

Self-Directed Education in Two Transformative Pro-Environmental Initiatives within the Eco-Schools Programme: A South African Case Study

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Abstract

The international Eco-Schools programme promotes Education for Sustainable Development (ESD) through introducing and stimulating pro-environmental initiatives by school learners and staff. This enabled learners in the Eco-Clubs at a resource-poor primary school to identify and undertake transformative pro-environmental initiatives in 2011 and 2014 through Self-Directed Education (SDE). An educative approach encouraging critical thinking at the school provided the foundation that made this possible. In discussing and working through their strategies to undertake research and challenge authorities about noncompliance in regard to municipal responsibilities that led to environmental degradation, Eco-Club members liaised freely with teachers and other learners. This process, together with local support for the eco-school initiatives, stimulated widespread interest and generated hope among learners by showing that another way of being is possible.

Keywords: Eco-Schools; Education for Sustainable Development; pro-environmental action; Self-Directed Education; Self-Determination Theory



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Introduction

In 2002, the concept of Education for Sustainable Development (ESD) was introduced at the World Summit for Sustainable Development (WSSD) hosted by South Africa. States proclaimed a collective responsibility to amplify the integration and mutually reinforcing pillars of sustainable development: environmental protection, economic development and social development, and affirmed that across-the-board partnerships should encompass civil society, including youth (UN 2002). In 2003, the United Nations Environment Programme (UNEP) identified the international Eco-School programme offered by the Foundation for Environmental Education (FEE) as a model initiative for ESD. This programme enables learners to contribute to the environmental policies of their schools and to grow actively aware of environmental issues and sustainable development (FEE 2017). Eco-Schools are encouraged to develop partnerships with local communities and organisations to enable shared insights on sustainable and environmentally responsible behaviours (FEE 2017).

Eco-Schools in South Africa

The Wildlife and Environment Society of South Africa (WESSA 2018) has driven the Eco-Schools programme in South Africa since 2003. Although school registration is optional, over a million South African learners were involved by 2018. In emphasising the importance of a learner-driven process, FEE and WESSA strive to capacitate a deepened association with the local while not neglecting the global. The Eco-Schools programme provides a seven-step framework, which partnering schools throughout the world follow in the pursuit of excellence in environmental education (FEE 2017). It complements the Department of Basic Education's Curriculum and Assessment Policy Statement (CAPS) in South Africa, which promotes the principle of a healthy environment, social and environmental justice and human rights. When schools integrate eco-curricular lessons, activities, and whole school environmental projects with contemporary Eco-School themes successfully, they are awarded an International Green Flag by the Eco-Schools programme. In South Africa, intermediate Bronze and Silver Eco-School awards encourage schools to continue their progress toward the Green Flag (Rosenberg 2008). After 10 years of sustained action an Eco-School receives a Diamond Decade award (Dzerefos 2015). Committed engagement by the school principal is crucial for an Eco-School programme to function effectively (Haingura 2009; Rosenberg 2008). A loose network of local supporters enables many Eco-Schools to undertake inspiring initiatives; these are challenging to sustain and supplement when the support ends (Rosenberg 2008).

Environmental education seems seldom to have been included in teacher training. Consequently, many teachers institute self-designed practices, or add "environmental education" as a stand-alone subject, or fail to address it (Haingura 2009; Mokhele 2011; Rosenberg 2008). The quality of curriculum policy implementation is powerfully influenced by available resources, teacher support and the beliefs and experiences of

teaching staff (Maluleke and Motlhabane 2015). Certain teachers and education officials find the Eco-Schools programme helpful for integrating environmental education with the education curriculum and have requested Eco-School support “to implement what [the education departments] are trying to achieve” (Rosenberg 2008, 35). Factual teaching about environmental issues generally fails to stimulate pro-environmental action of any kind (Dutta and Chandrasekharan 2019; Maluleke and Motlhabane 2015; Sethusha and Lumadi 2013; Wals 1990).

Formative and Transformative Pro-Environmental Initiatives

Eco-School registration increases the status of community schools and Eco-School guidelines commonly enhance teacher competence, the school curriculum, and school management. Some schools focus on attaining these benefits but pay minimal attention to engendering pro-environmental action by learners. Registration as an Eco-School requires environmental issues at the school itself to be addressed. Hence learners are encouraged to recognise the importance of routine and daily environmental care, frequently in the form of water and electricity conservation, soil and wetland rehabilitation, non-littering and recycling (Cincera and Krajhanzl 2013; Mogensen and Mayer 2005; Rosenberg 2008). An evaluation of Eco-Schools in 13 countries revealed a tendency to focus on the physical improvement of school environments at the expense of wider environmental learning (Mogensen and Mayer 2005, 86). Pro-environmental initiatives that hinge on the utilisation of resources have been identified as *reformist*, in contrast to those that “seek to achieve major structural or systemic changes for sustainability” and which are identified as *transformative* (Flowers and Chodkiewicz 2009, 6).

