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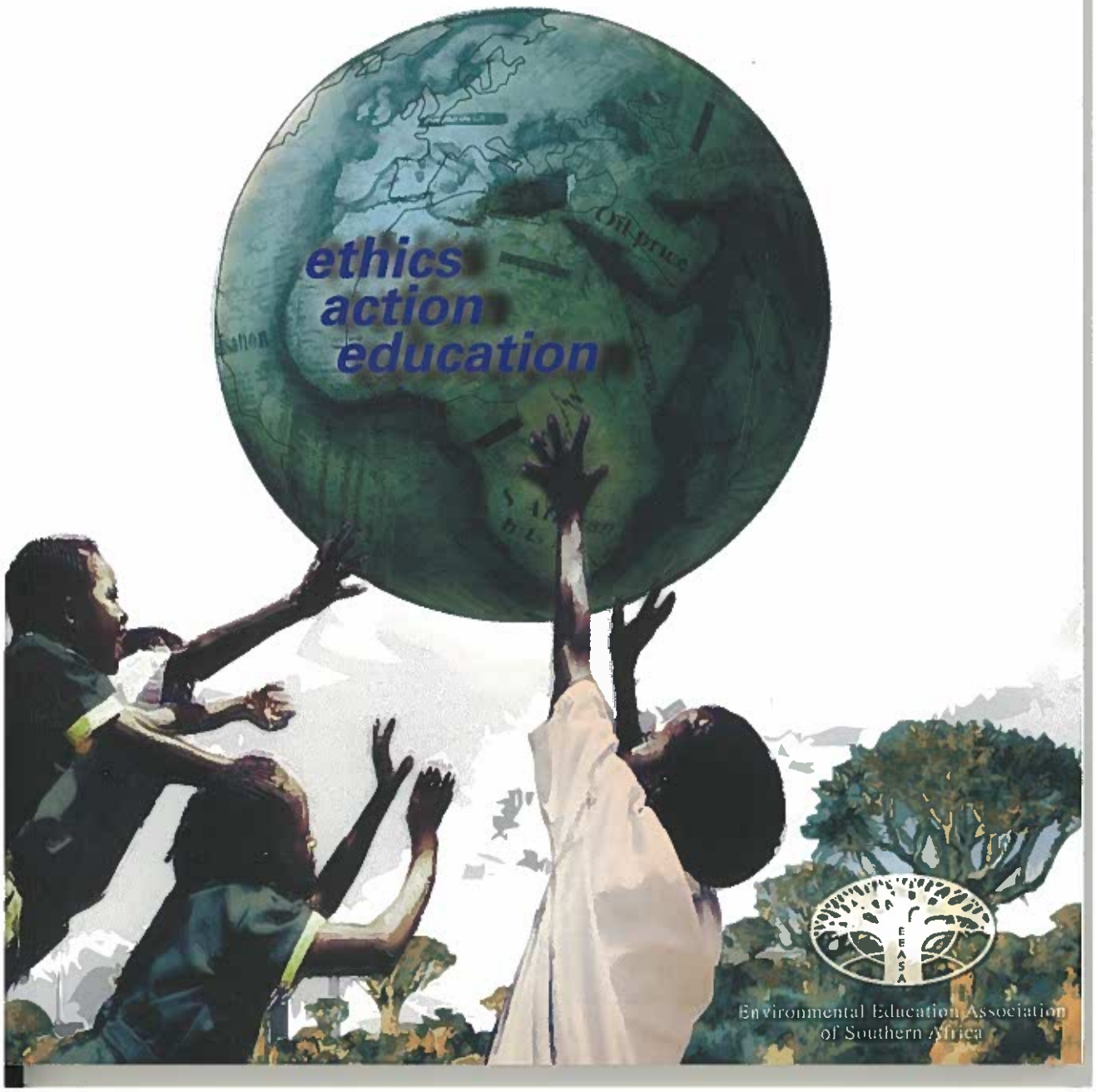

Southern African Journal of Environmental Education
Education Quality on the Agenda

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The Southern African Journal of Environmental Education (SAJEE) is an internationally refereed journal published once a year. The journal is published by the Environmental Education Association of Southern Africa (EEASA).

The SAJEE aims to publish and report on a wide range of aspects relating to Environmental Education, Ethics and Action in southern Africa and elsewhere. The journal seeks to further the study and practice of environmental education by providing a forum for researchers, scholars, practitioners and policy makers. The journal aims to carry papers reflecting the diversity of environmental education practice in southern Africa, and includes conference reviews and keynote papers, retrospective analyses of activities or trends in a particular field, commentaries on policy issues, comparative aspects of an environmental education, environmental ethics or environmental action issue, and critical reviews of environmental education, ethics and action in a particular country or context. The journal actively seeks out international dialogue in order to provide perspective on and for environmental education in southern Africa.

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VIEWPOINT PAPERS

Editorial
The Scope of Teaching and Learning in Environmental Education

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Environmental education involves a variety of teaching and learning processes which are diversely situated in a range of social and educational contexts. This diversity of scope is an interesting 'contour' of a field like environmental education. Contemporary environmental sciences and complexity studies draw our attention to an ever-changing world and to increasingly complex social-ecological issues, patterns and risks that require our attention. These too influence the scope of environmental education teaching and learning processes.

This edition of the Southern African Journal of Environmental Education provides a window through which we may see some of the scope of environmental education activities, research questions, learning and teaching settings, and educational activity. It also provides insight into the range of research methodologies that are being deployed to investigate the educational processes that are needed for re-orientation towards sustainability, equity, adaptability and transformation at the people-environment interface.

The first paper, by Christopher Masara, provides a case study of social learning processes and nature-culture relations in a context of transition from traditional to commercial beekeeping in Zimbabwe. The paper draws on a model of social learning to probe the learning processes in the social interactions shaping an emerging community of commercial beekeepers and their small- and medium-enterprise development practices. The paper illustrates how the practice of engaging communities in participatory expansive learning research could benefit from more refined tools for understanding the open-ended contours of social learning interactions and social practices that occur (and change) at the nature-culture interface. The study shows that social learning involves a complex mix of historical, technical, political, economic and ecological factors which are contextually 'woven' together in different co-evolutionary patterns over time as circumstances change, and as people exercise learning and agency in response to the challenges that arise as circumstances change.

Different to the community learning case study provided by Christopher Masara, the paper by Michelle van der Merwe considers environmental education teaching and learning in a formal school setting. She investigates the patterns of practice associated with the use of learning support materials produced by the African Coelacanth Ecosystem Programme (ACEP) and shows that the stated intentions for use, as well as the stated use (by teachers) is not fully realised in the actual classroom practice of teachers. The study sheds light on the relationship between assumptions embedded in learning support materials and actual patterns of practice in schools.

Moving from community-based teaching and learning (in the Masara paper), and school-based teaching and learning (in the van der Merwe paper), the third paper in the journal

focuses on teaching and learning in a university context. Writing from Ethiopia, Aklilu Dalelo reviews how the paradigm of sustainable development is being integrated into the revised undergraduate curriculum for Geography at Addis Ababa University in Ethiopia. Using content analysis, Dalelo identifies 20 issues from the first and second sections of *Agenda 21*. These are used to investigate the extent to which sustainable development issues have been integrated into three out of five categories of courses. Results show that while the three 'pillars' of sustainable development are represented across the courses, they tend to be dominated by the social and economic aspects. The study also reports an attempt to promote an integrative approach. The content analysis is complemented by a pedagogical analysis, in which methods of delivery are identified. Findings here indicate that while changes have been made to content within an integrative framework, the dominant method remains classroom-based delivery of content.

Writing from Jamaica in the Caribbean, Lorna Down deliberates on teaching and learning in education for sustainable development (ESD) initiatives in the Caribbean. The study focuses particularly on the service learning programme, arguing that service learning provides an adequate framework for ESD pedagogy. She points out that while ESD promotes more socially economically and ecologically relevant education that is oriented towards the public good universities often lack pedagogical approaches to engage these ideals. Service learning is based on a philosophy of education which sees education as developing social responsibility and education that prepares learners to be involved as citizens of a democracy. Through analysing a range of service learning programmes in the Caribbean, Down proposes that ESD requires a dialogic, rather than an hierarchical relation between academia and community, and that universities can engage such processes by positioning themselves within communities, working in more focussed and integrated ways to contribute not only to broader, universal knowledge but also to community and social-ecological transformations and well-being.

Continuing with the theme of the ethical and pedagogical dimensions of environmental education, and how these 'come together' in educational practices and processes, Lausanne Olvitt considers the ethical deliberations of a learner practitioner in a professional development course noting how different activity systems interface to produce the ethical discourses and practices of what she calls 'learner practitioners'. Her paper points out that the scope of environmental education, while ostensibly being located in the context of a training programme, is in fact constituted through interacting activity systems. Focussing on the case of one learner, she identifies tensions and contradictions that exist in the learner-practitioner's activity system as he learns in the workplace and on the course, tracing this to the wider influences of national qualifications frameworks and local cultural histories.

Following the Olvitt paper is a paper by John Kioko, John Warui Kringe and Geff Wahungu This paper considers youth's knowledge, attitudes and practices on wildlife and environmental conservation in Maasai land, Kenya. Working with a stratified population sample with even-spread gender, students in lower primary, upper primary and secondary schools were interviewed. Maasai *morans* – informally educated Maasai youth – were interviewed as well Results showed that youth whose parents were more engaged in tourism activities were more positive towards wildlife and environmental conservation. The study also reports that schooling and participation in extracurricular activities through clubs positively influenced youth

perceptions of wildlife and environmental conservation. The study concludes that increased support for education (and environmental education) amongst the youth can be beneficial to wildlife and environmental conservation. The authors also reflect critically on their own 'bias' and interest in the formulation of the research questions and research instruments, providing a reflexive perspective on attitude and perceptions research.

Turning more towards the way in which environmental factors influence learner performance, the paper by Gerrie Van der Linde, Luzelle Naudé and Karel Esterhuyse examines the extent to which environmental quality and time perspectives can account for variance in academic performance of Grade 12 learners. The study found that time perspective and environmental quality accounts for approximately 14% of the variance found in the academic performance of Grade 12 learners, but that environmental quality was not found to be contributing significantly to variance in academic performance of learners (as measured in this study). The authors define environmental quality as a relational phenomenon, involving 'relations between things and things, things and people, and between people and people' (p.103, this edition).

Discussing environmental education methodology in university curricula, Michèle Stears' Viewpoint paper presents a report of a small-scale study on how experiential learning, in the form of fieldwork, contributes to learning in Biology. A theoretical framework using Kolb's perspectives on experiential learning is presented, and data from a small sample of students is analysed following fieldwork. Results from the study provide some useful early insights on the influence of fieldwork on the affective and cognitive domains, which require further testing and research. As such the paper is published not as a full research paper, but as a Viewpoint paper.

The Viewpoint paper by Stears is followed by a viewpoint paper by Justin Lupele and Charles Namafe, who deliberate how university curricula, taking an interdisciplinary approach, can be developed to respond to complex issues and risks. The paper therefore provides insight into how interdisciplinary approaches can be constituted in university settings, and uses the case of the development of the University of Zambia's undergraduate Environmental Education degree. The reflections on the development of this curriculum point to some of the realities of adopting inter-disciplinary approaches in higher education, most notably the complexities of obtaining relevant expertise, co-operation amongst faculties, development of suitable learning and teaching materials, and job market implications of interdisciplinary courses.

Also on the subject of interdisciplinary university curricula, the Viewpoint paper by Tania Katzschner deliberates what kind of university knowledge environment may be needed to respond to an ever more complex world, which she describes as being in 'the grip of multiple crises'. She argues that new forms of understanding are needed in such a context, and that the traditional disciplinary structure of universities is inadequate for enabling the kinds of learning necessary to engage such a complex context. Her view is that there is a need to value and mainstream interdisciplinarity in research and education, an issue which she raises as a 'researchable question', implying that further research needs to be done on this. She further outlines some areas of action that may also be researched in the context of the wider research question on interdisciplinarity in higher education settings. Unlike the paper by Lupele and Namafe, Katzschner's paper does not address a specific context or empirical example of interdisciplinary university curriculum development; it merely seeks to 'make the case' for such curriculum development.

The final Viewpoint paper, by Sheperd Urenje, comments on one of the mechanisms tha has been put in place by the United Nations University to strengthen ESD at regional lev – namely, RCEs or Regional Centres of Expertise. Urenje examines RCE's drawing on som of the concepts in the community of practice literature. His interest is to examine whethe RCEs can 'qualify' as communities of practice, based on how these are described in some of th research literature. He also uses a typology of 'stages of development' of communities of practic to categorise the two RCEs examined. His view is that communities of practice literature ca provide some useful tools to examine both the formation and functioning of RCEs.

Two things are striking about the contributions to this edition of the journal. Firstly ther is a keen interest in interdisciplinary and boundary-crossing approaches. The Masara paper, fo example, examines learning in processes of co-evolution of nature-culture relations; while number of other authors such as Lupele and Namafe, Katzchner, Dalelo and Van der Merw consider how such inter-disciplinary approaches ought to be conceptualised and/or how the are implemented. Secondly, there is an interest in pedagogies and methodological approache such as the Stears Viewpoint paper which reviews experiential learning methods, the Dow paper which reviews service learning methodologies and the Olvitt paper which reviev interacting pedagogical systems and how they shape or influence learners' ethical deliberatio and practices. The papers also reflect the diversity of contexts in which environmental educatio research is taking place: communities, schools, universities and workplaces.

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Social Learning Processes and Nature-Culture Relations of Commercial Beekeeping Practices as Small and Medium Enterprise Development in Zimbabwe

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Abstract

This paper explores social learning processes and nature-culture relations in a context of transition from traditional to commercial beekeeping in Zimbabwe. The contours of social learning provided by Wals (2007) are used to probe the learning processes in the social interactions shaping an emerging community of commercial beekeepers and their small and medium enterprise development practices. The paper illustrates how the practice of engaging communities in participatory expansive learning research could benefit from more refined tools for understanding the open-ended contours of social learning interactions in relation to nature-culture relations.

Introduction

In order for us to understand our environmental problems and how they came into existence, it is necessary to examine our current histories of nature-culture relations (Norgaard, 1994; Head, 2000). Co-evolutionary environmental history or cultural landscape analysis are used as approaches to explore nature-culture relationships assumptions. Co-evolutionary environmental histories or cultural landscape analyses reflect relational perspectives that consider the relationships that exist between humans and nature/environment. At one end of the continuum, environment can be viewed as a pool of resource inputs that is transformed by scientific technological development in pursuit of satisfying human needs; while the other end of the continuum environment can be considered as a complex and biological system rather than a stock of separate resources, causing species to be transformed between environments as humans interact with them in the process of trade, colonisation and development (Norgaard, 1994). Using this continuum I will analyse the history of co-evolutionary/cultural landscape assumptions contained in the learning and development of beekeeping practices in Buhera South, Zimbabwe, and I will conclude by engaging the social learning contours provided by Wals (2007) in understanding the role of learning in resolving challenges of divergent ideas of nature-culture relations.

Historical Analysis of Beekeeping in Buhera South

In Zimbabwe honey hunting, subsistence beekeeping and trade of hive products has a long history which can be traced back well before the arrival of the first settlers in the late 1800s. The

presence of diverse vegetation, subtropical climates, high levels of poverty and increased honey demand became the driving forces behind sustaining trade of honey and commercialisation of beekeeping systems in the country (Nel & Illgner, 2004). Beekeeping also has several merits which resonate with sustainable development discourse, especially around environmental, societal and economic sustainability. In this paper I will start by tracing the history of beekeeping and how it emerged from colonial to contemporary Zimbabwe.

The coming of colonisation, the emergence of the white mining industry and the expansion of markets for both labour and agricultural products meant a new order for trade in Zimbabwe in the early to mid 1900s (Andersson, 2002). As was reported by Phimister (1974), this period of the early to mid 1900s was marked by the negative response of black Rhodesian[1] societies to the state's new economic systems of taxation to mobilise labour, as people were placed under strain by tax demands. People would sell grain, livestock, beer and other products especially to mine workers to meet their tax and other livelihoods needs (Phimister, 1974; Andersson, 2002). As was noted by Andersson (2002), in Buhera South where there has been a history of recurrent droughts, many people were forced to sell cattle not just to meet their food requirement but also to pay for tax. But what about households with no livestock? Natural-resources products – especially beekeeping – became people's safety net in earning a livelihood, as was reflected and retold by 87-year-old Headman Mushumba (Chapanduka, pers. comm., 2 January 2010). This period marked another co-evolution of learning beekeeping practices, as beekeeping was no longer a subsistence practice, but had been transformed to a small and medium enterprise commercial business by poor households with no livestock. Beekeeping practices had therefore co-evolved through learning to make and manage hives, and harvest, process and store honey in a state which would allow transporting it over long distances to trade centres such as mines and farms.

The gaining of Zimbabwean independence in 1980 brought about black majority rule, which created a a new society with equality in terms of employment, wealth, education and social security (Sylvester, 1985; Dhliwyo, 2001). Government policies were aimed at narrowing the economic gap between racial groups through the provision of free social services such as education, health facilities and housing, facilitating heavy government cash injections and subsidises into the agricultural sector. Especially significant was the shifting of rural people's farming practices from production of staple crops to cash crops such as burley tobacco, groundnuts and cotton (Sylvester, 1985). In Buhera South there was a shift from conventional livelihood strategies that had sustained poor people during the crucial moments of colonisation – such as beekeeping – to cash crop production such as cotton and red sorghum which were being grown on forward and backward contracts.[2] This marked another co-evolutionary moment as such crops demanded that farmers of large pieces of land use of fertilisers and pesticides which were readily available at subsidised rates. Learning beekeeping at this time had to co-evolve into a peripheral livelihood activity – practised by only a few enthusiasts as bee forage and healthy bee populations were negatively impacted by forest clearance and heavy use of pesticides, respectively.

