolyards with trees, grass, food and flower gardens embraces SDGs 1, 2, 3, 12, 13 and 15. It is evident that more sustainable development initiatives are needed in order to provide answers to contextual factors hindering greening schools. Overcoming these contextual factors will shape role players' ability to effectively achieve sustainable development.

Role players need to be capacitated and empowered to play their vital role in promoting sustainable livelihoods for current and future generations. Schools are the backbone of society and can change the well-being of society through green programmes and projects. Therefore, schools need to adopt more efficient sustainable methods (such as cleaning campaigns) as part of a social mobilsation programme to raise environmental awareness and encourage action in their learners to address littering, waste management and greening strategies. These practices will transfer skills and address the need to reduce, reuse and recycle waste in order to decrease the amount of waste going to the landfill sites. Schools could also share information on best small scale school gardening projects methods such as water-wise gardening; garden maintenance; seed planting of vegetables which can be sold to nearby communities and also used for the schools' feeding scheme. Schools, as hubs and vendors of communities, can help transform and prepare society to act in new creative ways of today, so that future school generations can continue to benefit from natural resources. Greening can contribute to maintaining the biodiversity of the school environment in a sustainable manner (Somwaru, 2016), and could be a major contributor to reversing the damage already done to schools.

Notes on Contributor

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Johannah Bopape was a teacher and a member of the school management team at Edward School in the North West Province of South Africa. She holds a M.Ed in Environmental Education from UNISA and completed a PhD in Environmental Education in 2021 at UNISA.

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REVIEW

Teaching and Learning for Change: Education and sustainability in South Africa

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Achieving environmental education within the current South African school system feels akin to putting eggs into a beer crate. But such is the difficulty, delicacy and discomfort of the project of system change we are struggling within, to remake and reimagine our relationships in and with the world. South African environmental educators and researchers have been involved in this task over the past 40 years. As the book *Teaching and Learning for Change: Education and sustainability in South Africa* shows, the school system is an important place to start, as a meeting point of knowledge and learning and as a site in which young South Africans spend much of their time. This book not only tells a story of efforts towards realising environmental learning within the school system over the last 10 years of the Fundisa (learning) for Change Programme but it distills the significant lessons for the context of environmental education practice, going forward.

The book has four distinct sections which are as necessary as the four legs of a table: curriculum development, pedagogies, assessment and teacher professional development. The book can be read right through, but it also stands as a kind of reference book into which practitioners and researchers may dip for the most relevant and up-to-date thinking on an aspect of environmental education. Most significantly, it is grounded in a South African experience drawing on "small-scale empirical case studies from South Africa that are nested within a coherent national teacher professional development programme" (p. 4). Edited and predominantly authored by Southern African scholars, many of whom I have read and learned from over the years of my PhD study, it is a significant contribution to our times. In this review, I walk through the four sections drawing out the elements that have stood out for me as significant for educational practice today.

The introduction of the book sets the stage with a politically rigorous notions of education, Environmental Education (EE) and Education for Sustainable Development (ESD), "rethinking education in terms of its development intentions" (p. 4), calling our attention to how sustainability concerns now explicitly feature within high profile international documents such as the UN Human Development Report and the 2030 ESD roadmap. For example, it problematises a development agenda underpinned by the assumption that environment and society are pitted against each other. It also suggests

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"a fundamental shift in the purpose and direction of education" (p. 8), expanding beyond learning about environmental devastation towards fostering hope through 'transformative' and 'connective' learning approaches. The introduction demonstrates a bigger picture conceptualisation of education and development, underpinned by a directive that is responsive to people's freedom to decide and achieve what a meaningful life is for them. This introductory framing is significant as environmental education is at risk of being de-politicised and undermined. The rest of the book presents how these ideas are struggled with in contexts of practice.

Section A: Environmental content knowledge in the curriculum

The first section outlines the journey that environmental and sustainability knowledge takes from relatively new academic fields (environmental and sustainability sciences) and into the curriculum. This journey requires a transformation of the knowledge produced in higher education contexts and is named "recontextualisation" (described on page 26). This chapter usefully makes visible the often invisible mechanisms that shape environmental education curricula, enabling us to analyse the issues that emerge in this process.

Environmental education practice contains five tensions or 'problems of recontextualisation'. These tensions should be part of the reflective tool kit of any environmental educator. I rephrase them as questions below:

- How do we ensure that environmental problems are understood holistically and do not get lost in the disciplinary separations of school subjects?
- How, when teaching across subjects, do we ensure conceptual coherence, that what individual disciplines offer us is used taking care of the learning process as well as content?
- How do we avoid disconnecting knowledge from lived experience and context?
- How do we hold onto visionary knowledge, such as alternatives to mainstream economics that are not yet present in established curricula?
- How do we ensure that the radical political values of change contained in the broader environmental education project, some of which might be found in environmental social movements, get transferred into school cultures which privilege notions of status quo, shallow inclusivity and 'objectivity'?

The discussion of these five problems of re-contextualisation speaks to a real need for educational cultures to break open and grapple with the contradictions that are contained within discipline dividedness and technocratic approaches. Chapter 5 demonstrates this struggle in the context of teacher training and the concept of socio-ecological systems thinking while Chapter 6 takes a deeper dive into climate change education noting the absence of socio-emotional elements of climate change pedagogy.

Section B: Transformative pedagogies for environment and sustainability learning

Throughout this book, there is a commitment to "theory and practice in practice" (Lotz-Sisitka, 2016 referencing Bhaskar) and this section's contribution is not only to describe case studies and examples of 'transformative pedagogies', but to think about them critically and take care of how they have fallen short, specifically in Chapter 8 (a historical analysis of active learning).

The comprehensive discussion of the complex and multifaceted elements involved in action learning in Chapter 8 critically points out the pitfalls and problematic assumptions emergent over the time "active learning" has been in Environmental Education discourse. The chapter draws on the work from four programmes on sustainability and environmental education in South Africa for real grounded and empirical examples. The framework on three meta-areas for action learning include aspects we would not automatically consider 'action'. These are figuring out what we know, what we need to know – information work, and reflexive deliberation reflecting on the values at play in our we engage action and, critically, building capacity to reflect on how our practices unfold in the complexity of the world. In our attempts to embrace this complexity and the complexity of our learning practices, we cannot accept that action alone is an effective mode of learning. These three areas are situated, action oriented and reflexively deliberative pedagogy. Action for the sake of action is not necessarily the way, but action accompanied by a situatedness and reflective practice enables transformative shifts.

Chapter 9 elaborates on facilitating active learning through the authors' reflection on mediating Life Science teacher practices in two classrooms, to inform and strengthen the teaching of Grade 11 Life Science content. Chapter 10 demonstrates a similar intention but in a different encounter of a course-supported design research intervention process in which teachers lead their own inquiry into how to include environmental and sustainability knowledge. Chapter 11 considers what is needed to assist learners to take up agency and develop 'higher order learning' in their research on renewable energy inquiry projects. The three chapters wrestle with active learning across theory, practice time and space.

Of course, it is essential that transformative environmental learning be more than simply transmitting information: "Exploring human-environment relationships and alternative practices in the context of learner's own lives was necessary to help them deal with the everyday reality of environmental risks and concerns" (p. 129).

The framing chapter for this section, Chapter 8, gracefully articulates the challenges when environmental issues are not well situated in the lives of learners. Firstly, the necessity of drawing on situatedness to capture the complexity of environmental issues, to avoid "over-simplification of and hasty judgements about, environmental issues – thus giving rise to solutions reflecting idealistic responses to negativity. This idealism results in learners having to deal with 'real contradictions in the world' but without the power to changer them" (p. 134). And on the other end of the spectrum, that 'situating' environmental

education in the lives of learners does not mean unconnected from phenomena on a global scale, but of course, the local is part of the global and these connections must be made, pedagogically.

I end this discussion with a mouth-watering example from this book used to communicate high quality situated active learning, connecting cultural heritage to food security.

> "A participant in the Schools and Sustainability course – examined how indigenous knowledge of wild vegetables (*imifino*) was integrated into the primary school curriculum by inviting wise grandmothers (*gogos*) to share their knowledge about the health and ecologically friendly benefits of imifino with younger learners"…knowledgeable and experienced generations are significant dynamo in mobilizing 'unique [African] histories of knowledge practices that have sustained its peoples over many generations of living in, and creating, habitable landscapes." (p. 134)

Section C: Assessing environmental learning

Environmental education is complex and open-ended, proving challenging for mainstream approaches to assessment which rely on linear measurement scales. As someone who works with arts-based inquiry in environmental learning, I have learned the importance of frames to reflect on my educational practice. Arguably, the more open-ended a learning process, the more rigorous the frame to reflect should be. Especially in the case of arts-based environmental learning, one is at risk of rendering arts processes more 'fringe' and unimportant than they already are in educational priorities, if they are not worked with critically and consciously. Of course, we are not using the same assessment frame as we would for a maths class, and this is where much resistance to the notion of assessment comes in. But we need assessment in the form of a practice that considers the particularities of the learning process in order to consider how it enables or not, the educational goals.

The reflective assessment practice described in this third section of the book is a continuation and extension of the learning process itself, ideally feeding back into teaching practice. This is summed up in the phrase 'formative assessment' (p. 208) – it is not an end but a means towards further learning and shaping of teaching practice.

Assessment as learning necessarily means we have discerning ways to look at our educational processes and understand what is happening and it helps to have the details spelled out as they are in this book. Drawing on UNESCO, Weik's famous competencies, creative adaptations to Bloom's taxonomy, this section of the book offers us 'dimensions' for reflecting on our educational processes. On pages 207-208 there is a critical list of competencies, which speak directly to the socio-ecological world we are trying to portray in our environmental education encounters:

- Intrapersonal
- Interpersonal

- Future thinking
- Systems thinking
- Disciplinary and interdisciplinary
- Normative and cultural
- Strategic

As much as some of us may glaze over at the word 'assessment', we cannot get away from the reality that assessment is a necessary part of our educational, social, economic and political worlds. The 'glaze over' has a good explanation – assessment instruments in the world today actively order and rank children according to a narrow model, insensitive to differences in class, race, culture amongst others. This chapter explains assessment as a practice that can be reappropriated for deep educational accountability and continued reflexivity. The assessment section in this book does a thorough job in highlighting this and sharing examples, frameworks and ideas about how to keep the 'good parts' of assessment alive.