Reformist initiatives constitute a form of “behaviour modification” (Jensen and Schnack 1997, 163) about which many young people feel ambivalent (Ojala 2017), but which leads others to introduce school-learned environmental practices in the home locality (Cincera and Krajhanzl 2013; Haingura 2009). In Mitchells Plain (South Africa), for instance, learners have shared gardening skills and water-saving methods locally (Haingura 2009). Role modelling such as this stimulates small changes in lifestyle that aggregate and generate a sense of personal agency, increasing hope (Ojala 2017). Transformative initiatives require social and political engagement (Chawla and Cushing 2007; Flowers and Chodkiewicz 2009), which is driven by action competence (Räthzel and Uzzell 2009). This concept, generated by Jensen and Schnack (1997), requires a sufficient grasp of identified problems to formulate strategic action plans and “a positive approach to co-operative decision-making, a respect for democracy and an understanding of participatory processes leading to sustainable actions within the context of people’s own lives and environment” (Räthzel and Uzzell 2009, 18). Enabling learners to be pro-active on school governing bodies stimulates the development of action competence (Cincera and Krajhanzl 2013; Reyneke 2013; Shushu, Jacobs, and Teise 2013).

In many countries a sense of hopelessness and helplessness prevails among young people about addressing the enormity and complex nature of environmental problems (Kelsey 2016; Ojala 2017; Sheppard 2004; Wilks and Harris 2016). A sense of hope appears to underpin young people's strong endorsement of individual, formative, pro-environmental action, while a sense of hopelessness seemingly pervades "their low endorsement of political action" (Wilks and Harris 2016, 690). Adverse responses to young people's environmental sustainability efforts by those in positions of power may generate feelings of powerlessness and indifference among learners but also potentially stimulate their realisation that there is a need for collective action (Jensen and Schnack 1997). Hope can be cultivated "by showing that another way of being is possible, by encouraging trustful relationships and by giving young people the opportunity to concretely work together for change" (Ojala 2017, 82). This process requires transformative learning through critical hope and constructive hope, a process that is not purely rational. Emotional investment is required for students to revise internalised assumptions by divesting themselves of "unsustainable habits, norms, and practices" and to stimulate "critical awareness and disruption of 'unsustainable' ways of regulating emotions" (Ojala 2017, 82). The Education Sector of UNESCO offered reflections on traditional schooling and lifelong learning in 2012 (Wals 2012).

Self-Directed Education (SDE) in Education for Sustainable Development (ESD)

In 2012, the UNESCO Education Sector concluded that characteristics important in Education for Sustainable Development (ESD), such as "interdisciplinary and collaborative student participation and learning", were hampered by the national curricula of schools with "standardized and prescribed teaching content and materials" (Wals 2012, 24). In this context, FEE's Eco-Schools programme was identified as structured yet flexible, and with integral student involvement (Wals 2012, 45). UNESCO concluded that

[t]he greatest gift a school head teacher can give to his/her students ... is the gift of freedom for self-directed and purposeful learning, supported by structures and processes that empower and engage with real life ecological issues. (Wals 2012, 61)

In 2015, world leaders adopted the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development. These came into force on 1 January 2016. The fourth Sustainable Development Goal (SDG4) is to "[e]nsure inclusive and equitable quality education and promote lifelong learning opportunities for all" (UNESCO 2017, 6). To promote competencies in sustainable development, UNESCO urged

a shift from teaching to learning. It asks for an action-oriented, transformative pedagogy, which supports self-directed learning, participation and collaboration, problem-

orientation, inter- and transdisciplinarity and the linking of formal and informal learning. (UNESCO 2017, 7)

Self-Directed Education (SDE) enables young people to shape their own education entirely, as shown by the Sudbury Valley School in Framingham, Massachusetts, which opened in 1968. Educational resources are provided for optional use in supportive, non-intrusive ways. The school is run democratically by staff and students. Age-mixing is normal; in finding that their opinions matter, students grasp that they have relevance within the larger community (Gray 2013; Gray and Chanoff 1986; Greenberg 2016). Sudbury represents a full expression of SDE when it permeates every part of that school's operations, but even when SDE is introduced into one part of a school experience, such as transformative pro-environmental action, it could conceivably have significant positive effects on learning.

SDE embodies the principles of Self-Determination Theory, which defines an inherent human tendency to learn and be creative as “intrinsic motivation” (Ryan and Deci 2000, 69). Personal autonomy, competence, and relatedness—which comprise the extent to which students relate to others in authentic, caring, reciprocal ways—foster this self-motivation. Social and environmental conditions can profoundly promote or hinder it (Ryan and Deci 2000). The theory “explains why autonomously-motivated students thrive, and ... why students benefit when teachers support their autonomy” (Reeve 2002, 199). Nevertheless, traditional schooling is not an ideal setting in which to stimulate autonomous learning. Here, learners self-regulate their learning within a curricular system created by adults:

Integrated regulation approximates intrinsic motivation in its degree of self-determination, though the two motivational constructs clearly differ, as integrated regulation is based on the importance of the activity and requires considerable reflection and self-awareness, whereas intrinsic motivation is based on interest in the activity and emerges spontaneously. (Reeve 2012, 155)

Riley (2016) examined the perceptions of young adults on their homeschooled or traditionally schooled educative experiences in terms of Self-Determination Theory. She found, as others had, that the homeschooled group experienced higher levels of competence and autonomy satisfaction than the traditionally schooled group. Relatedness satisfaction was equivalent for both groups, despite the fears of educationists that socialisation will suffer in Self-Directed Education environments. Riley concluded (2016, 5) that “[s]takeholders within the realm of education should take note, as intrinsically motivated, self-directed learning truly seems to be the future of education itself”.