The post-independence economic growth was not fast enough to absorb a rapidly growing young labour force, nor sufficient enough to generate the tax revenue for continued

expenditure on basic social services (Dhliwayo, 2001); for policy-makers it meant going back to the drawing board. By November 1991 the Economic Structural Adjustment Programme (ESAP) was launched as a strategy to resuscitate the ailing economy (Dhliwayo, 2001; Addisson & Laakso, 2003). The objectives of ESAP were to liberalise key markets, reduce the fiscal deficit by cutting budgetary support to some social and economic services such as education, health, and agriculture subsidises (ibid.). Despite ESAP benefitting some sectors of the economy it was a major blow to the poor majority. The drought of 1992, high inflation and importation of cheap textile products lead to loss of jobs, productive assets and investments (Addison & Laakso, 2003). To rural Buherans this meant looking for sources of livelihood to fall back on other than those that had now become 'traditional', i.e. cattle, cotton and remittances from towns. The easiest was to turn to natural-resources products – beekeeping. Beekeeping changed its status from being a peripheral livelihood strategy to once again becoming a core enterprise activity. The main reason why beekeeping was suited to co-evolve was that it was a low-cost practice and drought resilient; hence providing food and money for school fees, health and other social services.

The realisation of beekeeping as a key livelihood activity also coincided with the formation of non-governmental organisations (NGOs) whose aim was to improve livelihoods of the rural poor through sustainable utilisation and management of natural resources, such as the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) Association, the Southern Alliance for Indigenous Resources (SAFIRE) and the Zimbabwe Farmers Development Trust (ZFDT). This was another co-evolutionary moment in Buhera South, as support to beekeepers by ZFDT favoured consolidation of learning as a key livelihood activity. A number of people started to learn beekeeping as a commercial business again, however with support from an external agent which was using modern technologies to improve honey productivity, natural resources management and marketing within a small and medium enterprise development frame.

With the dawn of the 1990s economic challenges and civil unrest continued and there was loss of support for the ruling party, the Zimbabwe African National Unity Patriotic Front (ZANU PF), as their economic policies were seen to be failing. A new political party – the Movement for Democratic Change (MDC) – was formed (Addison & Laakso, 2003). The MDC's main support base was the 'born frees',[3] the working class, the urban populace and white commercial farmers who expected an alternative party to bring back the ailing economy. According to Addison & Laakso (2003), this was one of the main reasons for the highly politicised land redistribution programme – the land invasion. ZANU PF wanted to win rural people's votes through resolving the long outstanding land imbalances and on the other hand to fix white commercial farmers who were one of the main wings of the MDC. The data collected by this author from Buhera South suggested that land invasion affected learning of beekeeping practices negatively – not because the rural Buhera was invaded but because of the interpretation of politically motivated land invasion slogan, '*Land is the Economy and the Economy is Land*'. To some Buherans who were not beekeepers the slogan indicated that use of any land available to cultivate crops was the only way to be economically independent. This led to practices of cultivating anywhere, even in the legislatively controlled and ecologically

sensitive areas. This was a problem for beekeepers, as such land had been traditionally reserved for beekeeping, a practice which they had learned co-exists and co-evolves with ecologically sensitive areas. It therefore meant a contradiction in practices – a contradiction embedded in conflicting uses of the ecologically sensitive areas.

The following sections outline the methodology of the research conducted with beekeepers in Buhera South as I answer the research question: 'How do rural beekeepers learn commercial beekeeping?' I will outline how Wals' (2007) contours of social learning processes were used to resolve challenges of divergent ideas about implied nature-culture relations in the use of ecologically sensitive areas (stream banks) in a community workshop. Engeström (2001) explains that such contradictions are potential sites of learning, and it is this factor that interested me in the context of expanding the social learning of commercial beekeepers in Buhera South.

Methodology

As indicated above, a substantive part of the research involved developing a historically informed picture of the commercial beekeeping activity system so as to identify contradictions and tensions that emerge in the commercial beekeeping activity system. This process drew on the frameworks for such research provided in Cultural Historical Activity Theory (Engeström, 2001) where rules, subjects, community members and mediation tools are analysed historically and culturally to identify contradictions within or between these elements of an activity system (see also Mukute, 2009). As indicated above, I identified a contradiction in the object of two interacting activity systems; namely, the beekeeping activity-system players and the other farmers, both of whom wanted to use ecologically sensitive areas for their livelihood activities.

To resolve the challenge of different nature-culture views on use of stream banks in Buhera South, I took the research into an expansive learning cycle phase, involving the reporting of 'mirror data' to the communities. To do this I held a community expansive learning workshop[4] for the key actors involved; namely, beekeepers, farmers, traditional leaders, agricultural extension officers and local teachers at Chapanduka Primary School in March 2010. The workshop was meant to develop a collective understanding of commercial beekeeping as a livelihood activity and stimulate expansive social learning, as proposed by Engeström's (2001) expansive learning methodology. The entire expansive learning workshop was recorded using video and audio tape recordings and data was carefully transcribed afterwards. As Glasser (2007) pointed out, social learning involves individuals and groups learning by getting input from others, such as in a community workshop. To help me understand and interpret the social learning interactions of the community workshop, I used the first four of Wals' (2007) six social learning contours as an analysis tool. Wals (2007) describes six contours of social learning processes:

- *Orientation and exploration* – open-ended social processes of learning together through the identification of key actors and exploring with them key issues of concern that need to be addressed in a way that connects their prior experience and backgrounds to learning commercial beekeeping, enabling the emergence of motivation and a shared sense of purpose.
- *(Self) awareness raising* – learning processes where beekeepers as individuals elicit own

frames of reference relevant to issues and challenges in the learning of commercial beekeeping.
- *Deframing or deconstruction* – learning through observation and taking note of key actors' articulations and how these challenge other's frames through a process of exposure to alternative frames about the practice of commercial beekeeping.
- *Co-creating* – learning by observing and taking note when key actors' ideas are constructed and clarified together.
- *Applying/ experimenting* – key actors are expected to learn through looking at collaborative action using the newly co-created frames for commercial beekeeping.
- *Reviewing* – Key actors will learn by assessing the degree to which the self determined issues or challenges in their learning of commercial beekeeping have been addressed, and also review the changes that have occurred in the way the issues/challenges were originally framed, through a reflective and evaluative process.

Data Analysis and Discussion

Learning as **orientation and exploration** was observed when the topic was introduced. There was a concern that the workshop participants had failed to discuss the problem of use of land the previous day after learning that there was a missing key actor – the traditional leaders. See the discussion interactions in data extracts 1 and 2 below:

> ***Extract 1****: … The other issue which we need to discuss and we need traditional leaders to help us with is tree cutting and opening of new cultivation lands.*

> ***Extract 2****: On that issue we agreed that village heads should be there because they are the ones allocating cultivation land along rivers hence promoting stream bank cultivation.*

The facilitator opened the discussion based on the discourse of the previous day reflected when participants had learned that a missing key actor was significant, as indicated by participants in the previous day's discussions. This process highlighted the background and roles of key actors involved in the contradiction, but it also excited key actors to contribute to the discussion, especially traditional leaders who were absent the previous day when a discussion of the contradiction was introduced in the mirror data reflection process. This opened up the discussion in the workshop into a second dimension of the social learning process as described by Wals (2007) namely **(self) awareness-raising**.

Learning in **(self) awareness-raising**, according to Wals (2007), involves seeking to elicit one's own frames relevant to the issue or challenges identified – in this case, different approaches to use of ecologically sensitive land to support household livelihoods. As the traditional leaders had been identified as key actors and brought into the workshop on the second day, they were also motivated to put the record straight as to why the contradiction existed (see data extracts 3 and 4).

Extract 3: *I would want to say it had been always like that we don't cultivate along rivers. When we went for training the government encouraged us to put hives along rivers and in mountains. We were advised not to use flat land because farmers would want to use it to cultivate crops. … But it varies with the different village heads, one villager might decide to put a vegetable garden along a river, his village head must advise him that it's not possible to clear trees along rivers but … (making a bribery gesture) and the person goes ahead.*

Extract 4: *So headmen and village heads are not doing their work properly because of corruption. However some traditional leaders like me and others I know, such as the local headman, we are trying our best. I might not be aware of everyone, but I haven't allocated cultivation land along river in my village, because I learnt about natural resources management. If we destroy trees where would we get honey? This means as village heads we are failing to control people from cutting trees along rivers, we can see it happening …*

The two discussion interactions above show how the contradiction is understood by a village head who is a beekeeper – he believes that traditional leaders have a hand in the activity because of corruption. Key actors have also learned that traditional leaders need money because they are ordinary citizens and some are even poorer than the ordinary villagers they lead. Rich villagers are therefore exploiting them through bribery and they access land along rivers, a practice the beekeeper traditional leader highlighted as being unacceptable in his village.

However, another traditional leader who was not a beekeeper viewed it differently. He noted that the problems arose because of population increase; that 'people are squeezed' and they no longer had anywhere to cultivate. There were many children who grew up in the area, and also sometimes people coming from outside. This point is also raised in the work of Dhliwayo (2001) who highlighted jobs losses associated with ESAP in the 1990s as a cause of land pressure, and the work of Tibaijuka (2005) who highlighted the impacts of 'Operation Murambatsvina' in Zimbawbe in May 2005 when so-called illegal activities such as vending, building and agriculture were destroyed in urban areas by the government and more than 700 000 people were left without shelter. This caused people to flock to rural areas, creating land use pressure in the rural areas. More learning happened when the issue was clarified further; see discussion extracts 5–9:

Extract 5*: What is happening is a result of the population increase. There are some areas that were not suitable for human settlement, but you end up settling people because of shortage of land. The population increase is putting pressure on our forest and they are now finished.*

Extract 6*: Where are these people coming from?*

Extract 7: *Our children.*

Extract 8: *Are there some people who are coming from other areas?*

Extract 9: *They are there, but they are very few however most of the population are our children who grow up in this area.*

As indicated above, the reasons were given by the traditional leaders. Consequently, key actors understood the contradiction at hand from the views of the traditional leaders, until some other key actors intervened. The Agriculture Technical and Extension Services (Agritex)[5] officer initiated further discussion on the issue, which introduced a third dimension of the social learning process as indicated by Wals (2007), namely **reframing and deconstruction**.

Extract 10: *I would go back to the government's position, long back as civil servants we had the powers that if a person cultivate within 30 meters from the river, we would arrest… . These powers were stripped from us, it would mean they need to be restored, and also with the divisions which were done in various departments … and you should work within your department's confines. If you look at stream bank cultivation we can also report to department of engineering, this is no longer our role …That problem of stripping of powers. … long back we had the powers to arrest the culprits.*

The government agricultural extension officer deconstructed the way key actors had learned from traditional leaders. They were now learning how state intervention had exacerbated or even led to the problem through responsibility withdrawal. This was supported by literature from the Zimbabwe Ministry of Agriculture and Rural Development website[6], which showed that since 1992 soil and water conservation was a function of the Department of Engineering and Technical Services not the Department of Agriculture Research and Extension (where field extension officers are placed). However, other actors deconstructed the contradiction as participants learned that manifestation of national politics in Buhera South was extending the problem. Participants also learned that the manifestation of national politics in Buhera South was causing the problem of controlling stream bank cultivation (see interaction extracts 11–14).

Extract 11: *The other thing which caused this problem is number eight* [meaning number eight of the list of beekeeping challenges on the mirror data flip chart, which was politics]. *It caused problems in implementing legislation. It is now difficult to control people in this area because they would ask you who said that, and who doesn't allow it.*

Extract 12: *Number eight politics.*

Extract 13: *Yes, that is the catalyst to the problems.*

Extract 14: *In this area, it has a lot of impact because you will be politically labelled. You either belong to political party A or political party B.*

As national politics manifested itself in Buhera South it caused community polarisation. Some people supported ZANU-PF and its slogan '*Land is the Economy and the Economy is Land*' and there was subsequently a belief that anyone who interferes with them in achieving the land

agenda was an enemy and should be labelled a MDC supporter. It also meant that all those who were against it were being politically victimised by ZANU-PF supporters through the leadership of liberation war veterans who had become very powerful overnight, especially in rural areas. Such action made it difficult for traditional leaders and civil servants to implement environmental legislation.

Therefore deconstruction really helped in understanding the contradiction through the unfolding of history and getting to the core of the problem. Some village heads started to ask Agritex officers for help in solving this problem. Extracts 15–17 show how they were calling for assistance as the workshop now engaged in another dynamic of the social learning process, namely **the process of co-creating** and proposing solutions.

> ***Extract 15:*** *As beekeepers how can traditional leaders help us to solve this problem?*

> ***Extract 16:*** *I think the way for this issue to be solved, is to have a meeting with the headman to discuss the way forward for the problems we are facing.*

> ***Extract 17:*** *Yes, village heads would deal with the problem, however we need to discuss it with Agritex officers in order for them to tackle it, it will go back to number eight (politics) and we won't be able to handle it well; because the culprits will ask whether you own land. When it is presented by Agritex officers and they call for village meetings … and remind people what the legislation says about stream bank cultivation, then village heads…can now start to prosecute.*

This type of talk by one village head who was grappling with the problem can be described as 'agentive talk' – the willingness to address the contradiction (Mukute, 2010) even though he knew that there was political inference. That was the reason why he was calling for the Agritex officer to intervene first through educating people about the environmental legislation. Although the Agritex officer concurred that traditional leaders were at the centre of the problem and they were supposed to address it, workshop participants learned that he was not willing to be involved in educating people about the legislation because of the political environment, as is reflected in extract 18.

> ***Extract 18:*** *… I therefore think that for this problem to be resolved it requires the involvement of headmen who were officially installed by the state, and possibly the District Administrator (DA) their supervisor, and all village heads should be present. This issue can be discussed if a village head cannot control his people he will be stripped of his post. This is the best way to solve this issue; the weakness which they have is they are not exercising their authority. Some of the people are corrupt to the extent of giving land to people who are coming from Chatikombo (faraway places). Us as extension officers we have been stripped of the roles of controlling stream bank cultivation if we intervene we will be labelled number eight (politics) we are therefore facing hard times …*

This village head was not necessarily defeatist, and was also engaging in 'agentive talk' suggestive of another strategy – namely, the involvement of government officials from higher office: the

District Administrator (DA). By suggesting the intervention of the DA, participants learned that he was powerful because he was the boss of traditional leaders and district administrators were instrumental in the land reform programme; hence they were better able to explain the environmental legislation in the given new socio-political order.

This was further supported by discussion extracts 19–26 as the Agritex officer showed further willingness to solve the problem by pushing for the invitation of the DA, Forestry Commission, Environmental Management Agency and Agritex officials from the district offices to a meeting where people would be educated about stream bank cultivation. This showed further evidence of 'agentive talk'. There were also expectations of relational agency (where agents were to work together to resolve the contradiction), as it was made clear that traditional leaders were later expected to start executing their duties of managing the environment as outlined in the Traditional Leaders Act 25 of 1998 (Ministry of Local Government and National Housing, 1998).

Extract 19*: Are we agreeing? Village heads, can we call the DA so that we can have a meeting?*

Extract 20*: Yes, officers at our district offices of Agriculture they are not a problem, all those people in higher offices are not a problem.*

Extract 21: *Who will invite them? Who will call for a meeting?*

Extract 22*: We can invite all district stakeholders there is no problem.*

Extract 23: *We are agreeing that Agritex officers will call for the meeting and officials in their district offices will be present. The district officials from Agritex can also extend the invitation to the District administrator.*

Extract 24*: If the DA is coming the Agritex officials from the district office will also be present, however if we would want to have this meeting we need to invite them in time for them to schedule the date in their dairies.*

Extract 25: *We think if we call the DA, he will come with other officials from Forestry commission, Environment and not only Agritex will be invited, and even police officers will be invited.*

Extract 26: *Yes, this job will be for the state.*

Conclusion

The social learning trajectories above reveal a collective development of goals towards solving a common problem in a further stage of the co-evolution of commercial beekeeping in the Buhera South case study site, where this research took place. In the learning processes distributed knowledge – divergent nature-culture views on the use of ecologically sensitive

areas – existed and interacted in a learning process oriented towards understanding learning and sustainable development issues in the context of commercial beekeeping taking place in a complex social-ecological context (Lotz-Sisitka, 2009). As described above, the expansive social learning process was facilitated to engage multiple stakeholders in resolving a contradiction that was surfaced through long-term historical analysis of commercial beekeeping practices in Buhera South, using Cultural Historical Activity Theory which proposes analysing social activities and the sociological, political and contextual histories and cultural practices that lead to the formation and contemporary practicing of such activities. Cultural Historical Activity Theory also proposes that arising contradictions are important sources for expansive social learning, and that this can be facilitated through strategies such as community social learning workshops, as was the case in this research.

However, Cultural Historical Activity Theory does not provide adequate tools for interpreting the learning process, although some tools such as analysis of agentive talk (Mukute, 2010) and others are being developed (see Mukute and Lotz-Sistika, in press). Wals (2007) proposes a dimensional process model for understanding social learning which is grounded in an understanding that social learning when oriented towards sustainability involves dissonance, or engaging with complexity and contradictions. Following the discourse of a community of practice in an expansive learning workshop in the way that I have done, and reported on above, shows the complex nature of social learning processes, and also the various dynamics of a social learning process interaction. In her paper on environmental education in southern Africa in a context of heightened risk and complexity, Lotz-Sisitka (2009) notes that social learning processes are likely to be reflexive learning processes. This analysis of talk in an expansive social learning process demonstrates some of the dynamics of such reflexive social learning. As indicated in the historical analysis and in the micro-level workshop analysis above, learning commercial beekeeping in Buhera South has features of such reflexive learning processes in the longer term, but also in the shorter term, more immediate learning interactions oriented towards solving contemporary problems affecting the commercialisation of beekeeping. The analysis also shows that social learning involves a complex mix of historical, technical, political, economic and ecological factors which are contextually 'woven' together in different co-evolutionary patterns over time as circumstances change and as people exercise learning and agency in response to the challenges that arise as circumstances change.