Section D: Teacher professional development

There is arguably no more important site for the project of environmental education than the continuous education of a teacher and this notion has been implicit in the book prior to section D. Teachers are at the coalface, working in complex social contexts, orienting learners into the world. Indeed, teachers have played critical roles in change projects including within the anti-apartheid resistance movement (Weider, 2003), and they have significant potential to make the shifts we need to a more life-affirming world system.

I approached the notion of 'professional development' quite cautiously but I was won over with the phrase in the opening of Chapter 15: "Teacher professional development is not an event, it is a process" (p. 258 with reference to Harwell, 2003) . This chapter reviews cultures of teacher professional development, noting the problem with 'black boxes' of professional development programmes that do not examine their main assumptions in relation to the contexts of teaching practice. The chapter lands on a model that is most appropriate to the work of a teacher. Through reflection on Southern African teacher professional development efforts, the authors introduce 'professional learning communities'; critically these are underpinned by an orientation to what teachers feel as meaningful learning, (valued beings and doings). The possibility of a teacher being able to continue their own learning process in the world, is a critical element of ESD in the world today.

Closing remark

This work must be celebrated for its significant contribution to resourcing environmental educators and environmental education researchers! Its authors are well established in the environmental education research field - an open and importance space to play and innovate as the world moves to increasingly dangerous times. I urge environmental education practitioners and researchers to take some time, perhaps even form a study group and to use this research forwards in building ethically, politically, scientifically rigorous teaching practice.

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Transgressive Eco-Arts Pedagogy: A response to Kulundu-Bolus, McGarry and Lotz-Sisitka (SAJEE, Volume 36)

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Abstract

Kulundu-Bolus, McGarry and Lotz-Sisitka (2020) have offered transgressive learning as a new approach to environmental education. As a response to their work, this paper describes and discusses aspects of a four-year action research project in which a group of children, adolescents and adults from the rural community of Wakkerstroom-eSizameleni participated in a series of multimodal arts-based interventions in which increased environmental awareness and improved environmental practices were key goals. Five vignettes from these interventions are used to argue that Transgressive Eco-Arts Pedagogy (TEAP) can facilitate community engagement, greater environmental awareness and small steps towards the improved environmental practices that Kulundu-Bolus et al. have called for.

Keywords: *Environmental education, arts-based learning, multimodality, sustainability, transgressive learning, pedagogy of love*

Introduction

In the introduction to *Learning, Living and Leading into Transgression – A reflection on decolonial praxis in a neoliberal world*, Kulundu-Bolus, McGarry and Lotz-Sisitka wrote:

> This paper is inspired by the call and response tradition of singing in Africa, where one person sings a phrase, and inspired by their contribution, the crowd sings back; this becomes an intuitive on-going iterative process of improvisation and meaning making together. It is this kind of call and response education that is needed for environment and sustainability education, an approach to learning and education that is contextually responsive, adaptive and moves towards solidarity in this time of crisis (2020, p. 113).

This paper is a response, a 'singing back' to Kulundu-Bolus et al.'s call. It aims to offer a critically reflective account of aspects of a multimodal, arts-based informal education initiative in which I attempted to work in contextually responsive ways with a group of children, adolescents and adults in the eSizameleni-Wakkerstroom community to effect changes in behaviour with regard to littering and dumping.

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I hope that this response will be of interest to environmental educators in view of the impact of plastics and other forms of litter on the natural environment. The arts have an important role in changing attitudes and behaviours, and if arts-based interventions are implemented using an inclusive and bottom-up approach, over extended periods of time, and monitored carefully, they have the potential to make significant contributions to environmental education in both rural and urban areas.

Transgressive learning and environmental education

Kulundu-Bolus et al. pointed out that "within environmental and sustainable education there is much boundary crossing, and navigating of plural ecosystems of knowledge, world-views, cosmo-visions and identities" (p. 112). They called for a means of intersecting each of these thoughtfully and meaningfully and present transgressive learning as one such means. Their paper emerges from extensive cross-disciplinary work which they described as "grounded in empathy and practices of care, transgressive social environmental learning, and fugitive ways of re-imagining and re-sourcing the lived practice of decolonial love; always holding women, young people, children and the most marginalised of our societies in mind" (p. 113). Their work also encompasses non-human elements of our world such as fauna, flora, soil and air. They asked how transgressive learning could be extended "into a commitment to actively living in transgressive ways?" (p. 113).

For Kulundu-Bolus "going beyond abyssal thinking means constantly meeting oneself and one's community at the borders of what dignity for the Earth and all sentient beings should be in this world" (p. 114). For her "an important part of this process is the need for constant reflection in motion" (ibid.) and she asked us to consider "how we are implicated in the state that we are in" (p. 115). In her view, "living into transgression means accounting for all the parts of yourself that are unresolved in the tensions that you see around you" (p. 120). Doing this involves reflecting on who and how we are in the world, especially in the context of post-apartheid South Africa, and on how those of us who are educators behave towards and with our learners. This practice involves living with these personal truths as opposed to living apart from them as was the case for myself as lead facilitator in the action research project that is the focus of this paper.

In the same co-authored paper, McGarry argued that we need to 'unlearn' "the enculturated ways of being that encourage and reinforce coloniality" (p. 115), and he urged us to engage in "a practice of challenging the very ideas we use to think with" (ibid.), since these ideas have stemmed from the colonial past. He suggested that queer theory has the capacity to contribute to unhinging these past practices. Included in such unlearning and re-learning is the conceptualisation of humanity as a commonality that ignores differences such as creed, sexuality and race (p. 122). Throughout the four years of an action research project in which I have been involved based on principles of TEAP, there was a focus on commonality, while also acknowledging differences in identity positions of participants, researcher and facilitators, in ways that began to speak to McGarry's call for deep inclusivity.

Each successive cycle of the action research TEAP intervention was informed by critical reflections on practice in the previous cycle in ways that could begin to address what Lotz-Sitiska was asking for when she suggested that we "transgressively embrace the unknown", by extracting what is useful from old theory, discarding what is not, and creating a new theory from the resultant debris. Quoting Wark (2011), she suggested "a low theory dedicated to the practice that is critique and the critique that is practice" (p. 116). I suggest that TEAP may enact low theory in ways that are useful for contemporary environmental education in which the focus is on praxis rather than on academic discussion and where this praxis extends over long time-frames so that sustainability can be achieved.

To return to Kulundu-Bolus, she suggested that "leading into transgression requires a sense of optimism geared at asserting the possibility of what could be, within the constraints of what is" (p. 121). The action research intervention began within optimism on the part of the research facilitators who subsequently experienced both highs and lows as they grappled with socio-cultural and socio-economic constraints made worse by the effects of the Covid-19 pandemic. However, as will be indicated in the paper, some successes were achieved.

In addition to Kulundu-Bolus et al., others who have written about transgressive learning include Fox (2017) whose advice to those who wish to take such an approach included the following:

- "Create room for reflection
- Provide economic models that are attractive
- Trust your learners to follow you and to even lead you
- Target feelings and emotions rather than expecting the facts and stats to speak for themselves
- Collaborate with local communities to increase the feeling of connection" (Fox, 2017, no page number).

Condeza-Marmentini and Flores-Gonzales (2019) also considered transgressive learning in relation to environmental education noting that "recent research in the field of environmental education has introduced the concept of disruption as a desirable competence in relation to transgressive learning" (p. 20).

Transgressive Eco-Arts Pedagogy (TEAP)

While there are many approaches to informal environmental education, the approach proposed by Kulundu-Bolus et al. presents meaningful ways in which real changes to environmental behaviour can be made. I argue that TEAP is a pedagogic approach that enables the transgressive learning, living and leading which they advocate.

In Lotz-Sisitka's 'non-conclusion' she listed nine processes as being important for sustained futures. In view of its potential to use the arts to engage the interests of the

marginalised, to be inclusive of all elements in the environment (human, faunal, floral and the Earth itself) and to move away from colonial practices, I argue that TEAP begins to respond to these nine, which are:

> morphing towards an undivided future (learning), dancing between contradictory masks (living), … engaging in relentless experiments with freedom (leading), colonizing the charade (learning), re-habiting place (living)… practising solidarity within intersectional movements (leading),… low theory out of the dust of the old (learning), escape multi-form fractured selves (living, and lead from the situation… (p. 124)

I present TEAP as a contribution to the conversation about learning, living and leading for sustained futures as opposed to a formalised and fixed pedagogic approach to either formal or informal environmental education as various art forms for teaching and learning multimodally can be used in many different ways.

Multimodal arts-based pedagogy

Archer and Newfield (2014) explained that "a multimodal approach to pedagogy recognizes that teaching and learning happen through a range of modes – image, writing, speech, gesture – and encourages pedagogic tasks that require multiple forms of representation" (p. 1). In their view, such an approach is particularly valuable in multicultural, multilinguistic communities. For Block (2009), acting, singing, storytelling and the making of visual art all contribute to "building an individual sense of what it means to be a human. The arts are an essential part of the story of what it means to be a human being and a community" (2009, p. 35)

In writing about the role of the arts in community-based social change, Etherton and Prentki (2006) argued for a bottom-up approach in which all participants are included. On multimodality, Archer and Newfield have stated that "multimodal approaches have the potential to transcend, and embrace, multi-linguistic societies" (2014, p. 4), and continued thus: "a multimodal approach to pedagogy recognizes that teaching and learning happen through a range of modes – image, writing, speech, gesture – and encourages pedagogic tasks that require multiple forms of representation" (p. 1). The research on which this paper is based, investigated the affordances of a range of non-traditional arts-based interventions for engaging first children, and subsequently adults, in activities that aimed to promote changes in attitudes and behaviours towards the local environment. Educationists and others who value the inclusion of opportunities for learners of any age to learn and to demonstrate their learning through a range of modes argue that people make meaning in multiple ways (Jewitt et al., 2016, p. 369) and should be given opportunities both to work in their preferred modes and to take risks in using modes of meaning making that are new to them. It is this risk that is aligned to the principles of transgressive learning. This is important in a neoliberal world since this disrupts the status quo that we find in

contemporary environmental education where the value of learners in the process of learning is not recognised.