The following case study, ranging from 2008 to 2014, identifies formative and transformative pro-environmental initiatives undertaken in a single location through the

Eco-Schools programme. It takes particular note of a naturally occurring process of Self-Directed Education in learners' transformative pro-environmental initiatives.

Case Study

Setting and Phases

The Ennis Thabong primary school enrolls learners from Grade RR (a preschool year) until Grade 7, after which they attend high school. The case study concerns learners in Grades 6 and 7. The school is in Hartbeespoort, a small town and holiday resort on the slopes of the Magaliesberg mountain in South Africa's North West Province. The Hartbeespoort Dam provides water for the irrigation of agricultural land and for purification as potable water. The school was established in 1981 by the apartheid government, but had virtually no resources. Andrew Ngoma, the school's vice-principal and Science teacher, arrived on the opening day. He discovered with dismay that there were few trees, bare grounds, a basic water supply, and learners who stood about throwing stones at birds and lizards. "So I realised", he told me 30 years later in 2011, "that children explore nature even while they damage it. They want to see what living things do when they are threatened. And I thought, 'we should introduce these children to nature' because they live in cramped places and many of them don't even know much about their own culture".

Currently, three to four hundred learners attend the school annually from shack settlements, small farms and subsidised townships. Since the school serves low-income communities, the Department of Basic Education (DBE) has categorised it as a quintile 1 school; this exempts learners from paying school fees. In 2008, Ngoma successfully urged the importance of registration as an Eco-School. He then led the Eco-School programme, but no staff member was available to do so when he left the school voluntarily in 2015.

Between 2008 and 2015 learners aged 11 to 15 years from Grades 6 and 7, and who chose to do so, undertook three pro-environmental initiatives through the Eco-School programme:

- a) in 2008, a school food garden was established; this was subsequently maintained by other learners as an integral part of school activities;
- b) in 2011, quality of life issues for children in the Popo Molefe shack settlement close to the school were researched and addressed; and
- c) in 2014, the quality of the Swartspruit river closest to the school was tested monthly by using the miniSASS, a nationwide citizen science monitoring tool, which enabled learners to log their data on an interactive Google Earth map that depicts the quality of rivers throughout South Africa.

Different learners participated in each initiative since those previously in Grades 6 and 7 had moved on to high school. In 2011 and again in 2014, six to eight learners were members of an Eco-Club that formed the core of a far larger, loosely structured body of learners who were engaged in Eco-School activities. The creation of the school garden in 2008 constituted *formative* pro-environmental action, whereas learners' self-directed actions in Popo Molefe and in miniSASS were *transformative*.

Aim and Methodology

Aim

This article aims to share retrospective insights from the three above-named initiatives at the Ennis Thabong school. In this regard I borrow from Karen Barad's notion of "returning" the past, not in the sense of going back to it, but of "turning it over and over again ... as a multiplicity of processes, such as the kind earthworms revel in while helping to make compost" (Barad 2014, 168).

Methodology

I was not engaged in research at Ennis Thabong; I partnered Andrew Ngoma in the Eco-Schools initiative as an external support partner. My methodology was qualitative and grounded in phenomenological anthropology, which harnesses the tools of sensory ethnography (Desjarlais and Throop 2011; Pink 2009; 2010; 2011). This requires the suspension of theoretical and commonplace assumptions about children so as to enable a focus on their embodied, lived experience (Mackley, Pink, and Moroşanu 2015). Tim Ingold's (2011, 151) identification of the constituent strands of life's mainstream as meshworks—the "paths along which life is lived"—was helpful in guiding my perceptions away from standardised notions of linear developmental paths among school learners.

My meetings and discussions with Ngoma, and ours with Eco-Club members, were held in classrooms after the school day. Learners spontaneously used the blackboard to record ideas and identify their emotions and decisions. I documented these deliberations since they were jointly construed. I provided other materials if needed, from my personal stock. I liaised with the school principal in regard to planning and permissions, as necessary. I documented Ngoma's shared viewpoints and information from focused discussions. Talking and walking with others in the miniSASS initiative stimulated sociability and spontaneous communication. Such activity is both embodied and participatory; it presupposes a degree of rapport since it is "grounded in shared circumstances" (Lee and Ingold 2006, 67). I harnessed reflexivity in the field and in my analysis of documentary records since self-reflection assists effective analysis (Pink 2009; Procter 2013). In this particular case, my analysis comprised the location, identification, retrieval and analysis of data from interview transcripts, field notes, minutes of meetings, observant participation, and records of children's interactive discussions.

Ennis Thabong Food Garden, 2008

The creation of the school food garden preceded my involvement in the Eco-School programme. Andrew Ngoma's communications about the garden are the first of three records, which together informed the case study of pro-environmental initiatives by learners through the Eco-School programme. He envisaged the garden as providing vegetables for a nourishing midday meal for learners, and it did eventually do so. At first, learners resisted personal involvement, but they soon became enthusiastic. When very busy at school, Ngoma reported, "They would ask, 'When are we going to plant?' And I began to see real interest among the teachers who realised that this was different than using children for labour. The outdoors was like a classroom where the children learnt with nature."