Notes on the Contributor

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Endnotes

1. Rhodesia was the name for Zimbabwe under British colonial rule.
2. 'Forward and backward contracts' relates to the practice where by inputs and market are provided to farmers in order to stimulate production of a certain crop, mostly by private companies.
3. 'Born frees' are children born after independence.
4. Also known as a Change Laboratory Workshop after Engeström's expansive learning methodology – see Engeström (2001) and Mukute (2009) for more detail on how this methodology has been used to support expansive social learning in southern Africa.
5. Agritex was formerly known as Agriculture Research and Extension Services (AREX).
6. http://www.moa.gov.zw, visited 25 May 2010.

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The Use of Learning Support Materials in Rural Schools of Maputaland, KwaZulu-Natal, South Africa

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Abstract

The African Coelacanth Ecosystem Programme (ACEP) was established in 2002 after the discovery of a colony of coelacanths off the Maputaland coast at Sodwana Bay, KwaZulu-Natal. The environmental education and awareness sub-programme developed learning support materials for use in schools and the materials were disseminated annually through teacher education workshops.

This study aimed to uncover the use of these learning support materials in the rural schools of Maputaland. The active learning framework, originally proposed and developed by O'Donoghue (2001), was used to analyse the materials. Collectively, the ACEP materials cover a range of active learning aspects; however alignment with the curriculum has resulted in an increased focus on experiments, accompanied by a loss of environmental content and a narrowing scope for active environmental learning.

Workshop questionnaires and four school case studies revealed the patterns of practice of use of materials in schools. The stated use of materials by teachers is not fully realised in the actual classroom practice which centres on learning content and concept definitions. There is no culture of use of materials in the schools following the annual introduction of ACEP materials. It was also found that the marine and coastal knowledge holding power is outside the realm of the teachers' practice and control.

The findings of this study come at a time when there is uncertainty over the future of South African education and the curriculum. This research may inform the environmental education and coastal and marine education field as to their role in education and more specifically the development of learning support materials.

Background

The African Coelacanth Ecosystem Programme (ACEP) was established in 2002 after the discovery of a colony of coelacanths, a prehistoric species of fish, off the coast of Sodwana Bay, Maputaland. An environmental education and awareness sub-programme was subsequently formed. Between 2002 and 2009 learning support materials were developed for use in schools with the aim of promoting science literacy and motivating youth to take up future careers in science. The materials were disseminated annually through teacher education workshops (Snow, 2008).

Research for this study involved schools from the Kosi Bay and Sodwana Bay areas on the Maputaland coast where ACEP has distributed learning support materials through teacher workshops. Many of the schools are adjacent to the iSimangaliso Wetland Park. The Integrated

Management Plan for the park states that 'the distribution of the schools in the region is fairly well correlated with population distribution, distances to schools are often more than 15km in less-populated areas; the teacher to pupil ratios are in excess of 1:40; conditions of classrooms and facilities are generally poor; and a large proportion of teachers are inadequately trained' (iSimangaliso Wetland Park Authority, 2008:43). The challenges in these rural schools are thus fairly representative of the challenges facing many other rural and under-resourced schools in other regions of South Africa.

The National Curriculum Statement, Learning Support Materials and the Active Learning Framework

The National Environmental Education Programme for General Education and Training (NEEP-GET) documents show how engagement with an environmental focus in Curriculum 2005 allowed environment to become an important part of the curriculum. The Revised National Curriculum Statement made environment an important part of all learning areas and outcomes (Lotz-Sisitka & Raven, 2001). This allowed for inclusion of environmental learning in the curriculum and the formal education system. The NEEP-GET used the active learning framework to frame environmental learning processes (Lotz-Sisitka & Raven, 2001). The roots of this development lie in the White Paper on Education and Training which required environmental education processes that 'involve an interdisciplinary, integrated and active approach to learning' (Lotz-Sisitka & Raven, 2001:3).

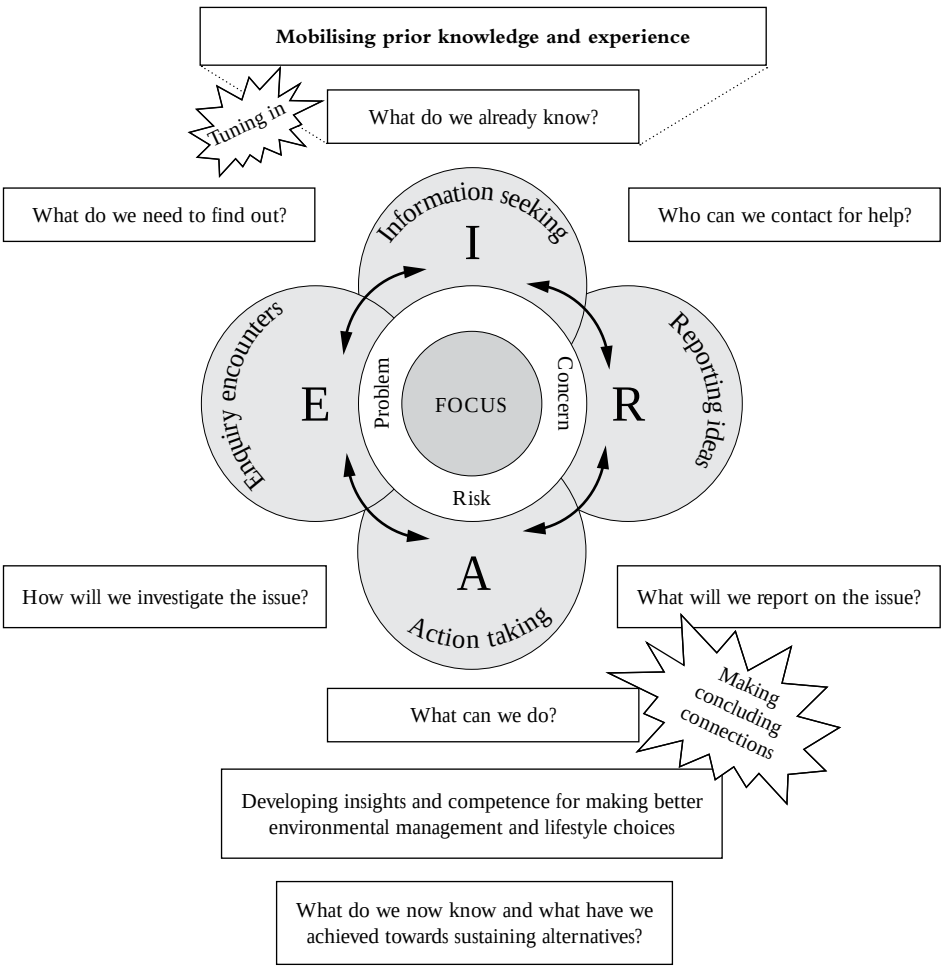
The introduction of Curriculum 2005 and Outcomes Based Education (OBE) after democracy in South Africa brought a new need for learning support materials given that there was less reliance on textbooks and OBE required a stronger resource-based learning orientation that used a wider range of resources than those used in traditional textbook teaching. OBE needed learning support materials that were aligned with the curriculum in order to meet the requirements of a resource-based and leaner-centred curriculum approach (Lotz-Sisitka & Raven, 2001).

The Active Learning Framework (O'Donoghue, 2001) has been used to frame and scaffold the design of materials for curriculum use in OBE. This framework (see Figure 1) also picks up on the environmental focus of each learning area and allows for learning that can develop from the learners' prior knowledge to more sustainable living and environmental management (O'Donoghue, 2001).

As indicated in Figure 1, the Active Learning Framework involves not only providing information about the environment and environmental issues, but also investigation into local contexts and practical actions, indicating a shift from content-based teaching which was the norm in the previous education system. The framework is a guide to 'inscribe environmental learning in school curriculum contexts' and does so in all learning areas of the curriculum (O'Donoghue & Russo, 2004:344). Mbanjwa (2002) found that using the active learning framework in developing materials affected what learning processes took place and the outcomes of these processes. The relationship between active learning, OBE and learning support materials development is ingrained in the context of South African school-based

environmental learning. The Active Learning Framework and its history therefore created a good framework to investigate the use of learning support materials in the schools and the aims that follow.

Figure 1. O'Donoghue's Active Learning Framework (2001)



Research Design

This research aimed to investigate how learning support materials are used in the rural schools of Maputaland. The goals of this interpretive research were:

- To critically review the historical development of the ACEP materials.
- To survey their current curriculum use.
- To probe the implicit and existing patterns of use and teaching practice in four local learning contexts.
- To discuss the data with teachers and materials developers to verify initial findings and uncover contradictions and possible solutions.

The research started with contextual profiling of the development of the ACEP materials and the school dissemination process. Survey questionnaires with 21 teachers from primary and high schools took place. In-depth studies of four school cases were done using interviews and classroom observations. These data were then coded and analysed according to the implicit use in the ACEP materials design, the teachers' implicit use of materials and the observed teaching practice in four school cases. The findings from these data collection processes were then used in two feedback discussion workshops. The first workshop was with marine and coastal environmental educators developing materials and the second was with the teachers from the case-study schools. During these workshops the findings were 'mirrored' back or shared with the participants in order to verify these data and discuss key contradictions and possible solutions to the problems.

The Active Learning Framework was used as a lens to gain insight into how the ACEP environmental education learning support materials were used within a South African curriculum context. In this second level of data analysis, the Active Learning Framework was used to analyse the design of the ACEP learning support materials and how these could be used by teachers. Teaching practices in the classroom were observed by using this framework in mind to uncover the relationship between practice and materials design and use.

The open-ended Active Learning Framework involves the following approach: 'Tuning-in which mobilizes prior experience and knowledge around an environmental focus, learning activities which develop and refine knowledge, skill and value orientation, and concluding connections which engage the challenges of sustainable environmental management and lifestyle choices' (O'Donoghue, 2001:1). The materials were analysed using the following activity categories relating to the Active Learning Framework:

- Reading for information.
- Concepts and factual content provision.
- Experimental modelling of natural concepts and processes.
- Experimental modelling of issues, processes and practices.
- Role-play and simulation.
- Audits and enquiry activities including data interpretation.
- Hands-on fieldwork encounters and experiences.
- Deliberation, debate and reporting towards decision-making.
- Action-taking, trying out and change practices.

Findings

The activities within each ACEP material are represented in diagrams to gain a clearer picture of the scope of active learning. The different materials and their development over time can then be compared. The observed teaching practice and the teachers' implicit use of learning support materials (how they said they could use learning support materials) was then analysed according to the categories of active learning developed above. The analysis revealed the following findings:

Finding 1: Alignment of the materials with the requirements of the curriculum has placed an emphasis on experiments with a loss of environmental content and a narrowed scope for active environmental learning.

If one looks at the trends in the ACEP materials development over time (between 2002 and 2009) in relation to active learning, there is a shift from an emphasis on environmental content and opportunities for various active learning activities to a narrowing of the scope for active environmental learning activities as the materials become more focused on technical experiments which model natural concepts and processes. The environmental content, as a result, is gradually lost (see Figures 2–6).

Figure 2. The scope of active learning in the 2002 Intermediate and Senior Phase packs

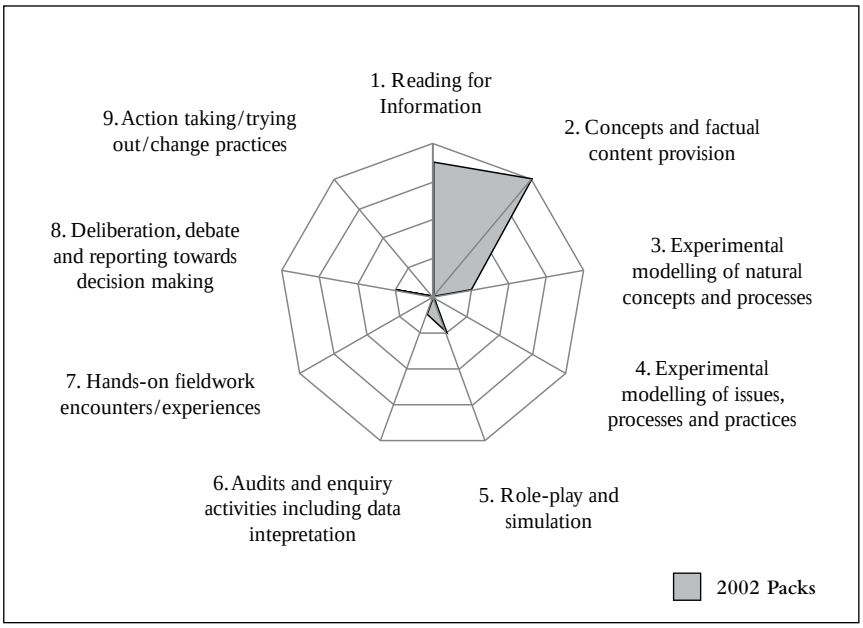


Figure 3. The scope of active learning in the 2004 video learning materials

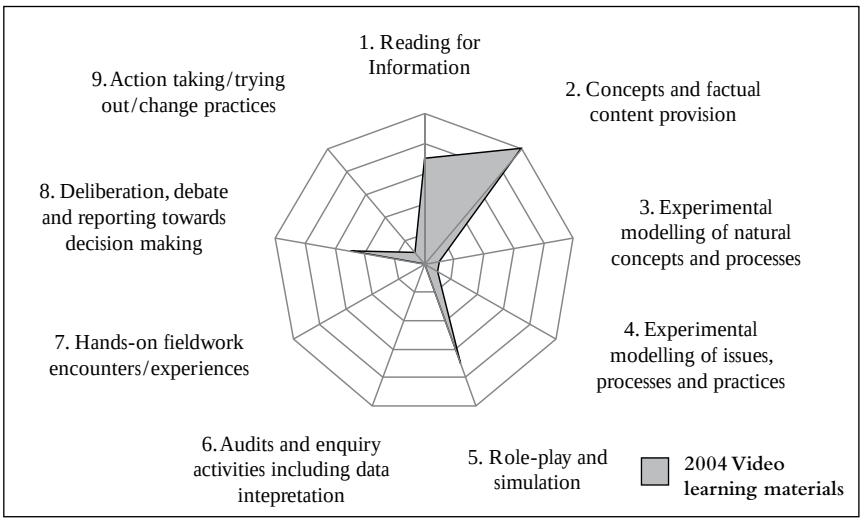
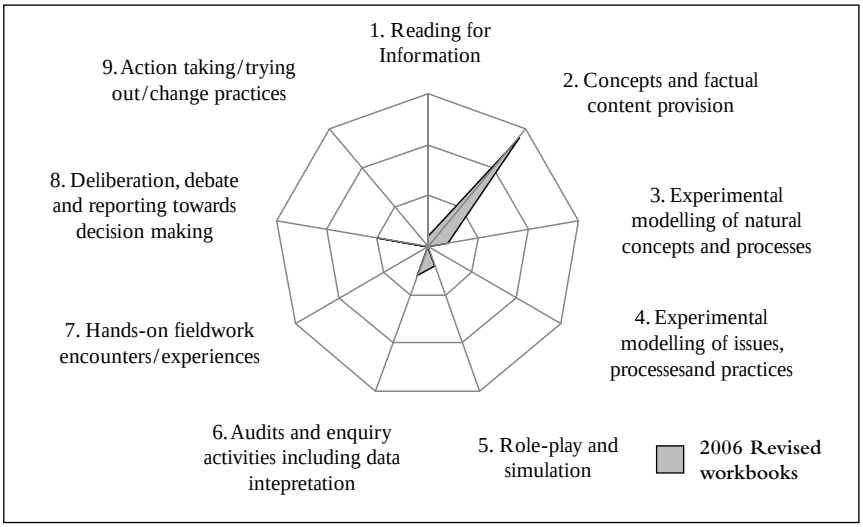


Figure 4. The scope of active learning in the 2006 revised workbooks



Prior to 2003, the materials were developed in relation to the curriculum in a flexible and adaptable way. After 2003, the materials were developed and aligned with the curriculum with the help of curriculum specialists. The materials were also further developed according to certain requirements of the South Africa Department of Education. The earlier materials (Figures 2–4) focused on environmental content knowledge provision. The environmental content in the materials decreased and the final ACEP products focus primarily on technical experiments for modelling concepts and processes. In 2009 ACEP developed materials for