Key principles and strategies informing a multimodal approach to teaching and learning in both formal and informal contexts include the following:

- Recognition of the semiotic resources, cultural practices, languages, epistemologies, histories, and personal experiences that learners bring to the business of learning
- Recognition of learner interest and agency
- Recognition of the affordances and constraints of particular modes and their appropriateness to the specificities of context. (Archer & Newfield, 2014, pp. 12-13)

The action research intervention

The four-year intervention involved a reconnaissance phase followed by three cycles of action research, of approximately one year each, undertaken for the twin purposes of doctoral research and community benefit, purposes that are not always easily aligned. This account of aspects of the overall study begins with a brief description of the research site and its residents and of the overall research initiative. This is followed by a series of short vignettes which are used to inform the conclusion to the paper

The research site, the research questions and the research process

Wakkerstroom in southern Mpumalanga is a typical example of a South African rural village with an adjacent township (eSizameleni). Wakkerstroom-eSizameleni is surrounded by wetland and grassland biomes that attract both South African and international visitors to the diverse birdlife. There are approximately 5500 residents in Wakkerstroom and eSizameleni with isiZulu being the dominant language, followed by Afrikaans and English (Census 2011). Most of the homes in eSizameleni are RDP houses and the unemployment rate is estimated to be between 40 and 55% of the adult population (SALGA, accessed 2021).

Service delivery in Wakkerstroom-eSizameleni is constrained by lack of funding for maintenance of infrastructure, and there are constant problems with sewerage leakage into the wetland, impassable roads with potholes and service vehicle breakdowns. Since for the most part eSizameleni residents are either unemployed or living a subsistence existence, the municipal funds are constantly under pressure. However, waste removal occurs once a week and is for the most part reliable. Despite the provision of this service, the evidence of widespread littering and dumping of waste throughout the community is what led to the conceptualisation of an action research project which investigated the following:

- Could an intervention at the intersection of applied arts and environmental studies, result in improved environmental awareness and improved environmental practices on the part of children in a rural village?

- What are the affordances of applied arts for developing sustained environmental good practice in relation to the management of litter?
- Could other rural villages in South Africa benefit from a TEAP approach to environmental education?

With the assistance of the co-ordinator of a school aftercare programme in eSizameleni, purposeful sampling was used in the selection of participants for this study. All the children were communicatively competent in English but could choose to communicate in isiZulu with the researcher employed to work with me.

For Paolo Freire, "knowledge is created through people struggling, observing, analysing and arguing with each other about how to make the world a better place in which to live" (cited in Bess et al., 2018, p. 89). This Freirean view of knowledge creation is at the heart of action research which focuses on *involving* participants in *improving* a social situation or practice (Kemmis & McTaggart, 1988, in Bess et al., 2018; italics in the original). The ongoing reflection on data gathered throughout the fieldwork from the preparatory reconnaissance phase to the conclusion of the third cycle of interventions, enabled adjustments to be made as the project evolved, although it was not always possible to achieve the equality of partnership between research facilitators and participants that is advocated in the action research literature (e.g. Bess et al., 2018; McNiff, 2014). One important adjustment was the inclusion of adults in the second and third cycles of the intervention, given the interest they showed in the children's activities during the first cycle. Within and between each cycle of the project, the action research process of planning, acting, observing and reflecting was undertaken. Reflection was facilitated through extensive journaling which included consideration of my own position as a white woman of privilege undeniably influenced by the colonial and apartheid past and its ongoing legacies in relation to child and adult participants positioned spatially on the margins by apartheid era planners. It was important for all participants to make choices about what they worked on and how they worked within the framework of the intervention and to engage in discussions in their preferred languages – made possible by the multiple language competences of my research assistant and myself.

The multimodal arts-based activities included in the research cycles consisted of play-making, process drama, puppetry, drawing, poster-making and participation in street parades and site visits. The facilitation of activities in a range of modes enabled participants to work according to their strengths and interests and to explore working in modes that were new to them. The collection and analysis of data in a range of modes also contributed to the validity of the claims made at the conclusion of the study.

Transgressive learning and TEAP

The five vignettes from the research included in this section illustrate aspects of what I am terming 'transgressive eco arts-based pedagogy' (TEAP). They were chosen to illustrate more and less successful aspects of the interventions and what can be learned from both relative successes and relative failures.

Research vignette 1: Visiting the village dump and drawing responses to the visit

After a visit to the village dump during the first research cycle, the children were given paper and drawing materials to use in making images of their choice as a response to the visit. Analysis of what they chose to represent enabled me to add to my understanding of what they had expressed verbally, in isiZulu, English or Afrikaans, about the visit. In analysing the drawings I focused on the features suggested by Hsu (2014):

(1) *Information value*. The placements of elements … endows them with the specific informational values attached to the various 'zones' of the image.
(2) *Salience*. The elements are made to attract the viewer's attention to different degrees.
(3) *Framing*. The presence or absence of framing devices …, disconnects or connects elements of the image, signifying that they belong or do not belong in some sense. (p. 177, italics in the original)

It was evident that the toxic nature of the dump had made an impact on the children, as many of them foregrounded the mound itself, a dead cow, a foraging dog and a family of waste collectors in their drawings. To my surprise fewer than half the drawings included any waste objects (tins, glass, paper, plastic, etc.), perhaps suggesting that these objects were so naturalised that they had either become invisible or were not considered worthy of attention. As a result of this analysis of the drawings, further activities were planned with a focus on the harmful effects of plastic on bird and animal life and on waterways and collecting waste to turn into useful (e.g. eco-bricks) or decorative (e.g. jewellery) objects. Drawing was included in activities in each of the three research cycles and over time provided some evidence of change in attitudes towards the environment. At first the images indicated that it was 'the children' or 'others' who dropped litter but during the course of the fieldwork the children became more willing to admit to their own poor behaviour in this regard. Figure 1 is an image of a child confessing to dropping litter before class, while Figure 2 shows a girl using snack packet papers to make mats, which she then sold at a village market. Figure 3 is a graphic and textual response to ways in which the respondent might deal with waste if there was no dustbin at hand, and these include keeping the waste until s/he got home or asking someone if they could point out a bin.

While these graphic indications of behavioural change are small and do not necessarily mean that good practices will be sustained, they did at least present a possibility that this could be the case. In terms of TEAP, site visits over time, with each one followed by graphic responses to the visit, provide an indicator of changes in attitude or perspective.

Figure 1: *Dropping litter before class (Preston, 2021, p. 136)*

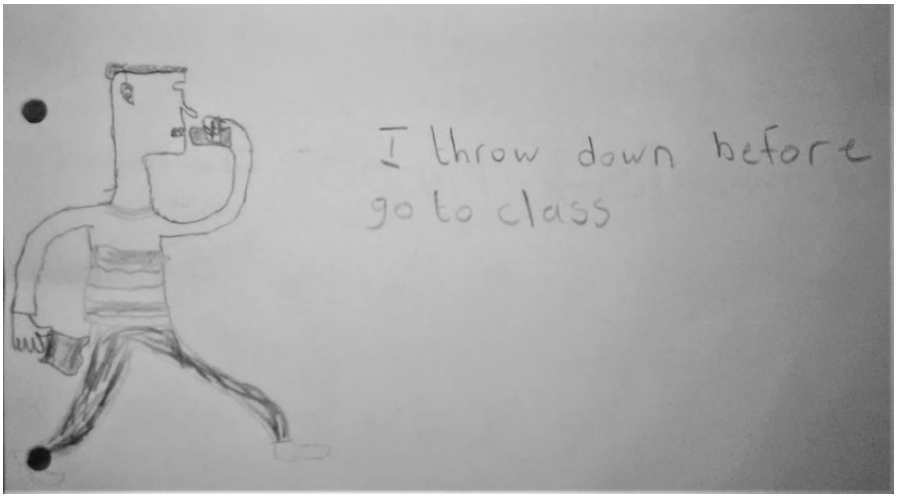


Figure 2: *Using snack packet papers to make mats (Preston 2021, p. 178)*

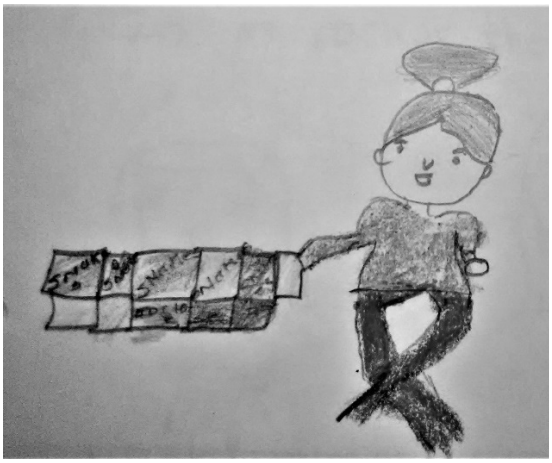
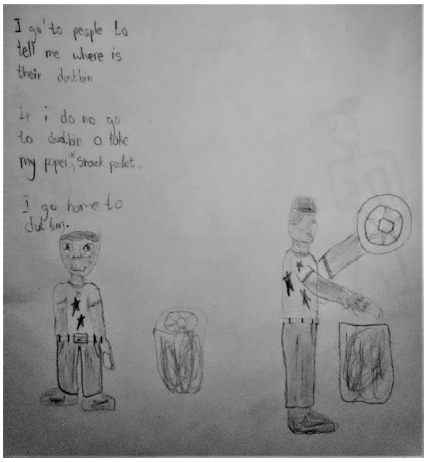


Figure 3: *Dealing with waste when there is no dustbin (Preston, 2021, p. 180)*



Research vignette 2: Introducing process drama

Dorothy Heathcote, a pioneer in the field of process drama, advised beginning the process by building belief and experience and then moving towards depth of insight about that experience, whenever possible, moving the participants to a moment of awe (Wagner, 1979, p. 76). A co-facilitator and myself aimed to create a space for the children that was familiar to them, within which they could play and interact with one another. Once this space had been established, with characters from a story they had listened to allocated to

each one, the children were encouraged to act within the space as they saw fit. The space created was a village similar to the one they lived in, with shops, taverns, a school, church and police station. The children immediately embraced the process and then engaged in the enactment of a range of village activities. While they were acting, issues were introduced to them: nappies and bottles were being dumped in the river and littering was becoming a serious issue. A shift in the performances was then observed in that the children began discussing the issues presented to them, and when a 'community meeting' was held a heated discussion ensued during which the children debated who was responsible for the dumping. There was evidence of shifts from light-hearted enjoyment of role-playing to a more serious engagement with local environmental problems.