Food gardens are radically different from structured classes and lessons; they offer considerable freedom to explore, experience, and grow with peers, adults, and the natural world. This, in contrast to the adult-structured classroom, is clearly a nonlinear process of personal learning and becoming. Whole body involvement accentuates "the immediacy of experience, along with a growing sensitivity to anticipated changes in the surroundings" (Dutta and Chandrasekharan 2019, 2). Being outdoors urges the body "into conscious awareness" in a way that is neither bounded nor confined (Doddington 2013, 55); embodiment in nature triggers joy, enchantment, anger, pain and frustration, which bring immediacy to children's personal experience (Dutta and Chandrasekharan 2019). Learners often lost track of time as they urged the garden into being through collective skill and eager desire for growth. Discovering earthworms in the once barren soil brought enchantment; Ngoma described this event:

... they were shouting "*Monopi! Monopi!*" (Setswana: Earthworm!). Some began to collect them to sell to fisher-folk at the dam. If they tried to escape, they dug them up again. They learnt many things that day because of the worms. Not from textbooks, but they discussed with their favourite teachers. They had no cell phones, computers, laptops, or tablets. I looked for information and shared it with them. The small computer lab at school was for training adults and children in the final grade, in basic computer use.

Learners displayed a clear sense of ownership over the garden when they discovered a flock of *mokuê* (Setswana: grey lourie) eating the leaves of their vegetables. They chased them off furiously, but the birds returned the next day. When a learner brought a pair of old overalls from home to create a scarecrow, this stimulated awareness and the discussion of local bird lore. As they worked together to create the scarecrow, a learner shared her grandmother's information: when a *mokuê* arrives, calling stridently, it warns of the presence of evil forces, such as demons, which could harm people. If you catch sight of the *pupupu* (Setswana: African hoopoe), however, your year will go well. And Ngoma shared that the call of the *ngwafalantala* (Setswana: red-chested cuckoo) heralds rain. He anticipated that learners would be enriched through environmentally

focused narratives and other cultural matters when parents helped periodically with the garden.

Importantly, the garden stimulated an ongoing interest and enthusiasm for Eco-School activities. Although teachers were aware that it was frustrating to learn about nature from textbooks, the school lacked resources to take learners off-site. To compensate, Ngoma set up outdoor experiments with soils in the school grounds and enabled learners to explore the functions and efficiency of a solar cooker donated by WESSA. He continually sought some means of widening their direct explorations of nature. A solution presented itself in 2010.

Xanadu Nature Conservancy and Popo Molefe Shack Settlement, 2011

In May 2010, Ngoma approached the Xanadu Nature Estate on the eastern border of the Ennis Thabong school to request permission for learners in Grades 6 and 7 to be granted access for the purpose of learning about the fauna and flora there. At the time, negotiations were underway to register the Magaliesberg mountain range and the surrounding areas, including the Cradle of Humankind World Heritage site, as a UNESCO Biosphere Reserve. As an important buffer zone for the Biosphere Reserve, Xanadu committed to ensuring ecologically sensitive management, conserving biological diversity, and sustaining environmentally sensitive land use. Since the Xanadu Eco-Committee promotes scientific research, information exchange and education as required by UNESCO's Man and the Biosphere (MAB) programme, the application for access was granted. Responsibility for arranging and supervising learner excursions was assigned to the author, a social anthropologist and member of the Xanadu Eco-Committee. This commitment required reporting at monthly Eco-Committee meetings and liaising with Xanadu, WESSA, and the Ennis Thabong school. I took part in certain of the learners' walks on-site but not on their game drives. Ngoma and Xanadu's ecological officer accompanied learners on all site visits. This enabled Ennis Thabong learners to explore the various habitats, fauna and flora, and the South African Weather Service's (SAWS) ambient air quality monitoring station at Xanadu. These excursions do not form part of the case study since its focus is on pro-environmental action by learners.

In March 2011, 26 learners on an excursion to Xanadu to locate "life in water" were delighted to discover minute creatures, which they scooped into fine nets, examined in large jars, then returned to the water. This stimulated their urgent desire to address long-standing issues of local water pollution, inadequate sanitation and irregular waste collection. Learners identified Popo Molefe, a shack settlement near the school and where some of them lived, as a site for pro-environmental action. They were keen to develop and drive the process, using the word *laola* (Setswana: conduct, direct, dominate, lead). This introduced Self-Directed Education to the Eco-School process and identified it as transformative rather than a formative pro-environmental action. They

named their project *Bolokang Metsi re Ipoleke / Save Water Save Ourselves*. Parents consented willingly to their children's involvement, and Ngoma validated the topic as

a good fit with the Eco-School theme, "Local and Global". Access to clean water and sanitation is also an international Millennium Development Goal because it brings dignity to everyone. Here in North West, we say *Noka e tlatswa ke dinokana* (Setswana: The river is filled by tributaries). This means that what we do today might seem useless, but our actions together lead to something greater tomorrow.