Figure 5. The scope of active learning in the 2008 Climate Change Kit

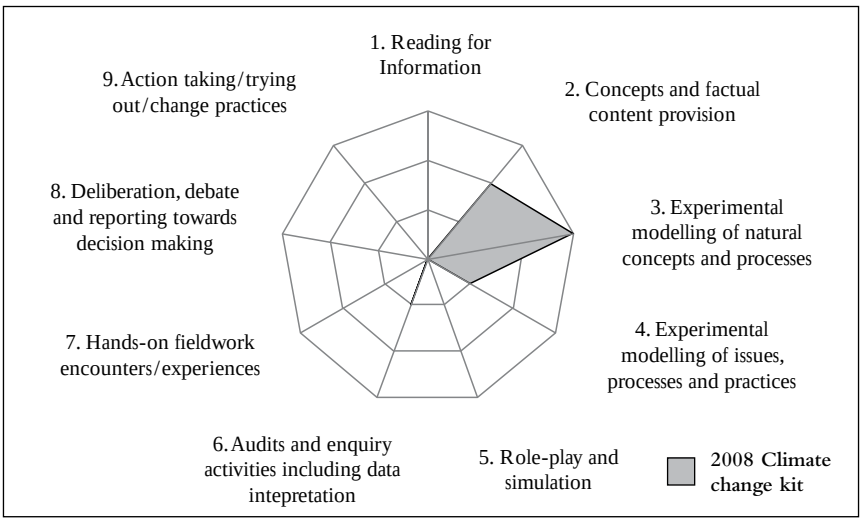
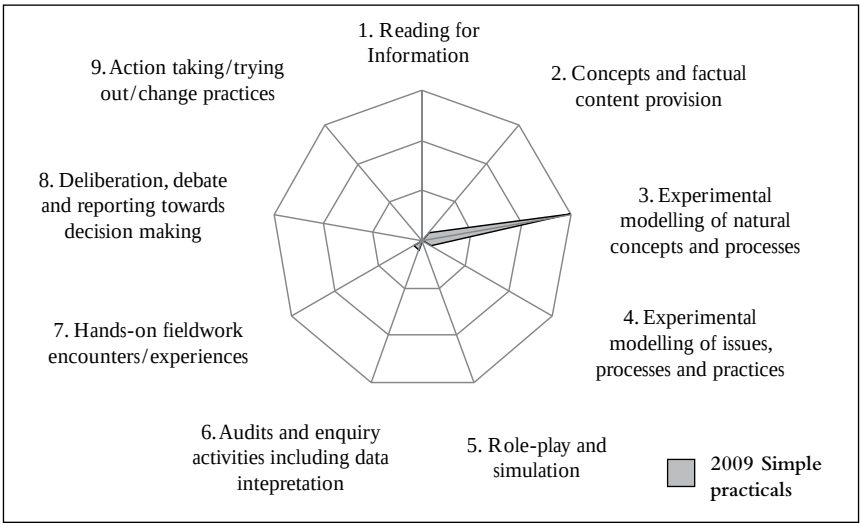
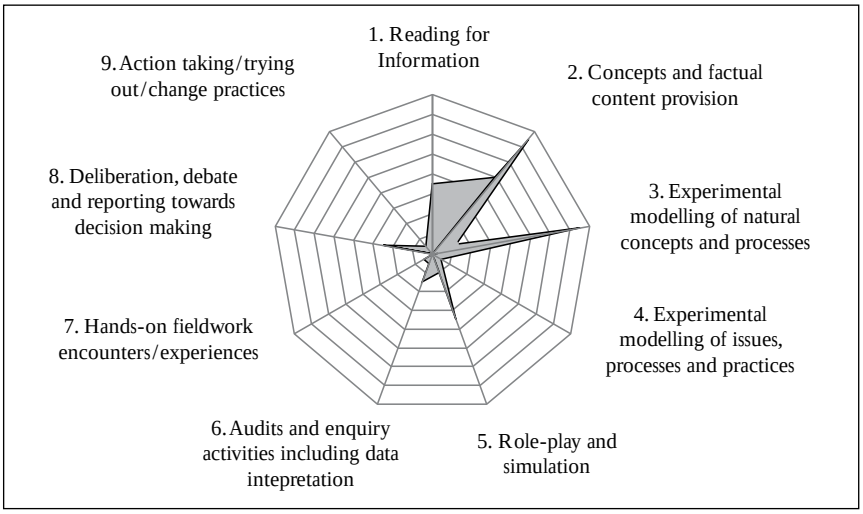


Figure 6. The scope of active learning in the 2009 simple practicals



science experiments, following requests from the Department of Education because teachers were not doing interactive experiments or practicals in the classroom. When looking at all of the combined materials, there is an overall coverage of active learning with an emphasis on content and experiments (see Figure 7).

Figure 7. The scope of active learning in ACEP materials (2002–2009)

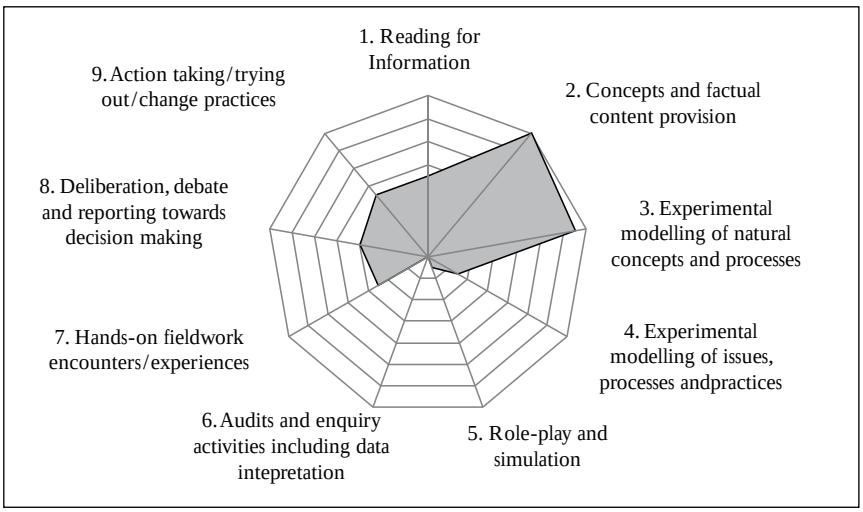


Finding 2: How teachers say they could use materials is not fully realised in classroom practice (emphasis on learning content and concept definitions).

At the survey level the teachers mentioned how learning support materials could be used for many of the activities within the categories of active learning. This uncovered their implicit use of materials which is illustrated in Figure 8.

The greatest reference to implicit use of ACEP learning support materials by teachers was in concepts and factual content provision. The teachers also referred to all of the other categories of active learning for the use of learning support materials: reading for information, action

Figure 8. The scope of active learning in teachers' implicit use of materials in Maputaland schools



taking, trying out, change practices, deliberation and debate, reporting towards decision-making and hands-on fieldwork encounters and experiences. There was minimal or no reference made to experimental modelling of issues, processes and practices, role-play and stimulation, audits and enquiry activities.

At a case-study level, teachers said that they could use learning support materials which could provide content information (especially visual aids such as posters, fact sheets, presentations and videos); fieldwork; experiments; audit activities; research projects which require the learners to find out and investigate in their local area; role-play; action activities; discussions; and reporting. Many teachers in this study described successful marine and coastal education lessons as those that provide the teachers with knowledge and successful learning support materials as those that would help to provide knowledge and understanding.

However, during observed lessons within the context of four school cases, all of the teachers did presentations on definitions and concepts. The two high schools did revision lessons. One primary school used a textbook for a short reading and discussion activity and the other primary school did an experiment using the recently acquired ACEP science kit, but most of the lesson time was spent teaching concepts and factual content.

When asked what materials were used for teaching the teacher said that 'normally in class we just do it theoretically' and 'We just theorise. You have seen in the class. Most of the things we theorise because we are running short of teaching material …'.

During the teachers' feedback workshop where the initial findings were discussed, the teachers agreed with this evidence, saying that they are accustommed to theorising and not using learner-centred approaches. They reported that they are interested in teaching concepts and facts and this is a result of their history which will take much time to change because the curriculum is changing so often. The curriculum allows for different teaching approaches but change in teaching practice is difficult. The teachers said that they had received plenty of training in other methods, lesson preparation, assessment, learning outcomes and classroom management from the Department of Education. However they have not been provided with content. One teacher said: 'How can someone be trained to prepare a lesson when he does not have the content? People do not know new concepts and topics and are never trained to teach these concepts or topics. They are only learning class management.'

Finding 3: There is no culture of use of materials in schools following the annual introduction of new ACEP materials.

Of the 21 teachers who completed questionnaires, only six reported that they had actually used some of the ACEP materials. Some teachers said that they had attended workshops on the ACEP materials even though they had not used the materials after the workshops. ACEP has run workshops with the intention of showing teachers how to use materials and how materials link to the curriculum. Only then could teachers take the materials back to their schools.

During the school visits teachers were questioned in order to locate materials that had been used. I discovered in two cases that teachers who used to work with the ACEP materials had left their schools. Only three schools were able to show the materials that were in storage. In the

other schools that were visited, I tried to locate teachers who had used ACEP materials and had attended workshops but no tangible connections were established.

During the feedback workshop, the teachers agreed that there was a high turnover of teachers in their schools and teachers often wanted to move to urban schools. There was no handover of skills or the actual materials once the teachers left. The teachers did however report that the situation was improving in the high schools and that teachers were staying in the rural schools because the government was offering training on condition that teachers stay.

During this workshop the teachers said that during their teacher training they learnt to mostly 'theorise'. They therefore reported that they had no skills in using learning support materials. They said that they were not 'moving fast enough' with a new learner-centred curriculum and getting the skills in 'handling materials'. Their classes were also extremely large (sometimes 70 learners), which made the use of materials difficult.

The teachers stated that the National Curriculum Statement was very compact and fitting in marine environmental education (even if they wanted to) was difficult as there was no space or time. The teachers had also not been exposed to the marine sciences before and said that this was a new science to them, which meant they were often unable to link the information from materials to their classroom practice.

Finding 4: The marine and coastal knowledge holding power is outside the realm of the teachers' practice and control.

The environmental education initiatives in the area are run by the local community conservation officers. These initiatives include rocky and sandy shores fieldtrips, presentations on turtles, environmental special days, coastal clean-ups, competitions and the Eco-schools programme.

All of teachers in the case study schools referred to field trips when asked to discuss a successful marine and coastal activity. They also mentioned the annual coastal clean-up, the local conservation authority's presentation on turtles, the drama of Peter Tim finding the coelacanth, Eco-schools and a global warming poster competition. Although these activities are broader than only field trips, they are all activities that are initiated by the conservation authority and environmental education service providers. The conservation authority funds the registration of schools in the Eco-schools programme and has sponsored the building of classrooms in some schools.

Most of the teachers stated that marine and coastal education materials could be used in the Natural Sciences. Common focus areas chosen within the materials or topics that teachers were interested in were ecology (food chains, ecosystems, ecology of coelacanths, etc.) and climate change.

There is therefore evidence that the teachers in this area seem to equate marine and coastal environmental education with the activities that are provided or controlled by the local conservation authority. Even when asked to describe the useful marine and coastal learning support materials, the teachers would refer to mostly field trips and competitions run by the authorities and service providers like ACEP.

Discussion of Findings

Alignment of the materials with the requirements of the curriculum has placed an emphasis on experiments with a loss of environmental content and a narrowed scope for active environmental learning.

A constructivist approach underlies the construction of the new South African curriculum that was developed after democracy. This is a learner-centred approach and the teacher is seen as a facilitator of learning – not someone with specialised knowledge. If one takes a progressivist view of curriculum, this curriculum placed emphasis on the processes and everyday knowledge at the expense of conceptual and content knowledge (Chisholm, 2004). Schudel (2010) also states that OBE and Curriculum 2005 prioritised skills and background knowledge at the expense of content.

Chisholm (2004) states that the principles of learner-centredness, relevance, integration, non-discrimination, human resource development, creative and critical thinking, and quality education were good but there were assumptions made about teachers and what was actually going on in the classroom. Teachers were expected to build the content of the curriculum themselves with a curriculum that had complex and difficult terminology and an assessment process which was also difficult.

Young (2008) states the following:

> *Learning, according to this view, becomes to be seen as little more than the 'construction of meanings' or a 'conversation' – regardless of what these meanings are, what the conversations are about, or whether they give learners any reliable understanding of the world, or power over it. One unfortunate legacy of apartheid is that many curriculum developers have been enthused by what they have seen as the emancipatory possibilities of social constructivism. This has led them to dismiss any notion of curriculum content being prescribed by specialists, and to see syllabuses as inherently authoritarian, rather than as frameworks that are necessary if genuine intellectual development is to take place.* (Young, 2008:191)

Through the prioritisation of skills, background knowledge and an outcomes-based curriculum, the content knowledge is sacrificed. This has played out in the situation around ACEP learning support materials which revealed a loss of environmental content over time as they became more closely aligned with the outcomes-based curriculum. This content is the formal or specialist knowledge referred to by Young (2008).

Young (2008) states that 'genuine intellectual development' is dependent on specialist and formal content knowledge. Clear boundaries between informal and formal learning are important because they allow for learning to go further than the 'non-school' local and situated experience. When looking at the South Africa curriculum context, Young (2008) says that when the division between the two knowledge types becomes less apparent, the informal knowledge dominates in the curriculum policy because of this 'blurring of distinctions'. Social constructivism then provides the academic justification of this curriculum policy which has been criticised for not working and has led to confusion amongst teachers. Young

(2008) says that failure of the curriculum therefore came about not only be because it was not implemented or resourced adequately, but also because it was based on mistaken assumptions about knowledge construction and the uncertainty of these knowledge boundaries.

The analysis of the ACEP learning support materials also revealed that alignment with the curriculum resulted in a narrowed scope for active environmental learning. Schudel (2010) highlights the importance of developing environmental learning skills and not just the environmental content. Analytical, reflexive, problem-solving, explanation and evaluative skills should be developed for environmental teaching and learning. The teaching methods and skills for active learning should be developed around the content and local environment. Once teachers are given environmental content they need to understand this environmental knowledge in order for their learners to make meaning of the knowledge.

Schudel (2010) also discusses the role of 'new knowledge' for active learning. Informed choice is possible when this knowledge is applied and new knowledge from experts is needed to allow learners to move beyond their prior everyday knowledge. She discusses this in relation to the Vygotskian view that 'new knowledge consolidates and challenges prior knowledge. It feeds new actions. It lays the foundation for informed choice. It is essential for learning concerned with change' (Schudel, 2010:29).

How teachers say they could use materials is not fully realised in classroom practice (emphasis on learning content and concept definitions).

The formal content knowledge loss in OBE is significant. The resulting loss of environmental content in learning support materials such as those developed by ACEP is also significant, especially as evidence suggests that the Maputaland teachers had limited environmental content knowledge and were seeking learning support materials and activities which provide this. In the 2007/2008 Eco-Schools evaluation, Rosenberg (2008) found that teachers had limited environmental content knowledge which is related to the curriculum. Mbuyazwe (2009) also found that teachers did not have the marine content knowledge to teach their lessons. The teachers in her study felt that they needed to acquire content. Mbuyazwe (2009:84) says that 'there is a direct link between the quality of learners' learning and the role of teacher knowledge of content so as to support learning'.

Mbuyazwe (2009:87) states that 'currently naming and defining is still what teachers know and practice in school classrooms'. In her research this teaching practice was shown to influence how teachers searched for content which they already knew when they were selecting materials for lessons. How the materials could support Learning Outcomes and Assessment Standards, their purpose and their curriculum alignment were not considered. The teachers only used the content and factual information. Mbuyazwe (2009) also found that learners were expected to learn through reproducing the facts and content information that teachers had taught.

The curriculum has gone through ten years of intensive reform and this has resulted in much insecurity, confusion, criticism and a lack of confidence in the system (Dada *et al.*, 2009). Teachers have not been trained and prepared sufficiently in teaching methods, especially as regards learning area content. Teachers are also needing guidance in subject-specific teaching methods and understanding the content. In many schools the teachers are not teaching the

same learning area or subject for more than a year as they are rotated and this increases the complexity of this issue (Dada *et al.*, 2009).

There is no culture of use of materials in schools following the annual introduction of new ACEP materials.

Like in the ACEP case, in a case study on the Creative Solutions to Waste Project, Mbanjwa (2002) found that the use of environmental education learning support materials was limited and superficial. In a case from the Learning for Sustainability Project (Janse van Rensburg & Lotz-Sisitka, 2000:90), it was found that teachers struggle to use learning support materials within activities and the materials are often used as 'display items'. Mbuyazwe (2009) found that teachers were unable to effectively use materials or structure curriculum-aligned learning activities from the content (facts and definitions).

The ACEP case shows that teachers need skills in taking information from learning support materials and accessing the relevance of the information to 'the learners' capacity, learning area, environmental context, outcomes, and intended pedagogical processes and applying the knowledge in curriculum processes' (Janse van Rensburg & Lotz-Sisitka, 2000:91). Teacher professional development, reflexivity and consideration of the teacher as a researcher and lifelong learner as seen as being important when developing learning support materials. The design of learning support materials should contribute to both teachers' conceptual development and learners' abilities to learn (Mbanjwa, 2002).

Learning theories and teaching methods influence the use of materials. Teachers need to be educated in how to access the materials and the 'relation between teaching methods and the use of the materials' (NEEP-GET, 2005:40). The teacher's role is to be the mediator of the learning processes in selecting the learning support materials and to use these in an adaptive way within the learners' context. However, teachers tend to select materials that are easier to use and understand (NEEP-GET, 2005).

As shown in this study, teachers in rural and under-resourced schools especially require skills to use learning support materials (NEEP-GET, 2005). Learning support materials cannot only be given to teachers, they need to be supported in using the materials (Janse van Rensburg & Lotz-Sisitka, 2000). Teachers should participate in not only the development of learning support materials, but also in discussions around the effective use of learning support materials (NEEP-GET, 2005). Lupele (2002) used participatory approaches to materials development but also used contextual profiling to understand the local context and the factors influencing the participators' practice and educational approaches.

Teachers are the primary mediators of the use of materials in learning processes, especially active learning processes. Lessons need to be planned which meet the criteria of the curriculum and are relevant to the local context and materials should be selected according to how effective they will be in the learning process (Lotz-Sisitka & Russo, 2003). Schudel (2010) speaks of the responsive provision of appropriate learning support materials and how this can support teachers' ability to develop and adapt their own learning support materials for teaching.

The marine and coastal knowledge holding power is outside the realm of the teachers' practice and control.