The children decided that mothers were responsible for dumping nappies and tavern owners for dumping bottles in the river. How the mothers could be supported in the disposal of nappies and tavern owners in the recycling of bottles was discussed. The children showed an ability to solve the problems they had identified themselves. Towards the end of the play-making, one of the boys said that it would be impossible to change the littering behaviour of children until their parents stopped littering. Through this process drama activity children found their voices – voices that they subsequently used to express their views on the value of a clean environment to adults in the community, as will be indicated in vignette 5. Prior to this play-making, the children had been reticent to speak up and voice both their concerns regarding waste in the environment and also their proposed solutions. The engagement with issues in an environment that was familiar to them (i.e. their village), together with the safe space provided for creative expression, enabled them to express their views strongly.

Wagner suggested that process drama functions to search for "the precise dramatic pressure that will lead to a breakthrough, to a point where the students have to come to a problem in a new way, to fight for language adequate to the tension they feel" (1997, p. 13). Through the observation of the boy mentioned above, at a critical moment afforded by process drama, the course of the study changed to include adults. Given the interest that some adults (mainly women) had already shown in participating in the project's activities, this was quite easy to achieve. It is the inclusive nature of TEAP that is brought to the fore here, in that TEAP does not privilege one sector of a community or society over another. All willing participants are included in all ways that they choose, thus promoting the inclusivity called for by Kulundu-Bolas et al.

Research vignette 3: Bringing adults into the research

As the first cycle of the research drew to a close, some adult family members and caregivers began to express interest in participating in the arts-based activities as will be described in vignette 4. There were also younger and older, male and female adults in both Wakkerstroom village and eSizameleni township who, once aware of the research project, became 'champions of the environment'. Their involvement afforded meaningful working relationships with parents and council workers enabling me to work alongside community

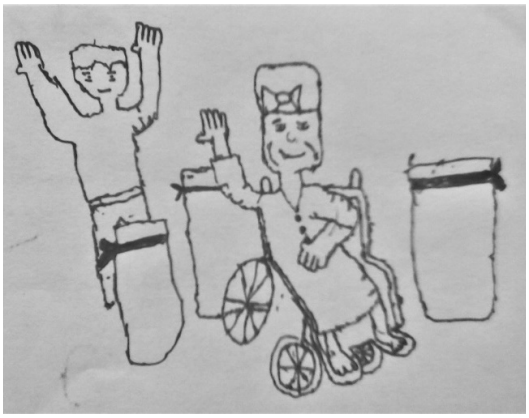
members to identify projects that could be undertaken when lockdown levels were eased during the Covid-19 pandemic. These projects included a job creation initiative to assist those who had lost their income and the construction of a bench made from eco-bricks at the taxi stop. Figure 4 shows people sitting on the bench while waiting for a taxi.

Figure 4: *Bench made from eco-bricks (Preston, 2021, p. 209)*

Liaison with these environmental champions also raised the possibility of sustaining initiatives with an environmental focus beyond the life of the research project. One initiative begun during the second research cycle and which is ongoing, involves the collection of plastic bottle tops and bread tags which are taken to the Tops and Tags programme in Newcastle. Once a sufficient quantity has been collected, the plastic waste is exchanged for a wheelchair for a member of the Wakkerstroom-eSizameleni community. The first recipient was the grandmother of one of the child participants in the project. The 'story' of the collection of waste and of the presentation of the wheelchair was performed as a puppet show and subsequently drawn by the audience. Gogo (grandmother) in her wheelchair was centre stage in every drawing. Figure 5 shows the recipient of the wheelchair with the bakkie-load of tops, while Figure 6 is a graphic representation by one of the child participants.

Figure 5: *Wheelchair earned from collection of plastic waste (Preston, 2021, p. 182)*

Figure 6: *Drawing of wheelchair earned from collection of plastic waste (Preston, 2021, p. 188)*



These initiatives served to bring child and adult residents together in ways that suited individuals and households with a degree of the socio-cultural and linguistic boundary-crossing advocated by Kulundu-Bolas et al.

Research vignette 4: Telling stories, making stories: Puppetry on environmental themes

Puppetry was introduced during cycle 1 with children learning how to make paper packet puppets and using them to tell stories with an environmental connection. In preparation for the puppet making and story-telling, the children first discussed characters and storylines. Once the puppets were ready, each child had an opportunity to present their story to the other children, using a combination of isiZulu, English and Afrikaans. The research assistant translated the isiZulu for me and I translated the Afrikaans for him as English was our lingua franca. The children were far more willing to tell stories through their puppets than without them and to use their full linguistic repertoires, providing support for the claim of Schmidt and Schmidt (1989) that puppetry affords one a degree of separation; it is the puppet that communicates messages rather than the puppeteer.

Figure 7: *A participant with his puppets (Preston, 2021, p. 116)*

During cycle 2, when some adolescents and adults had joined the child participants, I began to use rod puppets to tell stories with environmental themes. By invitation, I also used them outside the research project: at a meeting of council workers; with a group of retirees and also with other child audiences at a school and at an afterschool care centre. Not only did children learn how to make puppets but through the one degree of separation afforded by speaking as a puppet figure, they were willing to communicate their understanding of environmental issues.

Research vignette 5: Waste clean-up arranged by a research participant

On one occasion while I was driving in the township, one of the research participants stopped me and took me to a place that is regularly used for informal dumping. He asked: "What can we do about this?" and "When can we clean this?" This was a very special moment for me as the suggestion to clean up the site, with a further specific request for a time frame, indicated that the child not only had learnt to 'see' the waste but that it had begun to bother him. He wanted to make a change, and the language he used had shifted from 'they' to 'we'. His questions indicated that he had become aware of the hazards of informal dumping and also that he had developed a sense of personal responsibility for it as a result of his participation in the TEAP intervention.

After this conversation we organised a clean-up event for the following Saturday. The boy had arranged for a number of his friends to attend but during the course of the morning, other curious children joined us until there was a group of 25, between the ages of four and fourteen. All the children worked extraordinarily hard and we were able to make a substantial dent in the waste.

Two events that occurred while the clean-up was under way are worth noting. When an adult passerby teased the children, saying that their work was a waste of time, the boy who had initially suggested the event responded thus: "At least we are trying; what are you doing?" He said, "I love my planet and I don't want to see it like this". The second event that morning involved a person who arrived with a wheelbarrow full of waste with the intention of dumping it where the children were cleaning. The children voiced their indignation which drew the man's attention to the activity and he left, somewhat embarrassed.

While there had been other indications that TEAP had enabled small changes in attitudes and behaviours towards the environment, this was a pivotal moment in the fieldwork for the research. The 11-year-old boy who had asked for assistance in the clean-up had joined the programme when he was eight, left, and then joined again. This vignette suggests that long-term interventions may have the capacity to draw children back after they have dropped out for any number of reasons. Figures 8 and 9 show the children at work and the waterway after it had been cleared of waste.

Figure 8: *Clean-up (Preston, 2021, p. 251)*

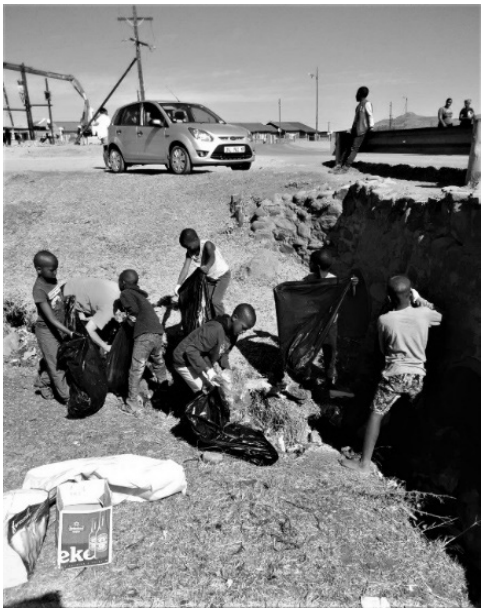
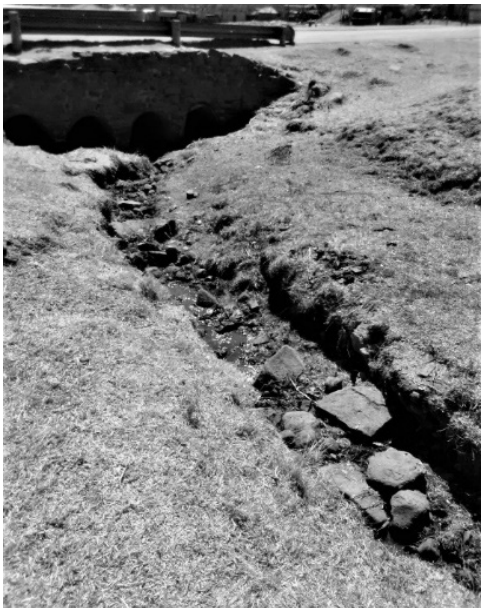


Figure 9: *A clean waterway (Preston, 2021, p. 251)*



Conclusions

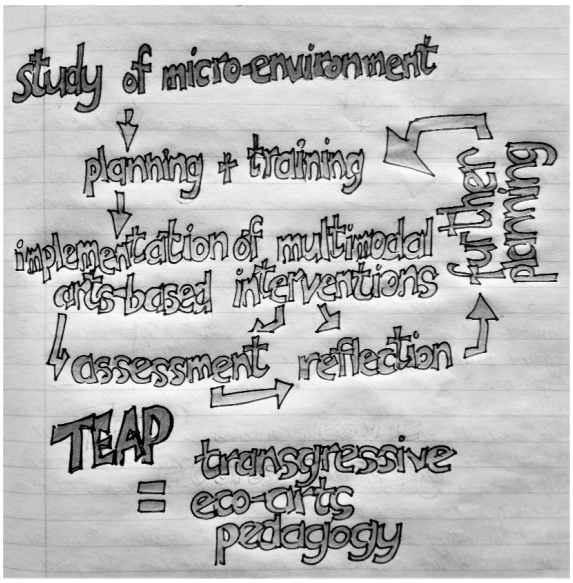
Transgressive art subverts, shocks and dismantles the status quo, as was often evident in the performance art that became so popular in the 1980s. Transgressive teaching and learning however, seeks to disrupt traditional approaches to teaching and learning. It seeks to level the playing fields between the haves and the have-nots, to include the voices of teachers and learners and parents or other caregivers. Co-learning and co-leading is emphasised, with space for mutual acknowledgement and respect between those who learn and those who teach, in ways similar to what Carabello and Soleimany (2018) described as 'a pedagogy of love' in which recognition and nurturing of differences – race, creed, nationality and sexual orientation for example – permit embracing of inclusivity.