Eco-Club members gained confidence while gradually shaping their initiative with each other, in discussion with other learners—regardless of age, gender and academic skill—and through shared insights with Ngoma, favourite teachers, and with me. Ngoma arranged meetings when learners said they were necessary.

Six Eco-Club members saw the project through from inception to completion, but an unknown number of learners were involved for part of the journey since Eco-Club members welcomed learners of any age who sought inclusion in part of the process. Self-Directed Education promotes fluidity such as this in children's interactions and is natural in children's everyday learning (Clements 2017; Gray 2016). The negotiation of possible conflict is engendered by such consultation and enables young participants to unite around environmental goals of mutual significance (Chawla and Cushing 2007). In two discussion and planning sessions held after school and termed "workshops", learners portrayed "Things that make me sad or happy where I live" in drawings. They discussed the issues vigorously, then selected critical matters to address in Popo Molefe. Potable water, sanitation, littering, and the seeming unconcern of adults regarding hygiene on-site, were key concerns. They were apprehensive about approaching adults and role played how they would do so. This led them to consider the importance of protocol: "You must not forget to greet the adults politely when you ask to speak to them". In discussing whom to approach, and in what way, they decided to practise this: "We must agree what it is important to say to the adults, or we will go away without knowing what they think". The child-friendly workshop co-facilitator, drawn from the Hartbeespoort community, agreed to be a surrogate resident to enable them to practise their approach and questions in Setswana.

During the third term of the school year, Eco-Club members visited Popo Molefe with other learners who were keen to join the three investigative teams of two Eco-Club members each. Ngoma had apprised residents that learners wished to undertake research there, and of the date, and they had approved this. Nevertheless, he hovered at the settlement to ensure that all went well. Their research enabled learners to experience the investigative process personally and to hear the direct responses of adults. The investigating teams recorded adult responses in notebooks and site problems on camera. In analysing their evidence, they shared their photographs and notes while speaking emphatically about embodied reactions to the pervasive unhygienic conditions on-site. Because the municipal skip at the entrance to Popo Molefe was seldom emptied, litter

blew everywhere. They described the location, even the spaces where they sat or played, as fetid and visually offensive. They were angry that the stench from the bushy area bordering the settlement was often overwhelming because the municipality provided insufficient portable toilets. Only one of six taps on-site worked and the water tasted bad and looked murky. Children were upset and angry that staff at the Rietfontein Wastewater Treatment Plant, claiming that Popo Molefe residents wasted water, switched off their borehole pump without warning, “from early till late”. Adult residents then required children to fetch water from the local nursery. Heavy containers hurt their necks, backs, arms, and legs. They were annoyed and resentful when “adults put their mouths right on the tap to drink” or women threw out “dirty [laundry] water where they wash”. They viewed these practices as unhygienic but dared not speak, fearing adult censure. They worried because preschool children were “always sick”.

Eco-Club members wanted to share their concerns with “important officials” and to find supporters who would work with adults in Popo Molefe to remedy problems. They pointed out that children have no power to implement change, or to access officials: “Adults will not listen to us. Who will be with us to speak to them?” This is a critical issue that many children face (Hart 1992). Agency for children is interdependent in the everyday (Abebe 2019). Chawla (2009, 75) found that “[p]artnerships between the generations can create opportunities for capacity building for adults as well as young people if adults hold themselves open to young people’s insights, energy and creativity”. And Nsamenang (2015, 842) reminded us that in African tradition,

[c]hildren extort the social, emotional, practical, cognitive, relational values and other norms ingrained in the activity settings of the home, society, and peer cultures more through their contextual embedment and active participation and less through explicit adult instruction or prodding. In so doing, they “graduate” from one activity setting and participative sector of the peer culture to another, steadily maturing toward adult identity and roles.

Representatives from Xanadu, the Ennis Thabong school, and Popo Molefe were willing consultants. Learners then requested help with leaking taps, laundry tubs with proper drainage, and a noticeboard that listed and pictured human errors on-site. The school assisted Popo Molefe residents to appoint a committee to hear and discuss the problems of young residents. Xanadu fixed leaking pipes, installed two laundry tubs and thick piping that drained away the water that commonly stood about in furrows, and arranged for a professional water analyst to test the water quality. He willingly engaged in a mutual learning process with the children, discovering the challenges of daily life in a shack settlement and answering their queries about his area of specialisation. Such learning, undertaken in a spirit of mutual trust and “by doing, living and experiencing the subject matter”, is intrinsic in indigenous learning systems (Omolewa 2007, 603). Nsamenang (2006, 294) observed that human knowledge is not shred into “discrete disciplines” in Africa south of the Sahara; “all strands of knowledge are interwoven into a common tapestry ... which is learned in a participatory curriculum” (2006, 294). All

water samples from Popo Molefe, including those from the borehole that provided drinking water, were found to be heavily polluted. *E. coli* (*Escherichia coli*) bacteria counts were over 2,400 units, whereas the official limit was 0–130 units. The long furrow that criss-crossed the settlement and had sections of broken, rat-infested piping, was the most likely source for constant diarrhoea among preschoolers who played there in stagnant water and mud.