Environmental education initiatives in the Sodwana Bay and Kosi Bay areas are arranged and supported by local conservation authorities and service providers like ACEP. The teachers associate any environmental education as being part of these initiatives, especially excursions. Ketlhoilwe (2007a) found that 'normalising strategies' were applied by teachers in their interpretations of environmental education policy. Normalisation is defined in Ketlhoilwe (2007b) as being 'norms of behaviour, attitudes and knowledge'. The 'powers of expertise' or 'symbols of scientific authority' create assumptions about knowledge which are internalised by individuals and normalised.

The three normalising strategies that were identified in Ketlhoilwe's research included: equating environmental education with environmental management activities in schools; expressing frustration with a lack of resources to undertake field trips; and equating environmental education with environmental science (Ketlhoilwe, 2007a).

In this study, teachers only described the environmental education practice that they were comfortable with and they associated environmental education with field work and excursions (showing similar normalising tendencies to those reported in Ketlhoilwe, 2007a). In Mbuyazwe's (2009) study, the teachers felt that seeing the marine ecosystem would help their understanding. Ketlhoilwe (2007a) describes this type of normalising strategy of seeing environmental education as fieldwork as reflecting a narrow understanding of increasing human-environment complexities in an African context.

Ketlhoilwe (2007a) discusses how environmental education policy discourse interpretation is influenced by local power-knowledge relationships. Similar to the Maputaland context, in Botswana environmental education support was provided for by conservation bodies, which led to a conservation discourse and emphasis on fieldwork and environmental management. This in turn influences teaching practice – both epistemological and pedagogical – and creates science-based interpretations of the environment and environmental education. The content and activities were narrowed to only being nature-based and environmental education discourses like problem-solving and issues-based approaches; the social and historical causes of issues and economic development aspects found in issues and risks were left out (Ketlhoilwe, 2007a). In the Maputaland schools environmental learning support materials were seen to be useful for the Natural Sciences and the chosen focus areas were mostly limited to ecology.

Conclusion

In July 2009 the South African Minister of Education assigned a panel of experts to research the major issues and challenges in the implementation of the National Curriculum Statement and to come up with suitable recommendations for improvement (Dada *et al.*, 2009). The review team in Dada *et al.* (2009) stated that they supported the Department of Education's move away from OBE. In order to address the issues of knowledge gaps, the review suggested that '…outcomes be replaced with clear content, concept and skill standards and clear and concise assessment requirements' (Dada *et al.*, 2009:45).

Schudel (2010) has discussed the role of new knowledge for active learning and environmental education service providers who develop learning support materials (such as ACEP) could take up this role. The existing ACEP learning support materials, when combined (see Figure 7), provide a range of activities for active learning and specialist marine environmental content for 'new knowledge'.

Teachers have not been trained and prepared sufficiently in suitable teaching methods, particularly in learning area content. Teachers need guidance in subject-specific teaching methods and understanding of the content (Dada *et al.*, 2009). Environmental education service providers can play a role in the professional development of teachers which addresses these needs. The use of learning support materials, such as those developed by ACEP, can be strengthened by teacher development in the skills and methods needed to implement appropriate environmental learning processes within specific learning areas.

Developers of environmental education learning support materials also need to be responsive in providing learning support materials that are relevant to local needs and fit in with suitable learning processes such as active learning (Schudel, 2010). Active learning allows for learning that can develop from the learners' prior knowledge to more sustainable living and environmental management (O'Donoghue, 2001). A challenge is to respond to changing environmental issues (Schudel, 2010). This challenge is relevant to the Maputaland context where the local people around iSimangaliso Wetland Park in Maputaland face many social pressures such as unemployment, a high population growth rate, increasing casualisation of labour and others which will further increase demands on the local marine and coastal natural resources (iSimangaliso Wetland Park Authority, 2008).

Professional development in the use of environmental education learning support materials will need to consider the power-knowledge relationships and normalisation strategies that have been discussed. While there is a place and role for the local conservation authorities and service providers to create learning opportunities in the form of excursions, presentations and the provision of learning support materials, they should strive to allow the teachers to take ownership of the informal knowledge that they know and the formal knowledge which they are being exposed to. Professional development initiatives should strive to allow teachers to have the confidence and skills to lead in the environmental teaching and learning in various local contexts, including the classroom.

The new curriculum will come into practice in 2011 and the structure of the syllabus will limit teachers in selecting environmental topics that are relevant to local needs and issues (Schudel, 2010). The appropriate learning skills, content and concepts, texts, pedagogical approaches and assessment requirements will be specified in the new curriculum and assessment documents. Textbooks will be reintroduced and a national catalogue of approved and screened, curriculum-aligned learning support materials will be developed (Dada *et al.*, 2009).

With this in mind, there is a question which will ultimately decide the role that these authorities and service providers will play – that is, the question of where they will fit in the new changing curriculum which is more structured and has specified curriculum content. How and what role will they play in learning support materials provision and development? These service providers will need to be strategic and draw on the findings and lessons from

educational research in order to: meet the needs of the curriculum; meet the learning and teaching needs of the learners and teachers; and encourage active environmental learning for more sustainable living in the rural areas of Maputaland.

Notes on the Contributor

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Sustainability Issues in the Geography Curriculum for an Undergraduate Programme: The case of Addis Ababa University, Ethiopia

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Abstract

The Lucerne Declaration on Geographical Education for Sustainable Development proposes that the 'paradigm of sustainable development' be integrated into the teaching of geography at all levels and in all regions of the world. This study is aimed at assessing the extent to and ways in which sustainability issues have been addressed in the revised undergraduate curriculum for Geography at Addis Ababa University, Ethiopia. The study also attempts to critically examine the methods of delivery suggested in the curriculum. Content analysis has been used as a principal technique. Twenty (sustainability) issues have been identified for analysis from the first and second sections of the United Nations Agenda 21. Courses offered in the Department have been put under four categories: physical/environmental; social/economic; interdisciplinary/integrative and foundational/skills. Attempt is then made to show the extent to which sustainability issues have been integrated into the first three categories of courses. Results indicate that the three pillars or building blocs of sustainable development are duly represented in the curriculum, with more courses dealing with social/economic issues. Moreover, a noticeable attempt has been made to take an integrative approach. It is, however, clearly evident that classroom-based approaches occupy proportionally more space and remain the dominant modes of delivery across the course categories.

Introduction

The UN Decade of Education for Sustainable Development (UNDESD) proposes that 'all levels of the education and training system need to be re-oriented towards a more sustainable model of development that meets the needs of the present generation, without compromising or jeopardizing the capacity of future generations to meet their needs' (UNEP, 2008:9). Higher education institutions (HEIs) are often considered as crucial for the creation, transfer and application of knowledge as well as for the training and re-training of highly qualified professionals and managerial staff (Shihab-Eldin, 1998). One of the major aims of sustainability education at this level is to help prospective graduates to not only develop a broad conceptual framework but also to gain specialised knowledge and technical skills which could, in turn, be applied in natural resource management and environmental protection (Belal & Springuel, 1998).

Tertiary level academic institutions vary in the way they approach sustainability (Beringer & Adomssent, 2008; Togo & Lotz-Sisitka, 2008). Some concentrate on minimising their ecological impact through emphasising operational practices; while others focus on sustainability in

the curriculum and take up the question of sustainability into their teaching, research and community service activities (Togo & Lotz-Sisitka, 2008). Beringer and Adomssent (2008) indicate three different types of projects related to sustainability in higher education. The first are what they call 'traditional', 'first generation' greening the campus initiatives (including campaigns and initiatives that seek to change one or a limited number of operational or academic aspects). On the other end of 'sustainability in higher education' spectrum are the sustainable university research and development projects. These are scientific projects, usually externally funded and targeting the entire institution. In between the two are those greening the campus projects that work primarily on the practical domain but target the entire institution. Such projects work on the level of systematic change and have a theoretical-conceptual framework or underpinning (Beringer and Adomssent, 2008).

A strategy of education for sustainable development in sub-Saharan Africa was developed in 2006 (UNESCO, 2006a). This strategy encourages states to adopt policies and practices to ensure the mainstreaming of education for sustainable development (ESD) in education. It has been noted, on the other hand, that mainstreaming ESD requires developing, revising and adapting curriculum and learning support materials (Lotz-Sisitka, 2006). The 'strengths model' appears to offer a useful conceptual entry point for possible development and revision of curricula to address sustainability issues.

The Strengths Model

'No one discipline can or should claim ownership of ESD.' (UNESCO, 2006b:27)

The strengths model is based on the recognition that many topics inherent in ESD are already part of the formal education curriculum though these topics may not be identified or seen to contribute to the larger concept of sustainability (UNESCO, 2006b; Gough & Scott, 2007). The model 'respects existing disciplines but alters the detail of what is taught within them to have a particular focus' (Gough & Scott, 2007:44). What is more, each discipline is believed to have associated pedagogical techniques. The combined pedagogical techniques and strategies of each discipline could, in turn, contribute to an expanded vision of how to teach for creativity, critical thinking, and a desire for lifelong learning.

The strengths model assumes that every discipline and every teacher can make an indispensable contribution to sustainability education. An empirical study conducted in South Africa seems to support this assumption to a certain extent (Togo, 2008). It was found that each of the three surveyed departments accommodates sustainable development issues 'as far as they interrelate with the core purpose and orientation of their discipline' (Togo, 2008:160). What are the strengths of Geography as a discipline? How do geographers approach sustainability? The next section of the paper explores these issues.

Geography and Sustainable Development

Bridging the social and natural sciences

Geographers study how the geosphere provides resources and living space for society and how society exerts an impact on the system 'earth' (Haubrich, 2007:28). In this way, geographers build a bridge between the natural and human sciences and seek to understand the whole 'human-earth' system. A potential strength of this disciplinary culture is, according to Wallace (2002:100), that geographers 'should be better equipped than many other academics to treat complexity and difference seriously, and to appreciate the value of questions about things which interest them that come from "outside the box" of their own particular theoretical framework'.

More specifically, a geographical education is expected to promote sustainable development by:

> …providing students with basic knowledge of the ecological, economic, social and cultural dimensions of sustainable development; skills and methods for evaluating and analyzing changes in natural, built and social environments; an understanding of sustainable ways of living and of environmentally friendly and ecologically effective production; the skill and willingness to work for sustainable development in their everyday lives; the skill to participate in the planning of their own environment; the capacity to develop the aesthetic response to the environment; and the ability to act with conviction in questions affecting the surrounding world and to adopt the role of world citizens working on behalf of sustainable development and for better future at local, regional and international levels. (Houtsonen, 2004:147)

A role beyond bridging

Geographers are also aware that their role goes far beyond conceptually linking the social and natural sciences. Wilbanks (1994:553) argues that geographers should 'advocate the principles of economic fairness and nature-society balance' through their roles as teachers and as citizens. Wilbanks also calls for going an extra mile to do extraordinarily well:

> In addition to integrating knowledge in order to meet pressing social needs and helping to unify our various traditions as a discipline, sustainable development focuses our attention on a great problem of mutual concern that can help to integrate the various pieces of our individual professional lives – to integrate them in the interest of a problem that we care enough about to go that extra mile to do extraordinarily well, not only in our scholarship but in every aspect of the ways that we live as experts in something the world needs very badly. (Wilbanks, 1994:553)

Despite wide ranging recognition of Geography's position as an 'ideal discipline for the academic advancement and promulgation of the concept of sustainable development', there is still a sense that geographers have missed the opportunity to be at the forefront of research and

teaching on sustainable development (McManus, 2004:218). In fact, the environmental studies units that emerged in Australian universities in the 1970s were believed to have been established in order to 'fill a vacuum which emerged as Geography neglected society-environment relationships and applied studies to pursue more narrowly specialized research and teaching' (Harvey, Forster & Bourman, 2002:30).

The brief review on the role of Geography thus reveals two things. First, Geography, given its integrative tradition, can play an important role in addressing sustainability issues. Second, Geography may fail to use the opportunity by excessively focusing on the multiple sub-divisions (e.g. bio-, cultural-, economic-, human-, medical-, physical-, social-, urban-, etc.) that equally characterise the discipline. It seems, therefore, exciting to investigate whether and how Geography curricula are responding to the growing call for academic disciples to demonstrate their 'strengths' with regard to addressing sustainability issues. This paper focuses mainly on the degree to and ways of integration of 'sustainability issues' as defined in Agenda 21, the UN's action plan on sustainable development.

Objectives

In Ethiopia formal discussions to mainstream environment and sustainability into universities started in May 2010 and were linked to the United Nations Environment Ptrogramme (UNEP) Mainstreaming Environment and Sustainability in African Universities Programme (Eshetu, 2010). Does this imply that not much has been done, prior to this initiative, to address concerns about environment and sustainability? This paper tries to answer this question by analysing the degree to and ways in which sustainability issues have been addressed in Geography curriculum for undergraduate programme at Addis Ababa University. The paper also attempts to critically examine the methods of teaching suggested in the curriculum.

Methodology

ESD focuses largely on the major social, economic and environmental issues that threaten the sustainability of our planet. Many of these key issues were identified at the 1992 Earth Summit in Rio de Janeiro and outlined in Agenda 21 (UNESCO, 2006b). Agenda 21 is a document with 40 chapters grouped under four broad sections: (1) social and economic dimensions; (2) conservation and management of resources; (3) strengthening the role of major groups; and (4) means of implementation. It has been argued that understanding and addressing the issues identified in Agenda 21 lie at the heart of education for sustainability (UNESCO, 2006b). In line with this, the present study selected 20 issues, which are more likely to be addressed in Geography curricula, for analysis from the first and second sections of Agenda 21 (see Table 1).

Table 1. Key issues addressed in Agenda 21 and identified for analysis

Section/ chapter	Issues/themes	Section/ chapter	Issues/themes
I/3	Combating poverty[1]	II/13	Sustainable mountain development
I/4	Changing consumption patterns	II/14	Sustainable agriculture and rural development
I/5	Demographic dynamics and sustainability	II/15	Conservation of biological diversity
I/6	Protecting and promoting human health	II/16	Management of biotechnology
I/7	Promoting sustainable human settlement development	II/17	Protection of the oceans, all kinds of seas and coastal areas
I/8	Integrating environment and development in decision-making	II/18	Protection of the quality and supply of freshwater resources
II/9	Protection of the atmosphere	II/19	Management of toxic chemicals
II/10	Planning and management of land resources	II/20	Management of hazardous wastes
II/11	Combating deforestation	II/21	Management of solid wastes and sewage
II/12	Combating desertification and drought	II/22	Management of radioactive wastes

(Source: United Nations, 1992)

As indicated earlier, the major aim of this study was understanding the extent to and ways in which sustainability issues have been addressed in Geography curriculum at undergraduate level. To this end, content analysis has been used as a principal technique. Content analysis is defined as 'a research technique for objective, systematic and quantitative description of the manifest content of communication' (Berelson, 1952, quoted in Asgedom, 1998:18). Leedy and Ormord (2005) and Neuendorf (2002) presented the technique as 'a careful, detailed, systematic examination and interpretation of a particular body of material in an effort to identify patterns, themes, biases, and meanings' (Leedy & Ormord, 2005, and Neuendorf, 2002, quoted in Berg, 2007:303–304). The technique is often accomplished through the use of objective language, categorisation, and systematic surveys (Burns-Bammel *et al.,* 1988, quoted in Norris & Jacobson, 1998:39).

The recently revised Geography curriculum for undergraduate programme at Addis Ababa University has been analysed based on the following steps:

Step one: Determining analytical categories

- The major area/core courses (excluding general education courses) offered in the Department have been divided into four categories: physical/environmental geography;

social/economic geography; interdisciplinary/integrative courses; and foundational/skill courses. The first three categories have been considered in this paper for analysis. The fourth category is not expected to address any specific issue like the one investigated in this paper.

Step two: *Establishing units of analysis*

- The specific courses related to the first three categories, indicated in step one, have been used as units of analysis. The courses in the three categories account for 67.4% of the core courses; and 56.9% of the total course requirement for graduation.

Step three: *Determining criteria for sorting data* into analytic categories

- The criteria used here is having sustainability issues clearly (manifestly) mentioned in the statements of objectives and/or corresponding course descriptions. Twenty such issues likely to be addressed in Geography curricula have been identified (see Table 1).

Step four: *Counting the number of entries* in each of the three categories

- This has been undertaken by counting cases (specific courses with objectives and/or contents related to sustainability issues).

Findings

Programme background, objectives and graduates' profile

The undergraduate programme of the Department of Geography has a history that goes back to the beginning of tertiary education in Ethiopia. The teaching of Geography started in 1950 at the University College of Addis Ababa, the only tertiary-level institution in the country at the time. Initially, Geography was offered as a field of study to Arts students. Since 1958, the Department has been offering courses at the undergraduate level leading to the Bachelor of Arts Degree in Geography.

A major revision of the curriculum took place at the beginning of 2000 which led, among others, to a change in the name of the Department from 'Department of Geography' to 'Department of Geography and Environmental Studies (DeGEES)'. Other aspects of the change include strengthening of geographic tools and techniques and putting greater emphasis on environment and land use in response to the emerging realities and corresponding challenges at global, country and disciplinary levels. One can thus note here that the Department has given due attention to recent developments at global and national levels and responded to them by making major revisions to its curriculum. According to this revised curriculum (DeGEES, 2008), the objectives of the undergraduate programme are to produce professionals who are able to:

- Distinguish facts about and patterns of spatio-temporal processes underlying the human and physical phenomena and their interactions.
- Identify and explain spatio-temporal problems of the physical and human environment.
- Distinguish the risks, potentials, and prospects of Ethiopia's environment in isolation as well as in global perspective.

- Generate, analyse, and present spatio-temporal data of the physical and human environment using different scientific procedures, models, tools, and techniques.
- Demonstrate confidence and conviction that enable them to become positive role models to society, committed to change and development.
- Participate in community development: provide professional trainings; mobilise the public for positive actions; and provide professional consultancy services with a view to accelerate environmental, social and economic development.
- Conduct research in different areas (environment, development, society, economy, etc.) that would help in solving societies' problems and disseminate results thereof.