With reference to Lotz-Sizitska's call for 'low theory', I suggest that the vignettes included in this paper are illustrative of the value of transgressive eco-arts pedagogy, informed by conceptualisations of transgressive learning, for arousing and sustaining community interest and involvement in environmental issues on the part of children, adolescents and adults. The interventions based on TEAP were informed by a range of 'high' theories (e.g. deep ecology and eco-feminism as explained in Preston, 2021) and multimodal arts-based pedagogic practices that have been at the margins or non-existent in most South African schools (Archer & Newfield, 2014). At their core was the need, expressed during the initial reconnaissance phase by community members, for a cleaner environment, for support of

community members through job creation and provision of services, and for opportunities for children and adults to 'play' in safe spaces. By the end of the third research cycle, in which some activities had to be put on hold because of the Covid-19 pandemic, there was evidence in the children's drawings, posters and performances of increased environmental awareness. However, while some of them became quite passionate about cleaning the environment, others continued to litter. Some of the adults who became involved are still collecting tops and tags for wheelchairs and other waste for making eco-bricks.

Throughout each of the cycles of an action research intervention informed by TEAP, the reflexivity advocated by Kulundu-Bolus et al. (2020) was paramount in thinking about, planning, implementing and reflecting on the multimodal activities as is indicated in Figure 10.

Figure 10: *Further planning (author notes)*



With reference to the further planning indicated in Figure 10, some of the adults in the community are willing to continue their efforts as 'champions of the environment' in collaboration with myself and the co-ordinator of an after-school programme in Wakkerstroom-eSizameleni. We are hoping to encourage both adults and children to actively live in transgressive ways (Kulundu-Bolus et al., 2020).

Through the use of five vignettes I have attempted to show how TEAP, using multimodal arts-based interventions, has the capacity through its non-binary approach, over time, to embrace the "boundary crossing, and navigating of plural ecosystems of knowledge, world-views, cosmo-visions and identities" that already exist in environmental education (Kulundu-Bolus et al., 2020).

Notes on Contributor

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The Handprint Initiative: Identifying learners' attitudes towards the environment

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Abstract

The Handprint Initiative was born out of the need for a new pedagogical approach to deal with current global challenges. It is founded in the social responsibility of educators and learners to actively participate in the decision-making process of our society. To achieve this, there was the need for a statistical basis to measure learners' attitudes towards the environment. A 19-item survey was used to determine five key attitudes in high school students in Mexico. With appropriate statistical tools (including PCA, KMO, normality tests and others), it was possible to measure ecocentrism, eco-apathy, naturalism, pessimism, and scientism attitudes and to confirm the data of other studies. The results of this study contribute to assessment of the impact of the way we teach, as well as the promotion of quality education and the implementation of the Handprint Initiative.

Keywords: *handprint; attitudes towards environment; eco-apathy; sustainability, quantitative study*

Introduction

Environmental education and education for sustainable development play a key role in shaping our future world (Nagel, 2005; UNESCO, 2017). Building the future will require not only the strongest of wills, but the right approach in encouraging the minds of those who will create it, namely, our students (UNESCO, 2020). Few if any initiatives have succeeded in achieving this goal (Nagel, 2005), due to the 'doom and gloom' feeling most of them create, and there is no apparent framework to follow for what we all share as a common objective: saving our world from the climate and social crisis by transforming the way we teach in favour of and about our environment.

Environmental education's purpose is to provide a mechanism to address environmental challenges. As Davis (1998) explained, environmental education is about values, attitudes, ethics and actions, a way of thinking and a way of practice. Environmental education is a positive contribution to counteract the 'doom and gloom' feelings associated with social and environmental challenges (Nagel, 2005).

Furthermore, education for sustainable development (ESD) aims to develop competences that empower learners with knowledge, skills, values, and attitudes. ESD seeks to encourage

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reflection on our own actions and taking informed decisions for environmental integrity, economic viability and a just society by empowering people of all genders, for present and future generations, while respecting cultural diversity (Bagoly-Simó et al., 2018; Draghici, 2019; UNESCO, 2012, 2017, 2020). There is a global call to take action for a common future (UNESCO, 2020), to see beyond the challenges and start thinking of solutions to environmental problems.

However, several studies (Aguilar Montes de Oca et al., 2015; Boca & Saraçlı, 2019; Gómez, 2014; Juneman & Pane, 2013; McKnight, 2010; Railean et al., 2016; Sashittal, Jassawalla, & Markulis, 2012) have found adolescents' (namely secondary and high school students') attitudes towards the environment to be marked by an increasing apathy. The current environmental challenges (e.g. global warming, biodiversity loss, food insecurity, deforestation, politic and social conflicts, poverty, hunger, peak waste, population growth, planet slums) are generally perceived by young people as impossible to solve or they feel very little can be done, or it is not of their concern. That means that after some fifty years of development and implementations, the behaviours being created are not positive (Nagel, 2005).

Expecting learners' attitudes and actions towards the environment to change is unrealistic when the main message we deliver is 'The world is about to end and it's your fault'. According to Schreiner and Sjøberg (2004), a person's actions in the present are affected by their images of the future.

Analysing the current attitudes of our learners is a key step to changing perspectives of how we face global challenges. Understanding how their attitudes are defined will allow them to move from the theory of how to achieve a common future towards active participation.

The Handprint Initiative is an action-oriented educational approach based on the development of the key competences for sustainability, namely systems thinking competency, anticipatory competency, normative competency, strategic competency, collaboration competency, critical thinking competency, self-awareness competency and integrated problem-solving competency (UNESCO, 2017). Its aim is to empower secondary and high school students and teachers to become changemakers for our common future, by actively participating in the decision-making processes of our society. The purpose of the initiative is to overcome the limitations (for example, eco-guilt, doom and gloom, apathy) of other approaches of education towards the environment. This can be achieved by identifying the current learners' attitudes towards the environment first, followed by implementing a framework that integrates the handprint concept, as well as the key competences for sustainability and the Sustainable Development Goals into best practices in the classroom. Therefore, the Handprint Initiative seeks to move away from discussion and debate to focus on how to best meet the goals established in the Agenda 2030 (Nagel, 2005).

The Handprint Initiative is based on the handprint concept, launched in 2007, described as actions towards sustainability (Alvarenga et al., 2020). The handprint concept has been defined as a complementary concept to the footprint (which considers human demands on

nature) as a measure of what we can do individually and as a society, to restore the balance between consumption and the planet's carrying capacity (Pandya, Vyas, & Schwarz, 2013). Handprints are also about the good society does for the environment (Biemer, Dixon, & Blackburn, 2013) and can be seen as an extension of the concept of the hand as a symbol for action (Guillaume et al., 2019). Norris (2015) referred to the handprint concept as the footprint-consistent estimate of positive change. Thus a handprint can be seen as the measure of the good we do in ways that are consistent with the measurement of the harm we cause.

Based on the above, the handprint concept could be defined as a solution-oriented approach, which promotes systemic thinking for sustainability and fosters individual and collective positive action, namely actions towards sustainable development (Centre of Environment Education [CEE], 2007; Gunawardene, 2008; Husgafvel, 2021; North American Association for Environmental Education [NAAEE], 2017; *Times of India*, April 7, 2013). Handprint is a symbol of, measure for, and commitment to sustainability (Pandya et al., 2013).

Since the handprint concept was first introduced, there have been several examples of its use around the world. Firstly, in education programmes to represent an individual's 'action competence' (for example, CEE's programmes and Sustainable Schools West Australia) (Hayward, 2011). Secondly, it has been used by organisations to incentivise citizen action (for example, Handabdruck [Handprint] Germanwatch [https://www.handabdruck.eu/was-ist-der-handabdruck]; Corporate Sustainability Handprint GIZ Germany [https://www.giz.de/en/aboutgiz/34118.html]; ecologicalhandprints.org, handprinter.org; RESOLVE UK [Howard, 2021], SHINE Harvard [http://shine.mit.edu/what-shine]). However, these examples lack a common framework for implementation in formal education (elementary, secondary, and high school levels).

Implementing the Handprint Initiative started from the reality and first-hand experience of students from middle school to high school, by identifying their attitudes towards the environment. We carried out a pilot project with the aim of developing the best instrument to measure key attitudes towards the environment. A secondary aim was to define the most suitable age for implementing the Handprint Initiative.

Materials and methods

Participants

The pilot project was conducted in four South Mexico City private schools, with which there was already established collaboration as well as the interest to conduct future joint research. These four institutions included traditional, alternative, and religious schools, mostly attended by middle class learners. A total of 548 students between 11 and 19 years were surveyed in class. The age was chosen based on Piaget's final cognitive stage, the *formal operational stage* (Babakr, Mohamedamin, & Kakamad, 2019). During this stage, adolescents achieve the final stage of cognitive development; they are able to think logically and deal

with abstracts (Babakr et al., 2019; Huitt & Hummer, 2003). The survey was conducted in person by teachers as an activity in class.

Of the sample of 548 students, 314 were studying at secondary school (junior high school) and 234 were students in high school; 49.6% were female and 50.4% male.

Instrument

To measure students' attitudes and to build a statistical basis for the Handprint Initiative, we applied a questionnaire consisting of 19 items of which the first 18 were inspired by the Relevance of Science Education study (ROSE) (Schreiner & Sjøberg, 2004) and the last item was adapted from Vázquez and Manassero (2005) (see Table 1 for a list of the items).

Table 1: *Items developed by ROSE project (Schreiner & Sjøberg, 2004) and adapted by Vázquez and Manassero (2005)*

Me and environmental challenges	
Item	**Sentence**
1	Threats to the environment are not my business.
2	Environmental problems make the future of the world look bleak and hopeless.
3	Environmental problems are being exaggerated.
4	Science and Technology can solve all environmental problems.
5	I am willing to have environmental problems solved even if this means sacrificing many goods.
6	I can personally influence what happens with the environment.
7	We can still find solutions to our environmental problems.
8	People worry too much about environmental problems.
9	I hate humanity for what it has done to Nature.
10	Environmental problems can be solved without big changes in our way of living.
11	People should care more about environmental protection.
12	It is responsibility of the rich countries to solve the environmental problems of the world.
13	I think each of us can make a significant contribution to environmental protection.
14	Environmental problems should be left to the experts.
15	I am optimistic about the future.
16	Animals should have the same right to life as people.
17	It is right to use animals in medical experiments if this can save human lives.
18	Nearly all human activity is damaging for the environment.
19	Nature is sacred and should be left in peace.