In September 2011, the Popo Molefe committee shared the learners' findings with residents, who decided to ask the municipality to chlorinate the water. Boiling it daily would be costly and there was no place to cool and store it. Putting bleach in the water would be too expensive. Learners requested that Ngoma and Xanadu jointly inform the Madibeng mayor of their findings, by letter. This led to an unexpected mayoral visit to Popo Molefe. The mayor and a small work team brought equipment and assisted in clearing litter. Extra portable toilets were promised, but no solution was offered for purifying the water. Xanadu then shared information about the solar disinfection of drinking water (SODIS), an effective and cost-free method to purify water (Conroy et al. 1999; Du Preez, McGuigan, and Conroy 2010) and subsequently erected a noticeboard in Popo Molefe that portrayed five critically important "rules", which the Eco-Club had compiled in consultation with other learners who lived at Popo Molefe: "No littering; No waste of water; No drinking from taps by mouth; No fighting; No beating children".

In their assessment meeting, the Eco-Club members expressed frustration and disappointment about the municipal response. Extra toilets had been provided, but were later removed without warning. Waste removal and polluted water remained a problem. However, working as a group to formulate strategies, and acquiring expertise to liaise with adults, had been enriching. Their mastery in this regard could be interpreted as gains towards future "authentic democratic citizenship" (Chawla and Cushing 2007, 450). They concluded: "We learnt much about making a protest action" and "[s]uch a thing is too big to do alone. You have to stand together."

They asked for the short project report, which they received as a memento, to be sent to "the government". Copies were then forwarded to the Madibeng local municipality, the provincial premier, and the national Minister of Human Settlements. Some weeks later, a ministerial task team arrived, without forewarning, to examine the situation at Popo Molefe. The Madibeng local municipality subsequently informed residents that they would be relocated to proper housing. Relocation was effected in June 2014, but water and sanitation provision was problematic there too, as was the case in most low-income municipal locations in the area. The municipality was placed under administration in 2011 and again in 2014 due to its failure to meet minimum standards of service

delivery.¹ In 2014, Eco-Club members of that time were afforded an opportunity to explore water issues through a project to map South Africa's polluted waterways.

miniSASS River Health Monitoring, 2014

South Africa is a water scarce country with an uneven distribution of water and increasingly polluted waterways. WESSA therefore suggested in 2014 that Eco-Schools consider taking part in a nationwide assessment of waterways. This would require each participating school to test the water quality of a nearby river, on the same date each month, for one year, using the miniSASS citizen science biometric monitoring tool (WESSA Eco-Schools 2014). The Ennis Thabong Eco-Club joined this project in June 2014. The mini Stream Assessment Scoring System (miniSASS) enables learners to identify, record and score five types of macro-invertebrates and to enter the data on an interactive Google Earth map (Graham and Taylor 2018). Xanadu approved a request for sampling to be done on-site at three locations on the Swartspruit. Together with Ngoma and the Xanadu ecological officer, I accompanied them on the days they took and analysed water samples.

Learners arrived chattering excitedly on the first day. At the water's edge they huddled together, seemingly concerned. Ngoma grasped that they were afraid of slipping on the large, mossy green rocks near the riverbank and assured them of immediate help if needed. Each capture and identification brought enchantment as they emptied the minute creatures onto their hands from their nets and everyone clustered around to ensure correct listing on the identification sheet. Subsequently, Xanadu's ecological officer provided a round tray for decanting their finds. The Swartspruit entered Xanadu here and the team analysis showed the water as fairly healthy. Tshiamo² confessed shyly that she was glad there were no crabs; they hid under stones and might pinch you if you tried to chase them out. Ngoma explained later that Tswana adults tell children: "Crabs are dangerous. If a crab scratches you as a child, your gender will change to that of the opposite sex. This myth is to prevent children from playing in water."

At the second location, learners recoiled from the scum and bubbling froth on the surface of the river, describing it as "sick" and smelling "like a toilet". They stepped back from the soft, muddy soil, scraping foul smelling mud from their school shoes on stones near the road. Xanadu's ecological officer explained that the Rietfontein Wastewater Treatment Plant discharged treated water into the Swartspruit, that it was cleaned further along the river by reeds, and that it ended up in the Hartbeespoort Dam. Horrified, they stepped further back from the water. Ngoma summarised their comments: "These excretions from the body are poisonous! If we eat fish from the dam, we will be very ill!" They vetoed the location for miniSASS sampling. Learners were

¹ Section 139 of the South African Constitution (RSA 1996) provides for the dissolution of a dysfunctional Municipal Council and the appointment of an administrator to fulfil executive obligations until a new Municipal Council is elected.

² Names for learners are pseudonyms.

sombre at the third location. The putrid smell was gone but the water was opaque, and they found only one small snail. The miniSASS team shared their experiences informally at school and many learners clamoured eagerly to join them. The team then swelled rapidly to include 12 to 15 learners (when the school schedule and available transport so allowed). Meanwhile, the Eco-Club called an urgent meeting. Although junior at the time to the Eco-Club members who had taken action about the situation at Popo Molefe, they remembered it well, and engaged in their own self-directed educative process. They were keen to initiate transformative pro-environmental action:

We have learnt many things that we did not know about. We see that creatures show us if water is healthy. The water from Rietfontein in Popo Molefe was bad and nothing has changed. We must find a way to do something about this pollution that affects children and animals and creatures that live in water. The adults protest in many places but it has not made a difference.