The revised curriculum also outlines the graduates' profile (DeGEES, 2008). Accordingly, the graduates of the Department are expected to:

- Demonstrate knowledge and understanding of spatio-temporal distribution of both the physical and human phenomena; and use geographic and environmental perspectives to evaluate issues, processes and events.
- Identify, collect and compile information through household and field surveys, aerial photographs and remotely sensed satellite images so as to alleviate spatio-temporal problems of physical & human environment.
- Demonstrate ethical values, and set a leadership role model in national, regional and local development.
- Work cooperatively for the common good of society.
- Initiate and participate actively in community services and developmental activities.
- Apply modern tools and techniques like Geographic Information System (GIS) and Remote Sensing (RS) in managing resources and protecting environment for sustainable development.
- Develop her/himself through continuous acquisition of knowledge and experience; and to be able to survive in a dynamic environment and rapidly evolving society.
- Conduct research beneficial to society and present results in clear and coherent manner.
- Demonstrate basic understanding about fundamental national issues and sustainable development.

McManus (2004:229) suggests that sustainable development is 'a challenge to higher education and, possibly, to geography more so than many other disciplines'. The list of objectives and the graduates' profile shown above clearly indicate that the Department of Geography and Environmental Studies at Addis Ababa University takes sustainability issues seriously. All the key components of sustainability education (environmental protection, social justice and economic growth) seem to be duly recognised. Moreover, desired characteristics of sustainability education like change in a value system; aspiring to be role model; active participation in community mobilisation and development endeavours; preparing to manage changes and uncertainties in society and the physical environment; capacity to work cooperatively, etc. have been clearly articulated in the graduates' profile. One can thus see that the programme objectives and graduates' profile, as they stand in the revised curriculum, have the potential to guide both the

selection of appropriate content for sustainability education and approaches thereof.

Programme content

As indicated earlier, the Department needed to revise its curriculum in order to address some of the shortcomings both in content and modes of delivery. The revision had two aspects: new courses were added and the content of some of the existing courses were modified in such a way that they properly address current economic, social, cultural and environmental problems (DeGEES, 2008). The changes affected all four categories of courses (see Methodology). Accordingly, seven courses (20 credits) were newly added and five courses (15 credits) modified. This paper attempts to relate all the core courses offered by the Department to the so-called three pillars or building blocks of sustainable development (see Table 2).

Table 2. Major areas/core courses offered in the Department by category

Category[2]	Course title	Credit hours	Status	Methods of teaching suggested
CI/1	Biogeography	3	Old	Not indicated
CI/2	Geomorphology	3	Modified	Lecture, illustrations (slides, diagrams, photographs) and fieldtrip
CI/3	Fundamentals of Climatology	3	Modified	Lecture, discussion, and field visit
CI/4	Applied Climatology	3	Modified	Lecture and field trip
CI/5	Environmental Hydrology	3	New	Lecture and field visit
CI/6	Soil Geography	3	Old	Lecture, discussion, field visits, and laboratory work
	Total	**18**		
	Percentage	**19.6**		
CII/1	Introduction to Economic Geography	3	Old	Lecture, audio-visual resources, and discussion
CII/2	Social and Cultural Geography	3	Old	Lecture, audio-visual resources, student presentations and discussion
CII/3	Geography of Population and Settlement	3	Old	Lecture, student presentations and discussion

CII/4	The Geography of Transport and Development	3	Old	Lecture, student presentations and discussion
CII/5	Urban Geography	3	Old	Not indicated
CII/6	Gender Geography	2	New	Lecture, student presentations, dialogue and discussions
CII/7	Livelihood and Food Security	3	New	Lecture and student presentations
CII/8	Political Geography	3	Old	Lecture
CII/9	Economic Geography of Ethiopia	3	Old	Lecture, student presentations and discussions
CII/10	Urban and Regional Services Planning	3	New	Not indicated
	Total	**29**		
	Percentage	**31.5**		
CIII/1	Fundamentals of Regional Planning	3	Modified	Lecture, student presentations, discussion, guest lectures, and field visits
CIII/2	Seminar on Africa and the Middle East	3	Modified	Lecture, student presentations
CIII/3	Agro-ecology and Farming System	3	Old	Lecture, student presentations and field visit
CIII/4	Global Environmental Issues	3	New	Lecture and seminars
CIII/5	Terrain Analysis and Land Use Planning	3	Old	Lecture, practical laboratory work and field trip
	Total	**15**		
	Percentage	**16.3**		

Physical/environmental Geography

Inkpen (2009:378) argues that 'physical geographers have made substantial contributions to sustainable development by providing understanding about the nature of the physical environment and how it changes'. The curriculum analysis shows that six courses (19.6% of the core courses) fall under the category 'physical/environmental' Geography. One can see from the list of the courses that the essential components of the bio-physical environment are all included (Table 2). It is also important to note that most of the courses in this category have

been modified during the revision, with only two retained from the old curriculum. A course entitled 'Environmental Hydrology' is newly introduced.

Social/economic Geography

Ten courses (accounting for 31.5% of the core courses) fall under social/economic Geography (Table 2). The list of issues treated in this category is quite diverse. Society, culture and economy; population and settlement; transport and development; urbanisation; gender; livelihood and food security; politics; and regional planning are all addressed. Three of the ten courses – namely, 'Gender Geography'; 'Livelihood and Food Security'; and 'Urban and Regional Services Planning' – are newly introduced following the curriculum revision. This group of courses is intended to create a comprehensive understanding of the social and political roots of sustainability issues and concerns.

Interdisciplinary/integrative courses

Geography often aspires to have an integrative understanding of the earth 'as the home of humanity' (Wallace, 2002:101). It is further suggested that such a perspective gives the discipline a unique opportunity to 'respond knowledgeably to some of the most pressing issues confronting individuals and societies in our time' (ibid.). Table 3 indicates that five courses fall under the third category. The courses in this category are aimed at integrating issues of the bio-physical and socio-cultural environments, and, hence, most appropriate to address sustainability as it requires an integrated approach to understand complex problems. For instance, one of the courses in this category, 'Global Environmental Issues', could be readily used to initiate and conduct discussions on any issue at a global level. It is also important to note here that this particular course is a result of the recent curriculum revision (Table 2).

Foundational/skill category

Wilbanks (1994:549) argues that in this age of 'information superhighways' our skill in GIS – emphasising connections with subject-matter knowledge – will be part of our contribution to the art and science of sustainable development. McKeown-Ice (1994:42) also suggests that 'Cartography and map interpretation offer a strong analytic component to environmental education'. In view of these arguments, the revised Geography curriculum could earn more than a satisfactory 'grade' for incorporation of courses related to geographic skills. Nearly one third of the courses (32.6%) fall under the foundational/skill category. The courses cover skills in areas ranging from map reading to digital image processing and interpretation. As indicated in the methodology section, courses in this category are not expected to be linked with any specific aspect of sustainability. However, they can facilitate understanding and application of concepts directly related to sustainability. The fact that ten courses are allotted to this category indicates a clear tendency to focus more on skill development, perhaps to address the growing need for 'vocationally focused degrees' (Holmes, 2002:16). Four of the ten courses are committed, for instance, to skills related to remote sensing and geographic information system.

Table 3. Integration of sustainability issues into different courses

Issues from Agenda 21		Category of courses				Specific courses
Section/ Chapter	Issue	CI*	CII*	CIII*	Total	
I/3& I/4	Poverty and consumption patterns	0	1	0	1	CII/7**
I/5, I/6 & I/7	Demographic dynamics, human health and human settlement	0	5	0	5	CII/2, CII/3, CII/5, CII/6, CII/10
I/8	Integrating environment and development	0	1	2	3	CII/9, CIII/1, CIII/4
II/9	The atmosphere	2	0	0	2	CI/3, CI/4
II/10&II/14	Land resources, agriculture and rural development	1	0	2	3	CI/6, CIII/3, CIII/5
II/11& II/12	Deforestation, desertification and drought	0	0	1	1	CIII/4
II/13	Mountain development	0	0	0	0	
II/15	Biological diversity	1	0	0	1	CI/1
II/16	Biotechnology	0	0	0	0	
II/17&II/18	Freshwater, oceans, seas and coastal areas	1	0	0	1	CI/5
II/19&II/20	Toxic chemicals and hazardous wastes	0	0	0	0	
II/21& II/22	Solid wastes and sewage; and radioactive wastes	0	1	0	1	CII/10
	Globalisation	0	4	1	5	CII/1, CII/2, CII/4, CII/8, CIII/2
	Total	5	12	6		

CI* (Category I): Physical/environmental Geography

CII* (Category II): Human/economic Geography

CIII* (Category III): Interdisciplinary/integrative courses

CII/7**: The course numbers are as given in Table 2

Integration of sustainability issues

As noted earlier, this study tries to examine the extent to which sustainability issues have been integrated into the revised curriculum for undergraduate Geography programme. To this end, 20 issues have been identified for analysis from Agenda 21. Another issue, 'globalisation', has been added to this list (Table 3). Some of the issues have been combined for the sake of brevity.

Table 3 shows that 15 out of the 20 issues (75%) have been integrated to a larger or smaller extent. The five issues that have not been adequately addressed in the curriculum are mountain development, biotechnology, toxic chemicals, hazardous wastes, and radioactive wastes. Category I of the Geography courses, physical/environmental geography, addresses aspects of six of the 20

issues: the atmosphere; land resources, agriculture and rural development; biological diversity; freshwater, oceans, seas and coastal areas. The second category of Geography courses, social/economic Geography, addresses aspects of eight of the issues from Agenda 21 and globalisation. The issues addressed in Category II courses are: poverty and consumption patterns; demographic dynamics; human health and human settlement; integrating environment and development; and solid wastes and sewage. Courses under category III, interdisciplinary/integrative, address five issues from Agenda 21 and globalisation. The issues addressed in Category III are: integrating environment and development; land resources, agriculture and rural development; and deforestation, desertification and drought.

It is important to emphasise that all the courses in three of the categories, except a course entitled 'Geomorphology', address sustainability issues as defined in this study. Obviously, some courses address the issues more extensively than others. Comparatively, courses in Category II have addressed larger number of issues than courses in other categories (Table 3). Details as to the extent to and ways in which the courses addressed specific sustainability issues are presented in the next section.

Extent to and ways of integration

This section presents a detailed account of how sustainability issues have been addressed in the curriculum by examining each of the issues in turm following the order of their presentation in Agenda 21.

Poverty and consumption patterns

These two important issues have not been adequately addressed in the revised curriculum. They have not been dealt with clearly and directly. The only course that addresses issues closely related to poverty and patterns of consumption is 'Livelihoods and Food Security'. The topics suggested for coverage in the course include vulnerability and food security; livelihood assets and strategies of poor households in developing countries; and intensity and patterns of food insecurity over space and time.

Demographic dynamics, human health and human settlement

These are issues that enjoy the highest coverage in the curriculum. There are a number of courses that address these issues both directly and indirectly. A course entitled 'Geography of Population and Settlement' seems to be most directly related. The topics proposed to be covered in this course include factors related to spatial population distribution; theories related to population and population-resource relationships; fertility and mortality patterns and migration of population; impacts of population growth on development and environment; and population planning and types and patterns of settlement.

Issues related to human health and settlement are also touched on in a course entitled 'Social and Cultural Geography'. The topics suggested for coverage in this course include changing human-environment relations; spatial inequalities in distribution and access to resources at local, regional and global levels; social planning and public policy; role of civil society in social welfare; role of culture in transformation of the earth; human settlements and spatial patterns

of language and religion; cultural unities and diversities; and multiculturalism and globalisation. A course entitled 'Urban Geography' also contains issues related directly to human settlement (and indirectly to human health). The topics suggested in this course include characteristics of urban settlements; contemporary world urbanisation patterns; the role of cities in national and regional economic development; urban land use patterns and the evolution of functional zones; the quality of urban life, urban labour-market structure, urban poverty and access to housing and urban services (with a focus on characteristics of urban places in developing countries).

A course entitled 'Gender Geography' seems to have huge potential to address issues surrounding demographic dynamics in developing countries. As it stands, however, the course only skirts the issue. Topics suggested for coverage in this course include geographies of gender and the gendered nature of spatial relations; feminism and feminist geography, relation of gender and geographical studies; gender as a structuring principle in all human activities; history of women (feminist) movement and academic feminism; relationship between gender and rurality; women and environment; differences in the lives of men and women over space; identity, power and sexuality.

Integrating environment and development

Courses in Category III generally take a more integrative approach to the issue of environment and development. For instance, the course entitled 'Fundamentals of Regional Planning' addresses issues like the role of environmental and human resources in regional development; theories of regional development; and instruments of regional development policy. Another course in the same category, entitled 'Global Environmental Issues', is one of the courses in the entire curriculum best suited to bring together issues from the bio-physical and socio-cultural environments (see details about this course under 'Deforestation, desertification and drought'. Another course entitled 'Economic Geography of Ethiopia' also attempts to show the link between use of environmental resources and economic development. Topics suggested for coverage in this course include population-environment interactions and the resource base of Ethiopia, among others.

The atmosphere

This is one of the issues in the physical environment which are thoroughly presented in the curriculum. Two courses entitled 'Fundamentals of Climatology' and 'Applied Climatology' address the issue. Topics suggested for coverage in the first course include composition and structure of the atmosphere; climatic elements; temperature; pressure; winds; atmospheric moisture; and climatic classification and types. The second course sets out to cover such issues as evaporation and evapotranspiration; water balance/budget; rainfall-coefficient and rainfall regimes; and methods of analysing the trends of temperature and rainfall as well as global climatic changes. It is interesting to see that global climate change has been specifically mentioned as one of the topics for discussion in 'Applied Climatology'.

Land resources, agriculture and rural development

Three courses address these issues to a different degree. The course entitled 'Soil Geography' focuses, for instance, on issues related to land and land resource management. Topics suggested

include the physical, chemical and biological properties of soil; processes and factors of soil formation and development; principles and methods of soil classification; distribution of major soil groups with emphasis on Ethiopian soils; soil degradation and its forms; and conservation and management of soils. Another course entitled 'Agro-ecology and Farming System' offers a more comprehensive basis for dealing with issues related to land resources, agriculture and rural development. Among the issues suggested to be covered are physical bases of agriculture; land degradation, pollution and its protection; agro-climatology and hydrology; climate and soil moisture regions; climatic requirements of crops and livestock; weather hazards; world water resource and water budget; crop and animal pests and diseases; cultural bases of agriculture; people as producers and consumers; crop and livestock domestication; the science and technology factor; the social and political factor; farming systems; and agriculture and environment.

The course entitled 'Terrain Analysis and Land Use Planning' also has a huge potential to address issues related to land use and land resource management. As it stands, however, this course seems to be too technical with the following issues given more emphasis: terrain data types and sources; procuring, extracting and organisation of terrain data; analysis of attributes of terrain; terrain classification and terrain units; techniques of terrain representation; drawing cross-section; absolute and relative relief and dissection index; slope analysis and mapping; drainage system and pattern; drainage density and texture; drainage basin delineation and characteristics; terrain characteristics and their uses.

Deforestation, desertification and drought

The revised curriculum introduced an interdisciplinary course directly related to the issue of sustainability and sustainable development. This course, entitled 'Global Environmental Issues' is aimed, among others, at exposing students to the different viewpoints on interaction between environment and development. Issues proposed for discussion include the greenhouse effect; ozone depletion and climate change; destruction of habitats and biodiversity; freshwater shortage and land degradation; and the concept of environmentally sustainable development. Issues related to deforestation, desertification and drought are largely addressed in this course; and to a smaller extent in other courses analysed in this section of the paper.

Biological diversity

There is a course entitled 'Biogeography' aimed at helping students to 'appreciate the impact of man in changing his environment and his role in protection and conservation' (DeGEES, 2008). Among the topics suggested for coverage are the evolution and distribution of life; structure and function of ecosystem; and the impact of people on the environment. One can thus note that the course offers ample opportunity to discuss the current trends (both local and global) in biodiversity use and abuse.

Freshwater, oceans, seas and coastal areas

One of the newly introduced courses, entitled 'Environmental hydrology', is aimed at enabling students to 'understand the key processes of the hydrological cycle … and its interaction with the broad environmental system' (DeGEES, 2008). The course emphasises freshwater flow

on and near the ground surface. Among the topics intended for coverage are precipitation, evapotranspiration, infiltration and soil water processes; stream flow, groundwater formation and movement; and basic concepts in water resources management. This course could form the basis for a critical assessment of issues related to water resource use and management; and the problems related to current use of water bodies, wetlands and coastal areas.

Solid wastes and sewage

An interdisciplinary course entitled 'Urban and Regional Services Planning' offers a huge opportunity to address issues related to provision of urban services including solid waste management and sewage treatment. One of the objectives of this course sets out, for instance, to provide students 'with methods associated with planning for improved municipal service delivery and facilities such as transportation, drainage, sewerage, solid waste, educational and health facilities'.

Globalisation

Globalisation is the only issue included in this study outside Agenda 21. It is strongly argued that 'socio-economic growth and the sustainable exploitation of natural resources can at present only be properly understood by taking account of globalization' (De Haan, 2000:363). The revised curriculum seems to put a marked emphasis on globalisation. A course entitled 'Introduction to Economic Geography' offers, for instance, an immense opportunity to address the pros and cons of globalisation. Among the topics suggested for coverage in this course are global patterns of distribution of industrialisation; development of transportation; internationalisation of production and role of transnational corporations in industry, trade and information and communication technology. Aspects of globalisation have also been addressed in another course entitled 'Social and Cultural Geography' (see details about this course under 'Human heath and settlement').