The 19 items were designed to present general perspectives regarding prevalent concerns for the environmental future and the role of science and technology, without specific references to concrete environmental problems or risks (Vázquez & Manassero, 2005). Items 1 to 14 were inspired by literature on alienation, powerlessness, and meaninglessness. Items 15 to

19 were related to quasi-religious views on nature and whether protection of nature is good in itself (Vázquez & Manassero, 2005).

In addition, the scale was adjusted to permit learners to take a neutral stand, modifying the 4-point to a 5-point Likert scale, to allow for students who felt indifference towards certain topics. According to Vázquez and Manassero (2005), this instrument identifies five environmental attitudes, and each of the 19 items is related to one of these attitudes (see Table 2):

(a) Ecocentrism – optimistic attitude of greater personal involvement and better care of the environment. Describes an optimistic, involved and proactive attitude towards environmental protection and conservation (Vázquez & Manassero, 2005). It refers to the idea that nature has value in itself and does not exist simply for human transformation (Macías Zambrano, 2017). Ecocentric attitudes are linked to addressing environmental issues because the individual sees nature as worth preserving regardless of the economic or lifestyle implications of conservation (Macías Zambrano, 2017; Thompson & Barton, 1994).

(b) Eco-apathy – a psychological defense against feelings of hopelessness, and emotional and physical deprivation (Okada, 1995). However, in their research, Aguilar Montes de Oca et al. (2015) noted that according to Cabrera, Peral and Barajas (2012), the concept of apathy was more acceptable in popular culture after the First World War, when it was qualified as one of several forms of war neurosis characterised by a feeling of emotional numbness and indifference to normal social interaction. Nowadays apathy is defined as "lack of interest, motivation, attention, concentration, emotion or feeling indifferent and disengagement (Aguilar Montes de Oca et al., 2015; Ishii, Weintraub, & Mervis., 2009; Itaaga, Muwagga, & Kaahwa, 2013; Riconscente, 2007) leading to disruption in consciousness and to the waste of psychic resources and skills" (Sashittal et al., 2012).

According to Nagel (2005), an eco-apathetic attitude surfaces as result of fear of the world and susceptibility to the negative emotions that arise as a result. Furthermore, Thompson and Barton (1994) claimed that individuals who are environmentally apathetic generally do not assign any value to nature for any reason. Vázquez and Manassero (2005) defined this as an indifferent, passive, insensitive and resistant attitude to the protection of the environment.

(c) Pessimism – can be understood as a psychological process or state, or as an argued position of expecting a negative outcome of processes (Nordgren, 2021). In this context, Vázquez and Manassero (2005) described pessimistic characteristics towards the situation and future of the environment.

(d) Naturalism – refers, in philosophy, to the theory that all beings and events in the universe are natural. Consequently, all knowledge of the universe falls within the realm of scientific investigation (Encyclopaedia Britannica, 2017). Vázquez and Manassero (2005) considered this term in the light of rights of nature.

(e) Scientism – the view that hard sciences (for example, chemistry, biology or physics) provide the only genuine knowledge of reality, or that such knowledge is inherently superior to what we can know from any other disciplines (Moreland, 2018). For Vázquez

and Manassero (2005), this attitude refers to the solutions of environmental problems from the perspective of a blind trust in science and technology.

According to Vázquez and Manassero (2005), each item can be related to one of the above five environmental attitudes (see Table 2).

Table 2: *Attitude related to each item*

Item	Sentence	Related Attitude
1	Threats to the environment are not my business.	Eco-apathy
2	Environmental problems make the future of the world look bleak and hopeless.	Pessimism
3	Environmental problems are being exaggerated.	Eco-apathy
4	Science and technology can solve all environmental problems.	Scientism
5	I am willing to have environmental problems solved even if this means sacrificing many goods.	Ecocentrism
6	I can personally influence what happens with the environment.	Ecocentrism
7	We can still find solutions to our environmental problems.	Ecocentrism
8	People worry too much about environmental problems.	Eco-apathy
9	I hate humanity for what it has done to Nature.	Pessimism
10	Environmental problems can be solved without big changes in our way of living.	Ecocentrism
11	People should care more about environmental protection.	Ecocentrism
12	It is responsibility of the rich countries to solve the environmental problems of the world.	Scientism
13	I think each of us can make a significant contribution to environmental protection.	Ecocentrism
14	Environmental problems should be left to the experts.	Scientism/Eco-apathy
15	I am optimistic about the future.	Eco-centrism
16	Animals should have the same right to life as people.	Naturalism
17	It is right to use animals in medical experiments if this can save human lives.	Naturalism
18	Nearly all human activity is damaging for the environment.	Pessimism
19	Nature is sacred and should be left in peace.	Naturalism

Statistical methods

When conducting research such as for this article, it is necessary to ensure that the results are statistically relevant, and if not, to provide suggestions for improving them. By statistically relevant, we mean that results are reliable and valid.

Reliable means that the results can be reproduced under the same conditions (internal consistency). Validity means that the questionnaire is accurate. These two concepts are

crucial, as a questionnaire could theoretically be reliable, but wrong. Alternatively, it could deliver good, but irreproducible results (Sürücü & Maslakçı, 2020).

Each statistical concept can be assessed using different tools. Reliability is normally assessed through Cronbach's alpha, which is obtained by calculating the pairwise correlations in a questionnaire. The higher the alpha, the better, as this means there is greater internal consistency and greater reliability (Cronbach, 1951)

Validity (that the instrument is accurate) can be analysed in several ways since there are various forms of validity or various degrees of 'correctness'. The most important of these is known as 'construct' validity, which means that the questionnaire is measuring what it intends to measure. This is measured by a Confirmatory Factor Analysis, which normally follows an Exploratory Factor Analysis (EFA) (Watkins, 2018).

However, an alternative to the EFA is a PCA (Principal Components Analysis), which though not exactly equivalent, is also a variables reduction technique. The purpose of both the PCA and the EFA is to reduce the number of variables (items) affecting the main underlying factors/components (in this case, the attitudes) (Tharwat, 2016). The PCA considers not only the common variance, but also the error variance. This may result in the need to redefine attitudes and underlying factors/components – specifically in the case of a PCA, since the construction of artificial variables by reducing the original number requires interpretation.

Additionally, a questionnaire should be able to properly differentiate groups of people based on the questions. In other words, should everybody answer the same, the questionnaire would be useless in practice, as it would be unable to set groups apart. Running normality tests is helpful in this regard, though most questionnaires fail due to the small number of possible answers (1 through 5 for example) or other factors. Thus it is common practice to carry out an initial frequency and descriptive analysis, purely to see if respondents have answered differently in each question.

Finally, comparisons between groups are of the utmost importance to better understand which may be subject to further studies. Several statistical tests are available, though each applies to different scenarios, depending on the number of respondents, and the number of questions, for example. In this particular case, the T-Student test was used to compare means between groups. The test carried out in this study can only tell whether two means are different, not which one is greater (Sánchez, 2015).

Data analysis

Once the statistical methods were defined, the first step of the data analysis was a frequency analysis of the samples to determine if there was an approximation to a normal distribution. Likert scales are never normally distributed (therefore tests such as the Kolmogorov-Smirnov are irrelevant); however, a visual approximation allows for an assessment of whether there is clear bias, or leptokurtic distribution. Finally, a Principal Component Analysis (PCA) was performed (Torbjörnsson, Molin, & Karlberg, 2011). The same analysis divided the data set by educational level (secondary and high school).

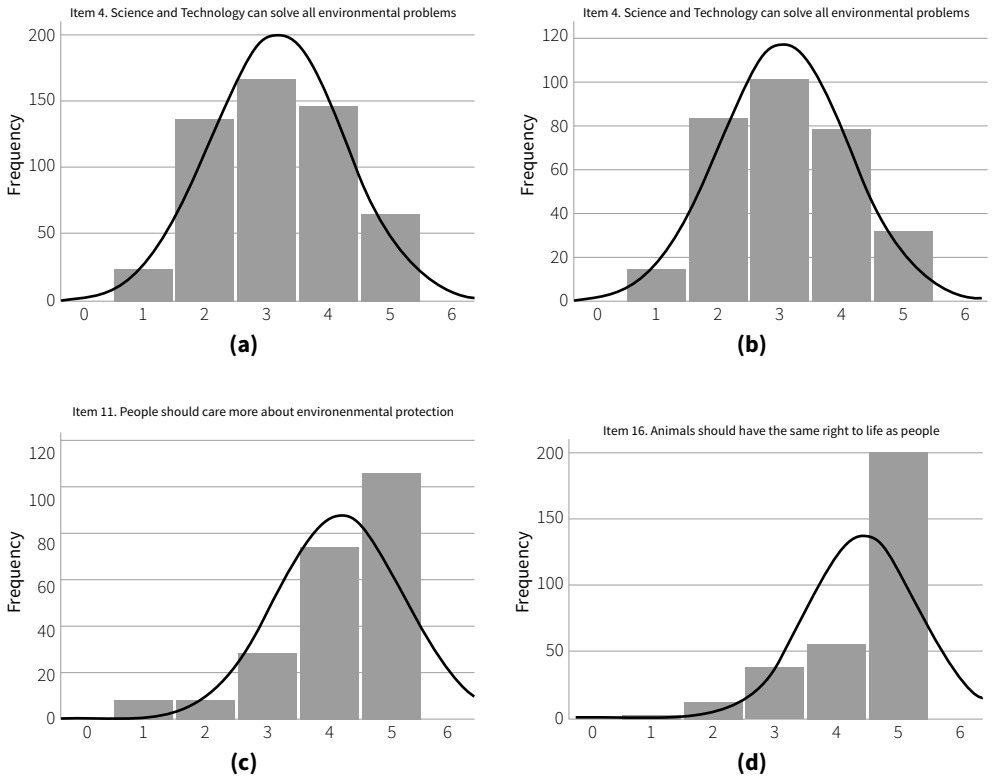
Results

Descriptive statistics

Frequency analysis

A visual analysis helps to identify clear problems such as leptokurtic distributions or obvious bias, which would indicate an area of improvement of the question being answered by the respondents. For example, items 2, 4, 5, 8, 14 and 19 do not show any obvious problems, in contrast to items 1, 3, 6, 7, 9, 10, 11, 12, 16, 17 (Table 1). Figure 1 presents items that visually approximate a normal distribution as well as items that visually do not approximate to a normal distribution.