Anger about the polluted water fuelled their determination and further actions. In meeting to develop a plan of action, the Eco-Club noted that the South African Constitution promised children a healthy environment. They described the deaths of three young children in the Bloemfontein municipality from severe diarrhoea due to polluted water as *kgakgamatsô* (Setswana: shocking). They decided to become Young Water Ambassadors (YWAs) “to fight this thing for all the children in South Africa” and to send a formal complaint about polluted municipal water to the South African Human Rights Commission (SAHRC). Using a Setswana copy of the Constitution, the YWAs prepared the SAHRC complaint during three afternoon discussion sessions in which they clarified their thoughts and the nature of the actions they proposed. They discussed everything they knew about the problems with water and identified key points to raise. They listed strongly felt emotions on a whiteboard, followed by statements on “why we feel like that”. They finalised it on 28 August, requested help to word their concerns “in proper English”, and approved the final version for submission to the SAHRC:

It is very important for them to fulfil their responsibility for sanitation and clean water provision for the children of South Africa. To neglect this is a criminal act. We would like to see such officials

- get red cards that show they must be banned from taking other responsible official positions;
- dismissed without golden handshakes;
- charged with a criminal offence of child abuse and neglect;
- listed on a national child abuse and neglect register; and

- publicly named and shamed, including to international child rights bodies such as the United Nations which monitors adherence to the CRC (Convention on the Rights of the Child) and the African Union which monitors adherence to the ACRWC (African Charter on the Rights and Welfare of the Child). South Africa has ratified the CRC and the ACRWC and is responsible for adherence to child protection clauses.

The very important services of sanitation and clean water provision by municipalities should be monitored by agencies assigned by parliament and which are empowered to enforce penalties that will benefit, and not harm, the communities they should serve. Fines will not serve this purpose.

Their action was widely endorsed. Parents proudly signed consent for the complaints to be submitted and Xanadu provided a list of officials who were contacted from 2011 to 2014 about pollution at the Rietfontein Wastewater Treatment Plant. This was added to their SAHRC complaint. WESSA issued a press release when the YWAs' complaint was delivered to the SAHRC on 11 September. Thereafter the YWAs continued to test the Swartspuit monthly until July 2015, since reporting was required once monthly for 12 months. Meanwhile, they were honoured at their school's morning assembly on 22 September. Here, learners aged 8 to 15 years old from Grades 4 to 7, most of whom were not involved in miniSASS, heard of their continued research at the Swartspuit as well as the SAHRC complaint on behalf of all South African children. Because learners were keen to know more, the school approved the miniSASS research and the SAHRC complaint as topics to be pursued in English classes at school. This would enable peer-to-peer learning on an issue of environmental importance and would also meet the English language curriculum requirements. The SAHRC later informed the Eco-Club by letter that they had other complaints pending and were investigating the issue. A friendly SAHRC representative subsequently visited the YWAs at school. They were so overawed by this honour, and the fact that everyone met in the computer lab, which was normally out of bounds, that they remained virtually speechless throughout his visit. One Eco-Club member shyly shared that they were "afraid to say the wrong thing".

On 23 September, at the invitation of Xanadu and certain local politicians, the YWAs shared their miniSASS findings with the Parliamentary Portfolio Committee on water and sanitation and a large group of other delegates who paid an oversight visit to the Swartspuit at Xanadu. The delegates had already visited the Rietfontein Wastewater Treatment Plant to identify the problems there (PMG 2014). Later, in an assessment meeting, the YWAs spoke of their nervousness in meeting the dignitaries and their appreciation of the courtesy and interest shown by the Portfolio Committee chairman. They valued his warm thanks.

He understood us well. They all saw the problems, that the water was polluted, so it was dirty. The day ended well. But some spoke to us in their own languages and we could not understand them. Some of them were not listening to us because they are not the ones who drink polluted water. They looked at other things while we were talking. Some

of them thought we are doing Xanadu a favour, but we explained that the dirty water goes into everybody's drinking water. It was very painful to us to see so many fish and other creatures floating lifeless on the water, with [faeces].

During this single event the YWAs experienced a range of typical adult responses to children's communications on issues of importance: rejection by those who spoke in languages the children could not understand or who showed that they were not listening; denigration by a senior local official who suggested that matters at their homes were a more appropriate focus for children; tolerance and indulgence by those who listened but discredited their communications as initiated by Xanadu; and appreciative acceptance of their contribution by the chairman and other officials. The YWAs chose to accept the response of the chairman as indicative that their contribution was worthwhile and to discount the disparagement. They were proud to have taken part and appreciative of those who had invited them to do so since they considered this to show "respect for our work".

Outcomes: 2008–2015 Ennis Thabong Eco-School Pro-Environmental Initiatives

Ennis Thabong's registration as an Eco-School legitimated Ngoma's encouragement of learners' embodied engagement in the natural environment. He had committed to accomplishing this on his first day at the school. "And now", he said, "we find that *othhala jwa Phala bo tswa Phalaneng*" (Setswana: the wisdom of the impala comes from its calf).