A course entitled 'Geography of Transport and Development' tries to link development with transport and communication. The latter is further linked (though implicitly) to the process of globalisation. The other course with good opportunity for addressing globalisation is 'Political Geography'. Topics suggested for coverage in this course include frontiers and boundaries; core areas and capital cities; global strategic views; water and islands; aspects of hydro-politics of the Nile River; imperialism, colonialism and decolonisation; contemporary international relations; and political geography and foreign policy. Finally, a course entitled 'Seminar on Africa and the Middle East' creates a chance to discuss on factors that enhance and/or hinder the process of globalisation. The stated objectives of this course are creating awareness about the 'impacts of the tri-continental location of the Middle East on the economic, political and social conditions of Africa' and help students to understand the 'historical and contemporary relationships between the populations of Africa and the Middle East'.

Delivery methods

Integration of sustainability issues is an important step but is not sufficient to achieve the goals of a sustainable future. Use of the appropriate modes of delivery is equally important. With regard to this, Eilam and Trop (2011) strongly suggest that academic learning, inter/multidisciplinary learning, multidimensional learning, and emotional learning are four essential principles of EE/

ESD pedagogy. The revised Geography curriculum assessed here suggests diverse methods of teaching for consideration by the respective course teachers/instructors. These include lecture, student presentation, discussion/dialogue, use of audio-visual resources, fieldwork, laboratory work and inviting guest speakers (Table 2). In three courses, no suggestion has been made as to methods of teaching. On the other hand, a pure lecture has been suggested in one case. In all other cases, 17 courses, a combination of two or more of the aforementioned methods has been suggested, the most frequently suggested combination being 'lecture, presentations and discussion' (Table 4).

Table 4. Delivery methods suggested in the curriculum

S/n	Method	Frequency	%
1	Lecture	1	4.76
2	Lecture, presentations and discussion (dialogue mentioned once)	7	33.33
3	Lecture, audio-visual resources, and discussion	1	4.76
4	Lecture, audio-visual resources, presentations and discussion	1	4.76
5	Lecture and field trip	2	9.52
6	Lecture, illustrations and fieldtrip	1	4.76
7	Lecture, presentation/discussion and field visit	2	9.52
8	Lecture, laboratory work and field trip	1	4.76
9	Lecture, discussion, laboratory work and field visits	1	4.76
10	Lecture, presentations, discussion, guest lectures and field visits	1	4.76
11	Not indicated	3	14.29
	Total	21	100.00

Given the traditional role of teacher dominated methodologies at universities in Ethiopia, it is not surprising that this method has been suggested for practically all the courses. On the contrary, fieldwork has been explicitly suggested only in eight of the 18 courses (44.4%) for which teaching methods are suggested. This shows that classroom-based approaches (55.6% of the courses are done this way) still dominate the teaching process despite the expressed wish of the Department to improve the mode of delivery. Such a dominance of 'old pedagogies' is not unique to the Department surveyed here as the observation by Eilam and Trop (2011:56) clearly indicates: 'For years, ESD scholars have been advocating to implement changes in pedagogies. Despite this call, while the curricula have been evolving and responding to the policy discourse, educators continue to implement old pedagogies in the service of new curricular contents.'

Summary and Recommendation

Geography is often presented as an ideal discipline for the academic advancement and promulgation of the concept of sustainable development (McManus, 2004). The Lucerne Declaration on Geographical Education for Sustainable Development proposes that 'the paradigm of sustainable development should be integrated into the teaching of geography at all levels and in all regions of the world' (Haubrich, Reinfried & Schleicher, 2007:243). This paper tried to report the

findings of a study aimed at assessing the place of sustainability issues in Geography curriculum for undergraduate programme at Addis Ababa University. Content analysis has been used as a principal method for data generation. The following points summarise the key findings of the study:

- The three 'pillars'/'building blocks' of sustainable development are duly represented in the revised curriculum, with more courses dealing with social/economic issues. Besides, the curriculum has multiple rooms for further incorporation of issues and concerns which are not adequately addressed in the existing courses. The diversity of topics covered in the courses attest to this fact.
- A remarkable attempt has been made to take an integrative approach. The Department designed a group of courses meant to integrate issues in the bio-physical and socio-economic environments. In view of this, the Department seems to have placed itself in a position to lead and contribute to environmental and sustainability education in Ethiopia. This is all the more important given the current role of Addis Ababa University to train the teaching staff needed for the newly established universities throughout the country.
- Diverse methods of teaching have been suggested in the revised curriculum. It is, however, clearly evident that classroom-based approaches occupy proportionally more space and remain more dominant. This goes against Geography's traditional claim to be a field-based and practice-oriented discipline; and signals an area for continued professional learning and growth amongst academic staff.
- The revised curriculum offers no evidence for the application of methodologies intended to help students to acquire favourable values (e.g. values clarification and values analysis); and this appears to be another area for further professional learning and growth of academic staff.

The curriculum assessed in this study is an official and legally binding document containing all the requirements for graduation. The courses examined here are all mandatory, i.e. they will have to be attended by all students. However, the way each of the courses is actually treated and the effectiveness thereof depends on several factors, including the background and competence of the course teachers/instructors. There is therefore an urgent need for a follow-up study in order to assess the effectiveness of the revised curriculum in achieving its stated objectives and factors that affect its effectiveness. Such a study, if and when conducted, should pay special attention to the balance between the four essential principles of EE/ESD pedagogy: academic learning, inter/multidisciplinary learning, multidimensional learning, and emotional learning (Eilam & Trop, 2011); and should consider issues such as values and values education more carefully than this current study has been able to do.

Notes on the Contributor

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Endnotes

1 The highlighted words or phrases represent the whole theme in the analysis of results and discussions thereof in the paper.

2 CI: Physical/environmental Geography; CII: Social/economic Geography; CIII: interdisciplinary/integrative courses

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Teaching and Learning In, With and For Community: Towards a pedagogy for education for sustainable development

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'Butterflies go before me down the path and I follow
thinking of the giant swallowtail
endangered in its Blue Mountain sanctuary.'
Earl McKenzie

Abstract

The paper explores how one teaches and learns for sustainable development primarily through analysing education for sustainable development (ESD) initiatives in the Caribbean within the framework of service learning. The paper proposes that a pedagogy for ESD will require positioning education in the centre of community. What that means in terms of content and methodology is the focus of our discussion.

Introduction

'We are more than a beach, we are a country' – so ran an advertisement in Jamaica in the early 1970s, beckoning both tourists and islanders to move beyond the mythic images of the island in tourist brochures to acknowledging the complexity of relations between a place and its people. The failure of Caribbean peoples and visitors to do just that has led to deepening ecological, economic and social problems – a snapshot of what is happening elsewhere on our planet. Those advertisements, an attempt to educate people about the interconnectedness between the environment and socio-economic relationships, were later withdrawn amidst criticism of their negatively impacting the tourist trade, the number-one income generator for most Caribbean countries.

A decade or two later, 'development' in the Caribbean has deepened into crisis. The cost of diminishing resources of energy, water and food is high. Poverty and violence are growing concerns in a number of the islands. There are also other sustainability problems like HIV/AIDS. And of course there is climate change. The Caribbean islands, like many other small islands elsewhere, are particularly vulnerable to these multiple and connected problems.

Witter (2007) explains that Caribbean countries have a production system that has historically been based on the exploitation of labour and the despoliation of the environment. He points also to current export industries like mining and tourism, key economic drivers in the Caribbean, which perpetuate this lack of respect for people and the environment. Moreover, the Caribbean is dependent upon industries such as tourism and agriculture. These all have a

natural resource base. Paying serious attention to this natural resource is, therefore, absolutely crucial. Additionally, Caribbean countries are faced with a high population growth rate and limited economic resources. These have hindered the sustainable development of Caribbean societies. Focused attention on sustainability is thus essential for the survival of these countries.

Development is a complex issue. On one hand, development is equated with a vibrant economy. Yet to attain that vibrancy often means the destruction of place and people. To be truly educated, therefore, for this technologically advanced world, requires that people learn about the dangers of unbridled development. Witter (2007:2) aptly illustrates the need for this kind of education as he describes a people's behaviour:

> I often wonder whether the habits of the past that had been beneficial by chance to the natural environment have become harmful because the nature of our garbage has changed. In the past, we threw our coconut husks, mango skins, and yam and banana peelings in the 'bush' where they would disappear into the environment quickly, nurturing the soil and the animals. Today we throw our plastic bottles and other non-biodegradable packaging in the same way, but these pollute the earth, the rivers and the sea as they make their way through the environment.

The call for a radical change in the way we live has thus to be insistent and the power of education to enable such change has been acknowledged by the United Nations as it has identified education as a primary way to achieve sustainable development. The overall goal of the United Nations Decade for Sustainable Development (UNDESD) is to 'integrate the principles, values and practices of sustainable development into all aspects of education and learning. This education effort will encourage change in behaviour that will create a more sustainable future in terms of environmental integrity, economic viability, and a just society for present and future generations' (UNESCO, 2005b:n.p.). It is, therefore, not education as usual.

It will mean a change away from subject-bound teaching, education contained in classroom walls and forms of assessment that require our students to merely regurgitate what has been fed to them. To a great extent, our educated students end up with certificates, diplomas and degrees but our societies remain beset by social and economic injustice, inequities, violence and environmental degradation. The relation of education and society is far more complex than suggested here, but the point is that there is still too wide a distance between what takes place in our institutions of learning and what happens in our society.

Interestingly, Lotz-Sisitka, Lupele and Ogbuigwe (2007), in examining the processes in the design of an ESD course, argue for a new role for African universities, a role that is more socially, environmentally and economically relevant. Quoting Singh, Lotz-Sisitka *et al.* (2007) point out that to do this, to redefine the nature of teaching and community engagement, requires universities to respond broadly to the public good in a manner beyond what is dictated by the market.

To respond to the public good, in other words, to create sustainable communities/societies, is the overarching objective of ESD. What is, however, problematic is the pedagogy needed in our institutions to do this.

This paper argues that to educate effectively for sustainable development a particular kind of pedagogy is needed. Through analysing a range of ESD or ESD-oriented initiatives in the Caribbean, as they broaden the concept of service learning, but also through reflecting on discussions on the concept of ESD, this paper proposes the kind of approach to content and pedagogy that is needed for ESD.

ESD Concept and Service Learning Theories

To identify the pedagogy that is needed for ESD, I begin first of all by examining the concept itself. The concept becomes the basis for determining the kind of teaching/learning approach that is needed.

The foundational definition of ESD is that outlined in the UNDESD International Implementation Scheme (UNESCO, 2005b). Here ESD is seen as being fundamentally about values, with respect at the centre – respect for others, including those of present and future generations, for difference and diversity, for the environment, for the resources of the planet we inhabit. Education is seen as enabling us to understand ourselves and others and our links with the wider natural and social environment, and this understanding serves as a durable basis for building respect. The close relationship between the various aspects of society – the physical, social and economic – is highlighted.

Different societies and different academic settings have interpreted this differently. There has been an emphasis on the environmental aspects in some societies. Peden (2008), for example, raises the issue of the integration of the social, economic and physical as leading to a de-emphasis on the environment. Collins-Figueroa (2008), on the other hand, shows that an emphasis on the environment is a limitation as the socio-political frame in which the environment is located is missing. Sterling (2004) reminds us that environmental problems are not self-contained, but are a critical and integral part of the sustainability imperative which is concerned with the well-being and longevity of interlocking human and natural systems. And Hopkins (2008) stresses that ESD is an integration of concepts of human development, social development, economic development and environmental concerns in a holistic, interdisciplinary way.

The various discussions and debates on defining ESD have helped to clarify the major differences between conventional forms of education and an education focused on sustainability. Some of the discussions – for example, Sterling (2001) – have urged us to focus on the goal of education, on what education is for, and specifically on what is meant about educating *for* sustainability. Others, like Scott and Gough (2004), have highlighted the process of education, thus suggesting a move away from 'the sage on the stage' approach to education. McKeown (2006) moreover, even as she acknowledges that strands and topics on sustainability have always been part of the curriculum, urges that these be woven together to create ESD programmes that are taught overtly.

The philosophy underpinning these discussions is that education should lead to the creation of harmony and balance in our relationship with the environment as well as in our social and economic relationships. The pedagogy needed, therefore, is one that is focused on real world tasks, is community-oriented, values-centred and has a strong future's perspective. Universities and other academic institutions would then become the hub of transformation of communities

and societies. Their graduates would be tuned into the sustainable development of their societies, of recognising that a country is more than a 'beach', a place for their self-pleasuring but a 'country' where the interlocking ecological, social and economic systems have to be attended to if there is to be quality of life for all of the people and not just a few.

Service Learning Contextual Framework

To educate for sustainable development is to educate with community/society in mind. Such an education can, for that reason, be seen as participating in the tradition of service learning. An examination, therefore, of service learning theories should help clarify how such an education should be 'delivered' as through those lenses we examine our existing approaches, changes that may be needed, the gaps, the inconsistencies, contradictions, etc.

The literature on service learning, with its many different labels, (community service learning, community field experience, community referenced learning) is extensive, as Solomon and Levin-Rasky (2003) point out. They draw our attention to the many initiatives designed to forge relations between institutions of learning and communities. At base is the notion of academic learning that encourages civic responsibility and community action. Real community needs are addressed while students learn through active engagement (Anderson, 2009).

The aim is, as Moely *et al.* (2002) discuss, for students to become more civic-minded, more interested in community issues and solving social problems. Service learning is also based on a philosophy of education that sees education as developing social responsibility, as preparing students to be involved citizens in a democracy (Anderson, 2009). Students are encouraged to see their achievement in terms of their service to the community.

Much of the literature on service learning speaks mainly to its purpose, as indicated in the preceding paragraphs. There is, however, some attention paid to its process, as the following paragraphs discuss.

In exploring the process of service learning, the literature identifies its foundational principle – learning by doing as practitioners, like McAleavey (2009) explains. McAleavey, invoking Dewey (1938), reminds us that one learns as well as or better by doing; that education is not only about books but about experience and connecting what one reads and hears with ongoing observation and experiences. Such learning is not a passive collection of information but is active learning, at base a constructivist teaching strategy connecting learning to real world activity (Williams, 2009). In other words, service learning is learning by doing but in the context of doing service.

With the focus on learning by doing, service learning dissuades students from the notion that educational success simply means finding the right answer. Instead they are encouraged to see education as a way to engage in addressing complex problems in a complex setting (Billig & Brown, 2009). As a result, the teaching and learning process becomes more analytical and reflective. Students are thus being directly and openly prepared to apply knowledge; this, as often happens, is not left as a possible outcome of learning.

Connecting learning in academia to real world activity, making the connection between academic learning and community needs, is nonetheless, at the heart of service learning. It is

the feature that is most often emphasised by a number of writers (Kaye, 2004; McAleavey, 2009; Swick, 1999, Williams, 2009). McAleavey (2009) asserts that service learning is a particularly appropriate pedagogy for courses that have social awareness components. I would argue that all our courses need to have social awareness components, especially as we move towards including a sustainability perspective in our programmes.

This kind of learning encourages students to see beyond personal aspirations and achievements, to recognise that it is in saving their communities that they too are saved. Larson-Keagy (2005) aptly expresses this idea in her reference Garrett Hardin's (1968) 'Tragedy of the Commons', which illustrates how self-interest leads to the destruction of the commons but *enlightened self-interest* (my emphasis) recognises that long-term sustainability of the commons is a shared responsibility.

Service learning raises, however, a number of issues related to assessment and pedagogical practices in institutions of higher education. Standard forms of assessment are your pen and paper essay questions, theses and so on, which have a long tradition of assessment demanding varying levels of rigour. Assessment of service learning, on the other hand, is more open-ended and as a result could be charged with being less rigorous. Yet, as I have suggested earlier, assessment of university education should take into account the level of transformation of community, the level of sustainability of the commons in which the university is located. This would require, of course, relevant forms of audit tools for this kind of assessment. Also the conventional pedagogical style of lectures and tutorials would have to give way to more on the field, on-site learning.

The discussion on the concept of service learning highlights its value and indicates the direction such learning should take. To summarise, service learning advocates learning by doing, active learning, at base a constructivist teaching approach, students applying knowledge learnt, connecting what they read and hear with ongoing observation and experiences, engaging in addressing complex problems in a complex setting and so being focused on real world tasks.

However, the literature does not speak to the radically new relation that is required between community and academia for sustainable change to take place. And it is this new relation that is needed if we are to educate truly for sustainable development/sustainability/sustainable futures; it is a relation that demands a shift from teaching and learning that is academic-centred to one that is community-centred as the selected ESD initiatives indicate. The extent to which these initiatives are able to effect this change, the paper argues, is the extent to which the teaching and forged.

Therefore even as an education for sustainable development is positioned within the tradition of service learning, we see it as extending this tradition as the urgency of transforming our societies impels a different way of teaching and learning.

Description of ESD Initiatives in the Caribbean Region

The initiatives selected are: Community Service Learning in Social Studies Cave Hill, University of the West Indies (UWI), Barbados; a Literature and ESD course at Mona, UWI, Jamaica; and the Sandwatch Project, which is regional. These are all documented in the UNESCO 'Teachers' Guide for ESD in the Caribbean' (UNESCO, 2010). Additionally, there is the Peace Promotion

Programme in Trinidad and the Biodiversity Project in Jamaica, as described on the UNESCO Innovemos website.[1]

Community Service Learning in Social Studies, as described by Anthony Griffiths (UNESCO, 2010) is an approach to teaching through serving community, by addressing the concept of development and ways of sustaining the society and the environment.

With this approach, students begin by identifying a community that they would like to serve. They select the service activity based on the needs in the community and the topic being studied in class. A range of services is undertaken by the students, from direct engagement to indirect, in which the students work with the community in a supportive role, through advocacy or through an agency. Examples of projects undertaken have included water conservation projects and the raising of awareness of local hazardous waste and collection sites.