Figure 1: *Answers to items on the Likert scale that visually approximate a normal distribution (a, b) and those which do not visually approximate a normal distribution (c, d) in the general analysis as well as in the secondary and high school analysis. (a) Answers to item 4 on the Likert scale complete set N=542; (b) Answers to item 4 on the Likert scale subset analysis (secondary school) N=311; (c) Answers to item 11 on the Likert scale subset analysis (high school) N=224; (d) Answers to item 16 on the Likert scale subset analysis (secondary school) N=308.*



Principal Components Analysis (PCA) complete set

Despite the data not being normally distributed, PCA was valid in this case, as it does not rely on the normality assumption. The PCA results of the general set of data with Varimax rotation produced a clear structure of five factors for the general poll and explained 52.19% of the variance for those five components.

Table 3 depicts the underlying problem with the overall analysis and the instrument used, and therefore the need for its modification. There is no clear division of components by the theoretical attitude they should be representing. That is, component 4, for example, has items belonging to three out of five attitudes measured, and so does component 5.

Table 3: *General results: Distribution of the items in the components and the attitudes defined by Vazquez andManassero (2005)*

Component 1	Component 2	Component 3	Component 4	Component 5
5 (EC)	1 (Apa)	9 (Apa)	4 (St)	2 (Pes)
6 (EC)	3 (Apa)	16 (Nat)*	5 (EC)*	14 (St/Apa)*
7 (EC)	5 (EC)*	18 (Pes)	9 (Pes)*	17 (Nat)
11 (EC)	8 (Apa)	19 (Nat)	10 (EC)*	
12 (St)*	10 (EC)		12 (St)	
13 (EC)	14 (St/Apa)			
14 (St, Apa)	15 (EC)*			
15 (EC)				
16 (Nat)				
19 (Nat)*				

* Items that are present in more than one component indicate that there is a cross-loading greater than 0.30 between them. Those with an asterisk present the lowest value. EC=Ecocentrism, Apa=Eco-apathy, Nat=Naturalism, Pes=Pessimism, St=Scientism.

Table 4 shows the results of an exploratory factor analysis, applied to five factors (n = 548). The weights of the variables that make up each factor are shown here. For simplicity, loads below the value 0.30 are omitted, and those in bold are the highest, in absolute value. There is significant cross-loading in many of them.

Table 4: *General results: Exploratory Factor Analysis. PCA, Rotation Varimax with Kaiser normalisation*

Item	Component 1	Component 2	Component 3	Component 4	Component 5
1		.611			
2					.791
3		.570			
4				.778	

Item	Component 1	Component 2	Component 3	Component 4	Component 5
5	**.524**	.308		.308	
6	.655				
7	.731				
8		.661			
9			**.608**	.321	
10		**.393**		.363	
11	.514				
12	.400			**.403**	
13	.703				
14	**.417**	.369			.319
15	**.531**	.427			
16	**.469**		.399		
17					.626
18			.719		
19	.383		**.598**		

Cronbach's alpha for the complete set using items with the highest values

In accordance with previous results, Cronbach's alphas (see Table 5) were very low for components 3, 4, and 5; therefore they were excluded from further analysis. Although the Cronbach's alpha of component 2 was slightly higher than the other three components, it was also excluded. Only component 1 had an acceptable, albeit improvable, alpha.

Table 5: *General results: Cronbach's alpha*

Component 1	Component 2	Component 3	Component 4	Component 5
0.743	0.535	0.452	0.303	0.393
0.752[1]	0.557[2]			

[1] Cronbach's alpha without Item 15; [2] Cronbach alpha without Item 10

Communalities of complete set

The communality of a variable is the proportion of its variance that can be explained by the factorial model by which it was obtained. The acceptable values are those higher than 0.35; by acceptable we mean that although they are relevant, they are not truly measuring what they are supposed to.

Kaiser-Meyer-Olkin (KMO) analysis of complete set

Sphericity tests (see Table 6) evaluate the applicability of factor analysis to the variables studied and define if this is statistically feasible. Although the ideal value is over 0.9, one very close to 0.8 is still acceptable in most cases.

Table 6: *General results: KMO and Bartlett's Analysis*

Bartlett's sphericity test	
Kaiser-Meyer-Olkin measure of sampling adequacy	0.798
Approx. Chi squared	1540.397
gl	171
Sig.	.000

Principal Components Analysis (PCA) Subset Results – Secondary School

The PCA with Varimax rotation produced a clear structure of five factors for the general case, which explains 49.55% of the variance for those five components.

Table 7 shows the results for secondary schools. Although there is a much clearer match between the theoretical and practical components, the other results are far from ideal, as shown in following sections.

Table 7: *Secondary school analysis: Distribution of the items in the components and the attitudes defined by Vazquez and Manassero (2005)*

Component 1	**Component 2**	**Component 3**	**Component 4**	**Component 5**
5 (EC)	1 (Apa)	9 (Apa)	4 (St)	2 (Pes)
6 (EC)	3 (Apa)	18 (Pes)	10 (EC)	3 (Apa)*
7 (EC)	8 (Apa)	19 (Nat)	12 (St)*	11 (EC)*
11 (EC)	12 (St)			16 (Nat)*
12 (St)	14 (St/Apa)*			17 (Nat)
13 (EC)	15 (EC)*			
14 (St, Apa)				
15 (EC)				
16 (Nat)				
19 (Nat)*				

* Items that are present in more than one component indicate that there is a cross-loading greater than 0.30 between them. Those with an asterisk present the lowest value. EC=Ecocentrism, Apa=Eco-apathy, Nat=Naturalism, Pes=Pessimism, St=Scientism.

Table 8 presents the results of exploratory factor analysis applied to five factors (n = 314). The weights of the variables that make up each factor are shown here. For simplicity, loads

below the value 0.30 are omitted, and those in bold are the highest, in absolute value. There is significant cross-loading in many of them.

Table 8: *Secondary school: Exploratory Factor Analysis. PCA, Rotation Varimax with Kaiser normalisation*

Item	Component 1	Component 2	Component 3	Component 4	Component 5
1		.641			
2					.621
3		**.463**			.321
4				.733	
5	.505				
6	.616				
7	.674				
8		.725			
9			.718		
10				.565	
11	**.355**				.353
12	**.414**	.412		.349	
13	.689				
14	**.447**	.373			
15	**.577**	.467			
16	**.384**				.322
17					.733
18			.746		
19	.442		**.487**		

Cronbach's alpha for subset results – Secondary school using items with the highest values

Table 9 shows the Cronbach's alpha results. For components 3, 4, and 5, the values are very low, which makes them useless. Even though component 5 presents higher values, the acceptable values are above 0.6; thus component 1 is the only useful one.

Table 9: *General results: Cronbach's alpha*

Component 1	Component 2	Component 3	Component 4	Component 5
0.724	0.546	0.458	0.418	0.327
0.726[1]				

[1] Cronbach's alpha without Item 15

Communalities of subset results – Secondary school

Communalities for secondary schools are better than those used for the general results, as there is only one below 0.3.

Kaiser-Meyer-Olkin (KMO) analysis of subset – Secondary school

In comparison to the general analysis, the KMO (see Table 10) is not as good as the general results. Although the value might still be acceptable, it is significantly lower than the 0.798 observed in the undivided results.

Table 10: *Secondary school: KMO and Bartlett's Analysis*

Bartlett's sphericity test	
Kaiser-Meyer-Olkin measure of sampling adequacy	0.745
Approx. Chi squared	869.068
gl	171
Sig.	.000

Principal Components Analysis (PCA) subset results – High school

Finally, results from the high schools are shown in the following sections. As for the variance, the first five factors explained 52.196%, and 57.577% for the first six, showing little improvement in comparison to the variance from the secondary school.

Table 11 shows that Ecocentrism, Eco-apathy and Naturalism can be more clearly distinguished. It could be assumed that given that there are six components when there should only be five, these results are less reliable than those obtained for secondary schools, but this would not be accurate. As previously noted, three out of five theoretical factors are better distinguished, and EFA and Cronbach's alpha analysis show better values from a statistical approach.

Table 11: *High School: Distribution of the items in the components and the attitudes defined by Vazquez and Manassero (2005)*

Component 1	**Component 2**	**Component 3**	**Component 4**	**Component 5**	**Component 6**
5 (EC)	9 (Pes)*	1 (Apa)	4 (St)	8 (Apa)*	2 (Pes)
6 (EC)	13 (EC)*	3 (Apa)	12 (St)	9 (Pes)	10 (EC)
7 (EC)	16 (Nat)	8 (Apa)	14 (St/Apa)	15 (EC)	
8 (Apa)	17 (Nat)			18 (Pes)*	
11 (EC)	18 (Pes)				
13 (EC)	19 (Nat)				
14 (St/Apa)*					
16 (Nat)*					

* Items that are present in more than one component indicate that there is a cross-loading greater than 0.30 between them. Those with an asterisk present the lowest value. EC=Ecocentrism, Apa=Eco-apathy, Nat=Naturalism, Pes=Pessimism, St=Scientism

Four of the six components clearly define young people's attitudes to environmental challenges.

Table 12 shows the results of exploratory factor analysis applied to six factors (n = 234). The weights of the variables that make up each factor are shown here. For simplicity, loads below the value 0.30 are omitted, and those in bold are the highest, in absolute value. There is significant cross-loading in many of them.

Table 12: *High school: Exploratory Factor Analysis. PCA, Rotation Varimax with Kaiser normalisation*

Item	Component 1	Component 2	Component 3	Component 4	Component 5	Component 6
1			.752			
2						.589
3			.560			
4				.609		
5	.702					
6	.694					
7	.731					
8	**.507**		.445		.330	
9		.428			**.563**	
10						.830
11	.705					
12				.744		
13	**.588**	.334				
14	.407			**.457**		
15					.769	
16	.329	**.619**				
17		.634				
18		**.390**			.307	
19		.784				

Cronbach's alpha for subset results – High school using items with the highest values

In Table 13, values obtained for components 1, 2 and 3 are consistent with the results shown in Table 11, making them useful to determine the attitudes of Ecocentrism, Naturalism, and Eco-apathy. The values for components 4, 5 and 6 are very low and not acceptable.

Table 13: *High school: Cronbach's alpha*

Component 1	Component 2	Component 3	Component 4	Component 5	Component 6
0.789	0.259	0.566	0.362	0.278	0.282
	0.604[1]	0.625[2]	0.417[3]		

[1] Cronbach's alpha without Item 18; [2] Cronbach's alpha without Item 1; [3] Cronbach alpha without Item 4

Kaiser-Meyer-Olkin (KMO) analysis of subset – High school

The KMO test result (see Table 14) for high school is significantly better than the one for secondary school, with a value much closer to 0.8.