Learners who engaged in Eco-School activities were not competing for Eco-School awards, although they were delighted if their efforts were acknowledged in this way. In 2014, the school won the miniSASS prize for the North West Province, was in the top three schools for the miniSASS national research competition, and finally won the 2014 national Eco-Schools prize. These were all awarded by the Department of Water Affairs. In 2015, Andrew Ngoma received a Silver Eco-School award as "Dedicated Teacher" for the miniSASS aquatic science project and the Ennis Thabong Food Garden. Then, during a Water and Sanitation Youth Summit convened by the Department of Water Affairs in 2015 and attended by over a thousand learners, two YWAs won a Gold Medal each for the miniSASS river analysis, which summit participants carried out at the Klipriviersberg Nature Reserve (Ratau 2015). Their prize included bursaries to study water affairs at a tertiary institution when they left school.

No immediate improvement followed the learners' transformative pro-environmental interventions in 2011 and 2014. This could be attributed to municipal neglect since the Madibeng municipality was placed under administration three times between 2011 and 2019 for failed service delivery. Barnes (2018, 544) recorded that officials undermine, vilify, and dismiss "activist efforts" in low-income communities to secure water, sanitation and household power provision; they argue that "backlogs and high

infrastructural costs” prevent this and that the South African Constitution provides for the “progressive realisation of rights”. When Ngoma left Hartbeespoort in 2015, the school was unable to assign a teacher for the Eco-School programme. He had added the role to his already full schedule and Xanadu proved to be a valued support partner. He identified the “biggest outcome for the children” who engaged in Eco-School initiatives, as

self-esteem. You could see them change before your eyes. It came from learning by experience, by doing and sharing, and discussing with other children and with grownups, in their own time. Not from learning in the classroom through teachers and schoolbooks, although they got on well with their teachers. Three things that I noticed especially about miniSASS, the learners felt very special about doing real research; they saw themselves as involved with life science; and their report-back to other children, parents and the community was published in a local newspaper. These all increased their self-esteem.

Roger Hart identified self-esteem as “perhaps the most critical variable affecting a child’s successful participation with others in a project. It is a value judgment children make about self-worth based upon their sense of competence in doing things and the approval of others” (Hart 1992, 31). Ngoma concluded the following regarding the importance of action competence and anticipatory hope:

Learners would never have challenged adults, especially dignitaries, before we registered as an Eco-School. They grew confidence. In working together, they shared equally in discovery and didn’t have to worry about competing, and so they learnt that there are ways you can challenge officials about things that are wrong in the country. And what was most interesting of all is, it was not only them. It rubbed off on the community and on other children. It gave them hope.

In South Africa, school fees are intended for improving the quality of education for learners. Resource-poor schools without income from school fees require supplementary assistance in finance or provisioning from other sources. To engage fully in the Eco-Schools programme requires financial support for part-time assistance, transport, and other incidental costs. By 2011, public no-fee schools such as Ennis Thabong comprised an estimated 60% of all South African schools (Sayed and Motala 2012). More such schools would possibly register as Eco-Schools if resources were available.

Discussion

The Children’s Bill in the South African Constitution (RSA 1996) and the Children’s Act, No. 38 of 2005 (RSA 2006) both enshrine the right of children to be consulted on matters that affect them. In 2016, African countries, including South Africa, re-envisioned the situation of children regarding Education for Sustainable Development through “Africa’s Agenda for Children 2040: Fostering an Africa Fit for Children”.

“Aspirations” for Agenda 2040 include “African children’s views matter” (ACERWC 2016). In light of these national and continental commitments, self-directed transformative pro-environmental initiatives such as those of the Ennis Thabong learners deserve wider recognition.

Ngoma’s approach to education provided a firm foundation for learners’ Self-Directed Education in their transformative pro-environmental initiatives in 2011 and 2014. Observant participation and interviews revealed that he encouraged children to learn by doing, in contexts that reflect their own experience. He stipulated that they should “ask for and discuss information, just like other people can, because it leads to critical thinking”. In their transformative pro-environmental initiatives at Popo Molefe and through miniSASS, learners were accorded all the time they wanted to think things through and to discuss them. They shared their anger about the way the environment was treated but, at first, they did not feel competent to do anything about it. In terms of Self-Determination Theory, learners’ identification of their two transformative pro-environmental initiatives, and their decision to self-direct them, reflects autonomy. Although their efforts did not generate immediately successful outcomes, their evaluations on conclusion of their efforts reflected gains in competence. The Eco-Club members not only worked together companionably but also consulted with and inspired other learners, showing a capacity to relate to others in authentic, caring and reciprocal ways, hence a capacity for relatedness. The eagerness of other learners to share their experience enriched the schooling process. In this regard, the learners served “as role models for political action”, revealing to peers that they could do the same (Chawla 2009, 73). It could be argued, therefore, that when Self-Directed Education is enabled through the Eco-School programme, it provides grounded experience that will be of value for learners both in the present and the long term and in many facets of life. It not only prepares learners to adapt and problem-solve in changing societies, but is also crucial to ensure a healthy environment for people and the life of biodiverse ecosystems.

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