Table 14: *High school: MO and Bartlett's Analysis*

Bartlett's sphericity test	
Kaiser-Meyer-Olkin measure of sampling adequacy	0.794
Approx. Chi squared	843.543
gl	171
Sig.	.000

Gender analysis

The sample size (female high school students = 121) caused problems in the PCA, so this segmentation was ruled out. In a gender analysis, the results obtained showed alphas similar to the high school results, but the components are not distinguished due to the high cross-loading.

Differences between secondary and high school

Before concluding the aforementioned results, a test was conducted to see if there was any difference between the mean value associated with secondary school and high school regarding eco-apathy. A student's t-test (see Table 15) was performed for independent samples in the eco-apathy factor between secondary and high school (assuming the representative sample of the general schools).

To perform the test, a new variable was created with the average of the values of items 1, 3 and 8, for both groups. The items were recoded, which means that the lowest value is the one with the highest rate of apathy.

Our null hypothesis was that the mean for eco-apathy in high school students is equal to that of secondary school students.

Table 15: *T-Student results comparing secondary and high schools*

Bartlett's sphericity test		
Apathy	High School	Secondary
Grade	0	1
Sample size	234	314
Standard Deviation	.72726	.80945
Mean standard error	0.4754	0.4568

The bilateral significance was 0.000, which means that the null hypothesis was rejected; therefore, we can conclude that the two groups' means differ. Although the test does not establish which one is greater, it confirms that they are different, which could lead us to think that the apathy values in high school students are greater than that in secondary school students.

Discussion

Establishing the instrument for the Handprint Initiative

Results of the pilot project suggested what to modify to make the instrument appropriate for further use. Now that the results have been analysed, it is possible to develop a better instrument that will suit the necessities for the Handprint Initiative. In order to do this, all items were analysed based on four criteria (see Table 16), which establish: (1) if its distribution visually approached normal, (2) if it presented some degree of cross-loading, (3) if the communality was greater than 0.35, and (4) if the item was useful for determining the attitude.

Table 16: *Items analysis*

Items	Defined attitude[1]	Normal distribution	Absence of cross-loading	Communality	Usefulness
1 – Threats to the environment are not my business.	Ecoapathy	s	1	1	1
2 – Environmental problems make the future of the world look bleak and hopeless.	Pessimism	s	0	1	0+
3 – Environmental problems are being exaggerated.	Ecoapathy	s	1	1	1
4 – Science and Technology can solve all environmental problems.	Scientism	N	1	1	1
5 – I am willing to have environmental problems solved even if this means sacrificing many goods.	Ecocentrism	s	1	1	1

Items	Defined attitude[1]	Normal distribution	Absence of cross-loading	Communality	Usefulness
6 – I can personally influence what happens with the environment.	Ecocentrism	S	1	1	1
7 – We can still find solutions to our environmental problems.	Ecocentrism	S	1	1	1
8 – People worry too much about environmental problems.	Ecoapathy	N	1	1	1
9 – I hate humanity for what it has done to Nature.	Pessimism	S	0	1	0+[2]
10 – Environmental problems can be solved without big changes in our way of living	Ecocentrism	N	0	1	0-[3]
11 – People should care more about environmental protection.	Ecocentrism	S	0	1	0-
12 – It is responsibility of the rich countries to solve the environmental problems of the world.	Scientism	s	0	1	1
13 – I think each of us can make a significant contribution to environmental protection.	Ecocentrism	S	1	1	1
14 – Environmental problems should be left to the experts.	Scientism/ Ecoapathy	s	0	1	0-[4]
15 – I am optimistic about the future.	Ecocentrism	N	0	1	1
16 – Animals should have the same right to life as people.	Naturalism	X	0	1	1
17 – It is right to use animals in medical experiments if this can save human lives.	Naturalism	N	1	1	1
18 – Nearly all human activity is damaging for the environment.	Pessimism	N	0	0	0+
19 – Nature is sacred and should be left in peace.	Naturalism	s	0	1	1

For communalities: 1 means the item has a communality of over 0.3, 0 that it does not. For normal distribution: X=the item does not visually approach normal distribution, either for notable bias or for being unmistakably leptokurtic. S=more than moderate bias. s=moderate bias. N=the item visually approaches normal distribution. For cross-loading: 0 means the item present cross-loading (over 0.3 in more than one component). 1 means the item does not present cross-loading (meaning there is no weight greater than 0.3 in more than one component).

[1] According to Vazquez and Manassero (2005); [2] Constantly presented in components other than Ecocentrism; [3] Presented a distribution with a lot of bias, an important cross-loading and the writing caused confusion among the participants (using the original Spanish questionnaire from Spain); [4] Because it marks two different attitudes, causes an important cross-loading.

None of the Pessimism items worked as they were expected to, due to very high cross-loading, and a constant mix with Naturalism items. The best explanation is that Pessimism, as a concept, is not well defined in this instrument.

Adaptation of the items for further use

After having analysed the results, the main problems encountered were the following, which were also evident given the outcomes of previous research papers:

- Heavy cross-loadings indicate a lack of understanding on the students' side of what the items are meant to measure; or, rather, a non-correct formulation of the items. In fact, no item should be used to measure more than one theoretical concept, since this leads to a lack of clarity of such concepts. This was visible from the very beginning, as some items were theoretically approached in the original questionnaire by ROSE as measuring more than one attitude.
- Low Cronbach's alphas indicate a low reliability as to the measurement made by the Likert scale. All values, however, were much higher than most of those published in previous studies, most likely due to changing from a 4- to a 5-point Likert scale.
- Items with extreme bias are ineffective since they are unable to discriminate attitudes. Again, this was visible from the very beginning, and was proved by the results already analysed.
- Some items, particularly those related to pessimism, were stated in such a way that participants were unable to understand the impact they were going to suffer due to their environmental attitudes.

Items corresponding to the pessimistic attitudes (items 2 [*Environmental problems make the future of the world look bleak and hopeless*], 9 [*I hate humanity for what it has done to Nature*], and 18 [*Nearly all human activity is damaging for the environment*]) were modified because what the original literature was measuring did not fit the scope here. To define each of the items, they were rewritten based on the perspective of the present and future quality of life of the participant.

Item 2 [*Environmental problems make the future of the world look bleak and hopeless*] was modified in order to make the statement clearer and more personal, from "the world" to "my world".

Item 9 [*I hate humanity for what it has done to Nature*], in all cases (general and by educational levels) presented a leptokurtic distribution, which indicates a bias towards indifference due to a lack of commitment on the part of participants to take a positive or negative position. Therefore, it was modified to avoid its evident leptokurtic distribution by changing the term "hate" to "despise". Claiming to "hate" something or someone is too strong a statement, albeit not morally so, for people to take a stand. That is, students were forced to choose what was right, and seeing no evident answer to the dilemma, they went for the neutral option.

Item 18 [*Nearly all human activity is damaging for the environment*] was adjusted from a more general statement and linked to the direct impact of human activities on the environment.

Since Ecocentrism has a greater number of items, and item 10 [*Environmental problems can be solved without big changes in our way of living*] consistently presented a higher load on apathy components, it was defined as a new item to determine apathy in adolescents.

Although Spanish is the learners' main language, there are slight differences between Spanish spoken in Mexico (as used by the students) and Spain (where the questionnaire was originally developed). The relevance of these differences became evident in the results of item 11 [*People should care more about environmental protection*], as well as in certain comments made by the teachers who applied the questionnaire in the schools (see Table 17). As a consequence, item 11 was rewritten in a way that was more clear, and that could accurately determine an attitude of Ecocentrism.

Previously, item 14 [*Environmental problems should be left to the experts*] presented two challenges; on the one side it was set to determine two different attitudes (Scientism and Eco-apathy), causing an important cross-loading, and on the other, the concept of "expert" in the statement was too general. For these reasons it was edited to be more specific and to determine only one attitude (Scientism).

Table 17: *Items adapted after the data analysis*

Me and environmental challenges	
Item	**Sentence**
1	Threats to the environment are not my business.
2	**Environmental problems make my future look bleak and hopeless.**
3	Environmental problems are being exaggerated.
4	Science and Technology can solve all environmental problems.
5	I am willing to have environmental problems solved even if this means sacrificing many goods.
6	I can personally influence what happens with the environment.
7	We can still find solutions to our environmental problems.
8	People worry too much about environmental problems.
9	**I despise human activities for the damage that has been done to the environment.**
10	**Environmental problems can be solved without affecting my quality of life.**
11	**We should make more sacrifices to protect the environment.**
12	It is the responsibility of the rich countries to solve the environmental problems of the world.
13	I think each of us can make a significant contribution to environmental protection.
14	**Scientists have the knowledge to solve environmental problems.**
15	I am optimistic about the future.
16	Animals should have the same right to life as people.
17	It is right to use animals in medical experiments if this can save human lives.
18	**All activities that humans do negatively impact the environment.**
19	Nature is sacred and should be left in peace.

Conclusions

The Handprint Initiative was in need of an instrument capable of measuring the critical attitudes that we are addressing. With the suggested modifications, the newly created instrument will prove to be a valuable resource for assessing attitudes of participants.

The original questionnaire allowed for a segmentation of the students into two clear sets according to the identification of their attitudes. On this basis, the students in high school were defined as the best target group for implementing the initiative.

Originally, this instrument was designed as part of a larger research project (ROSE study) aimed at identifying the aspects that influence science and technology school learning. In the framework of this research, Vázquez and Manassero (2005) assessed attitudes towards the environment, defining ecocentrism, eco-apathy, pessimism, naturalism, and scientism attitudes. The term 'naturalism' proposed by the authors created some confusion, for their study refers to the rights of nature. However, its better-known definition in philosophy can make it difficult to understand. We recommend that future application define a different term that relates closely to the attitude described.

Having established the statistical basis to defining the attitudes towards the environment in young people and convinced of the need of a different perspective in education for the formation of change-makers, the impact of the Handprint Initiative on the way environmental teaching and learning is done throughout the world can now be assessed. In addition, it should be possible to show how and why such a goal is possible.

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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	Morel Schramm	40%
	Ruz Salmones	40%
	Robischon	20%
Data collection	Morel Schramm	80%
	Ruz Salmones	10%
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Analysis and interpretation	Morel Schramm	30%
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Drafting the paper	Morel Schramm	40%
	Ruz Salmones	40%
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Critical review of paper	Morel Schramm	15%
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