In the Sandwatch project students monitor the beach and beach activities, addressing problems they note. In the Bahamas, for example, a group of students addressed reef damage by tourists who carelessly stood on it to adjust their masks as they prepared to scuba dive and thoughtlessly broke off pieces for souvenirs. In a simple yet meaningful act these students created a brochure on proper reef etiquette for tourists. It was action that spoke to knowledge of the importance of reefs, of tourists to the region and of respect for both the environment and the human beings involved.

The Literature and ESD course in many ways combines elements in the previous two initiatives discussed – providing knowledge about sustainability issues, engaging in community and taking action to address the issue. Specifically, the course aims to explore the concept of sustainable development and what it means to educate for a sustainable future, to teach about environmental/sustainability issues, and to engage students in sustainability practices. Literature is the vehicle through which the exploration of the 'content' of sustainable development takes place and the major means through which students are motivated to take action for creating a sustainable world. A model for how ESD can be infused through other disciplines, the course focuses on ways of addressing sustainability problems in communities. As part of their course work, students identify a sustainability problem in their community and engage in a community action project similar to that described in community service learning. Projects have included managing waste, recycling, greening a school environment, school vegetable gardening, developing a 'literacy for peace' project, building HIV/AIDS awareness for teens, documenting local knowledge through work with senior citizens. A reflective log details students' involvement, the lessons learnt, the impact and the value of the project.

The next initiative reflects the emphasis on environmental education – an indication of the way sustainable development is often conceptualised in the region. The Biodiversity Project is a collaborative effort by a non-governmental organisation and an educational entity, the Joint Board of Teacher Education at the University of the West Indies, to educate lecturers and student teachers about biodiversity. Each college involved has initiated one project on biodiversity and has integrated it to some extent into the curriculum. Examples of projects include a herb garden, a butterfly sanctuary and a vegetable garden. These projects not only involve a wide cross-section of the college community, but by their nature engage with the community beyond the college walls.

The final initiative to be discussed is one that reflects direct engagement with the social dimension of sustainable development – that is, a peace project. Violence is a major sustainability problem in a number of the islands in the Caribbean. The Peace Promotion Programme – 'Putting People in the Path to Peace in Trinidad', like the 'Change from Within' programme in Jamaica (see Down *et al.*, 2007) – addresses the need to create a society in which peace prevails. The programme is about creating a peace that entails self-discipline, self-esteem, respect, a non-violent approach to resolving conflict and a sense of democracy.

The programme consists of interactive workshops. Local artists and indigenous art and cultural forms are used to spread the message of peace and ways of achieving peace. Specifically, the programme offers training in mediation, peer counselling and conflict resolution as well as a pre-carnival preparation programme. The latter helps students to avoid negative behaviours associated with carnival, such as alcohol and other drug abuse, sexual promiscuity and fighting. Complementing these workshops is a skill-based alternative education project for students who are under-achieving. Additionally, there are projects focused on teachers, which include training courses in 'stress and anger understanding and management' as well as 'alternatives to corporal punishment'.

Analysis and Reflection

These initiatives mentioned here indicate the approach to teaching and learning that is needed for an effective ESD. They do, however, have a major limitation, which is that they fall outside the mainstream curriculum. There are a number of reasons for this, including the relative unfamiliarity of the concept of ESD in the region. The main reason for their marginal position, though, is that education is more concerned with the market and than with public good (Lotz-Sisitka *et al.*, 2007). Educational institutions are still too distant from community. This limitation, nevertheless, does show us what we need to do in order to identify content and pedagogy that will make our educational institutions more attuned to serving their community.

At the core of these initiatives is the central place of community. Many of the definitions of ESD discussed earlier suggest, too, this need for a focus on community, even though this may be interpreted in a number of ways. What is evident in these initiatives is that community determines content and shows us the kind of pedagogy that is needed for an education that takes into account the quality of our present life and the survival of our species. The radical departure from the conventional that these initiatives demonstrate (in varying degrees) is in the what and the how of education; that is, in its content and pedagogy. As such they suggest the new relation that needs to be forged between academia and community.

The community speaks to the choice of content – that is, the kind of knowledge, including the kind of values, attitudes and skills, that are needed for a sustainable society both locally and globally. In reflecting on the initiatives, one notes that students are expected to observe their community and identify its needs, problems and issues. So Griffiths' students (in the community service learning described earlier) undertook projects related to water conservation, hazardous waste and collection sites. The Sandwatch group centred on the beach and its activities, noting as they did so the problems with the reefs. Species at risk became the focus of the Biodiversity

group and peace initiatives, conflict management the work of the Peace Promotion Programme in Trinidad. Peace building, greening, recycling, waste management and school garden were some of the responses to community needs in the Literature and ESD course.

What these initiatives suggest is that the content of our educational programmes should be determined to a large extent by the needs of the community – its need for water conservation, waste management, reef protection, species protection, peace, etc. Our teaching and learning should not be a matter of simply following a syllabus. Instead we should allow our curriculum to be 'written' as students interact with community. This is not to deny the value of a given curriculum; it shows instead the need for a curriculum to be open to the 'directives' from the community. The major difference is that it is not the curriculum determining what should be in community (as in, for example, field trips to concretise what is being taught in classrooms), but it is the community deciding what should be done in the curriculum.

This 'new' relation between content and community in an ESD programme or ESD-framed curriculum will require attention to be paid not only to the issues emerging in the local community but also to the global community, to the 'education for sustainability agenda'. Scott and Gough (2004) in fact suggest that Agenda 21 and action plans of subsequent UN conferences (for instance, those focusing on climate change) should be the basis and inform the critical content of ESD. Of course, a focus on the local community would mean also exploring an issue such as climate change in terms of what it will mean for people in that community.

What this approach emphasises is education in and for community. Topics in the curriculum are issues that need to be attended to in the community. There is the shift from that of passive, text-bound learning to that of active real-world learning. Students see the immediate value of acquiring knowledge as it is needed. Peden's (2008) call for a strong knowledge base is placed in a context that emphasises application not acquisition. Research then becomes a truly needed and primary activity.

If the main site for learning becomes the community, then learning in discrete disciplines will have to yield to a more cross-disciplinary approach. The students studying beach activities needed to understand the science of the reefs, communication skills for advocacy, etc., so it became very clear that the knowledge needed to address a community's problems did not lie in any one discipline.

The work on water conservation in the Social Studies initiative, a topic primarily focused on the physical environment, would be broadened as students' participation in community will make obvious the economic and social implications. Similarly, the activity of waste management will encourage students to recognise the relation between managing waste and blocked gullies, flooding, erosion, destruction of coral reefs, destruction of livelihoods and the engendering of social and economic problems. There is thus the emphasis on the connections between the environment, the society and the economy. The debate about whether ESD de-emphasises the natural environment or not is 'resolved,' as it becomes clear that whether one begins or ends with nature, the relation of nature to human beings is ignored at our peril.

Equally important is the emphasis on values education and on the development of critical thinking, problem solving and system thinking skills. The UNDESD implementation strategy as well as the definitions quoted earlier highlight the importance of values: respect, tolerance,

democracy, social justice, peace and harmony. In supporting a shift to that kind of emphasis in education, Orr (1994) makes the important point that much of the world's problems have been the work of the highly educated. He thus argues for a different kind of education, quoting Wiesel (1994) who warned against an education that emphasises theories instead of values, concepts rather than human beings, abstraction rather than consciousness, answers instead of questions, ideology and efficiency rather than conscience, as he saw this as the kind of education that those responsible for much of the world's horrors had received. Orr's (1994) insistence, too, that the planet does not need more 'successful' people but instead peacemakers, healers, restorers, storytellers and lovers of every kind further supports the need for an education that emphasises values, people, and consciousness.

The pedagogy that such a community-centred education requires can perhaps be most clearly expressed in how values can be learnt. Students learning/working in community begin to identify with the community. As they pay attention to its needs and attempt to address them in concrete ways, the community becomes important to them. The reef is not some distant reef, the Swallowtail butterfly not some insignificant creature, but special because they are trying to save it. The sense of belonging to a particular place is developed. And from such beginnings come a sense of respect and caring for the physical environment and its people. The method of learning shifts from being individual-focused to that of community-centred. Engagement at this deeper level with community leads to students understanding their essential connection with the whole.

There is thus a big shift away from the concept of education as the progress of the individual, as upward social mobility for the individual, to that of progress for the community and the individual in community. Students become community-centred rather than self-centred.

Moreover, this approach to education is one that builds and fosters community rather than separating individuals from their community, as so often happens when students leave their communities to acquire education but remain distanced from community. This is further illustrated in the practical work done by the students as they address in concrete ways the identified need of the community, literally 'getting their hands dirty' in many instances. Creating a vegetable garden in a school or a nearby community 'field' will require students to engage in digging, planting, weeding and watering. Recycling plastics will require the actual collection of plastic bottles, often strewn around a community or piled up on a beach. Waste management may mean a beach clean-up, the gathering of rubbish and safe disposal of it or creating a compost heap.

The pedagogy, too, is one that is based on working closely with community members, meeting and planning how to create a more sustainable community. Some of the responses to the needs in the community called for help in advocacy. Students cannot do this without major input by the community members. What is being encouraged is a relationship between students and community members that based on collaboration, taking action together to effect meaningful change. It is also working with a wide range of members of the community – as was the case with the Peace Promotion programme, which involved local artists and parents.

Community members, especially the elders/senior citizens of the community, are seen as sources of knowledge and wisdom. Education becomes a kind of conversation, of teaching and learning, between students and community members. This allows for the 'recuperation' of valuable local knowledge as students interact with different members of the community.

Together they share and pool their knowledge for the good of the community.

Attending to community, observing its landscape, its environment, being physically there, is also a major difference between the usual teaching and learning which takes place primarily in a classroom and one that shifts to community being the primary classroom. 'Outdoor education' takes on a whole new meaning as students gain the benefits of working closely with nature as a number of environmentalists have pointed out. But, in addition to this, students are working directly and immediately to build community. The 'give back' to society, the stated and unstated expectation of those who benefit from formal education is not 'delayed', nor does it come with the usual attendant attitude of the 'superior child returning to teach his/her parent'.

The limitations of the initiatives discussed also point the way to the some of the challenges of positioning the academy in community. For the most part, community involvement is marginal, an addendum almost to the main way of teaching (lectures and tutorials) rather than the central way of teaching, which is what I have been arguing for. Furthermore, the interaction between lecturer, student and community members is very much located in the old paradigm of the academy being the privileged 'partner'. There is at base a failure to recognise that what the academy offers and what the community offers are different but equally important. 'True' collaboration and conversation are needed and dependent on sharing of power. At the very least the power relations need to be examined; the student interviewer and the community member interviewee if cast in the hierarchical self/other relation are unlikely to effect the substantial changes needed. Teaching and learning possibilities are immense in a model in which community members, students and lecturers come together in service to community. Perhaps traditional societies offer such a model.

These initiatives also indicate the existing fragmented approach to addressing sustainability issues. What is urgently required is a whole university approach to community. Imagine a model in which faculties identify a major community need or needs and identify what and how each department in the faculty could address this/these. What if teaching and learning centred on this? There would be interlocking circles of communities (academic and non-academic) which would decide on content. The pedagogy would be the actual work in the community linking with the research and discussion in academia. The learning would come about as students reflected on their task in community, as they researched through dialogue with their lecturers; that is, 'transformed lectures', conversation with community members, and texts (scholarly and non-scholarly) to find 'answers' to the needs identified and implemented these 'answers'. In other words, a dialogic relation between the academy and community, with each group interfacing and so nurturing the other, replaces the conventional separation of the two. Assessment takes the form not only of theses, articles and books, but also and more importantly the changes that have occurred in community.

Conclusion

This paper has argued that to educate for sustainable development requires a dialogic (as opposed to hierarchical and distant) relation between academia and community. The academy in collaboration with its community plans the lessons and identifies the tasks that are needed to

address the problem. The strength of the academy – its research and theoretical knowledge – is enhanced by the experiential knowledge of the community. The flow of knowledge and the synergy with such an approach, allows for more creative, on-the-ground and effective student learning.

Our universities are in an ideal position to advance such a pedagogy by positioning themselves inside communities. Instead of having to build walls to secure themselves from their communities they can work in a more focused and integrated way to transform these communities by building on the principles underlying the initiatives discussed here. Academia becomes validated by its work to make local (and in turn national, regional and global) communities more sustainable.

What I am proposing is of course being attempted, but often in a fragmented, unstructured way. The challenge is how to bring this together, to re-fashion our relation to community and with that our teaching and learning. Further research on this is required. In this regard, the present Mainstreaming Environment and Sustainability in African Universities (MESA) programme (Lotz-Sisitka *et al.*, 2007), which advocates a 'new' relationship between academia and community, demands our close attention. The initiatives analysed show us that pedagogy for sustainable development is pedagogy that is responsive to the needs of community, that centralises instead of marginalises community. It is teaching and learning that takes place through collaborating with community and engaging in community work. It is pedagogy reconstructed as dialogue between academia and community.

The vision of ESD is an education that is deeply responsive to the urgent environmental and socio-economic needs of our times. The goal is no less than the creation of a citizenry mindfully engaged in building a just, peaceful and environmentally safe world. Yet their fulfillment still waits for the radical repositioning of community in academia and a pedagogy so aligned.

Notes on the Contributor

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Endnote

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Ethics-oriented Learning in Environmental Education Workplaces: An activity theory approach

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Abstract

In the context of increasing national and global environmental challenges and their implications for the working world, new ethics and practices are being introduced into workplaces that take better account of socio-ecological relations. Little is understood, however, about the nature of ethics-oriented workplace learning. Drawing on Cultural Historical Activity Theory (CHAT), which enables historically and contextually situated relational perspectives to emerge, this paper explores contradictions in the activity systems of two young environmental education learner-practitioners struggling to engage with the ethical dimensions of their professional work and the professional development course they are studying. The study focuses in particular on the environmental values and ethics component of their course – a year-long Learnership in Environmental Education, Training and Development Practices (EETDP). The paper reflects how tensions and contradictions within and between the interacting activity systems of the workplace, the course, and its regulating qualifications authority influence the teaching and learning of the environmental ethics component of the course. Ethics-oriented teaching and learning processes are found to be strongly influenced by the 'rules' and 'mediating tools' of these interacting systems, but these are often at odds with the ethical perspectives, socio-cultural context and skills of the 'subject' and 'community'. These systemic contradictions can be more fully understood when their cultural and historical origins are made explicit. The analytical process has led to a more nuanced understanding of ethics-oriented teaching and learning in a workplace-based course, and has revealed several areas needing more careful research (particularly the area of environmental discourses) and the explicit and implicit language of ethics.

Introduction

Using a third generation Cultural Historical Activity Theory (CHAT) framework (after Engeström, 2001), this paper examines how contradictions within and between interacting activity systems influence learning processes of the ethics component of an environmental education course. Contradictions, the 'historically accumulating structural tensions within and between activity systems' (Engeström, 2001:137), are seen as having generative potential, as being the drivers of learning, change and development in activity systems. It is through identifying and grappling with contradictions that transformation is mediated; when, according to Engeström (2001:137), 'the object and motive of the activity are reconceptualised to embrace a radically wider horizon of possibilities than in the previous mode of the activity'. This study works backwards from that aspiration to find new and better ways of working in

change-oriented, workplace learning settings. It recognises that for expansive transformation to occur, the systemic contradictions must first be identified and described, because such scrutiny might generate new visions and opportunities for change-oriented learning. This paper shares empirical work in progress conducted under the auspices of the Rhodes University/South African Qualifications Authority (SAQA) research programme into change-oriented learning and sustainability practices (Lotz-Sisitka, 2008), and in so doing, contributes to an emergent body of research that focuses on work and learning, a new focus for SAQA research.

The primary unit of analysis is the activity system of two learner-practitioners engaging with the ethical dimensions of environmental education practice. The term 'learner-practitioner' is used to denote the integrated nature of their identities and practices simultaneously as 'learners' doing a course and as 'practitioners' in a professional workplace. Various tensions and contradictions related to ethics-oriented learning occur in this activity system, but, as shall be shown later, most are traceable to more systemic contradictions between this and the other activity systems with which it interacts. The interacting activity systems are: (1) the National Certificate in Environmental Education, Training and Development Practices (EETDP), which is a 12-month professional development course (a learnership) offered by a non-governmental environmental organisation (NGO) in South Africa; (2) the Wetlands Conservation Project[1] (WCP), where the two learner-practitioners are placed for the duration of the EETDP course; and (3) the South African Qualifications Authority (SAQA) and the National Qualifications Framework (NQF) within which the EETDP course curriculum was developed and is currently being offered.

This paper reflects on how tensions and contradictions between the interacting activity systems of the workplace, the course, and its regulating authority influence the teaching and learning of the environmental ethics component of the course.

Sustainability Practices and Changing Work Ethics

Through international and national policy initiatives and rising public concern, organisations (including those providing and creating work) are slowly realising the need for change towards a more sustainable way of living amongst people and within planetary limitations. New ethics and practices are being introduced into workplaces that take better account of socio-ecological relations. Various new sustainability practices which reflect a new work ethic at play are being introduced. These include practices such as environmental impact assessment, sustainable agriculture, energy conservation, water resource management, pollution control, environmental education, design and use of new (green) technologies and energy systems, cleaner production, biodiversity conservation, improved social conditions in the workplace, design of new economic models (e.g. green taxes), and waste recycling (Lotz-Sisitka, 2008). These sustainability practices are permeating workplaces everywhere and introduce a change-oriented learning environment, at the heart of which lies the creation of a new work ethic.

Modern work ethics and practices were originally constituted through the expansion of industrialisation, colonialism and capitalism. In this process, the modernist 'work ethic' purposefully separated workers from wider concerns in the world, including socio-ecological

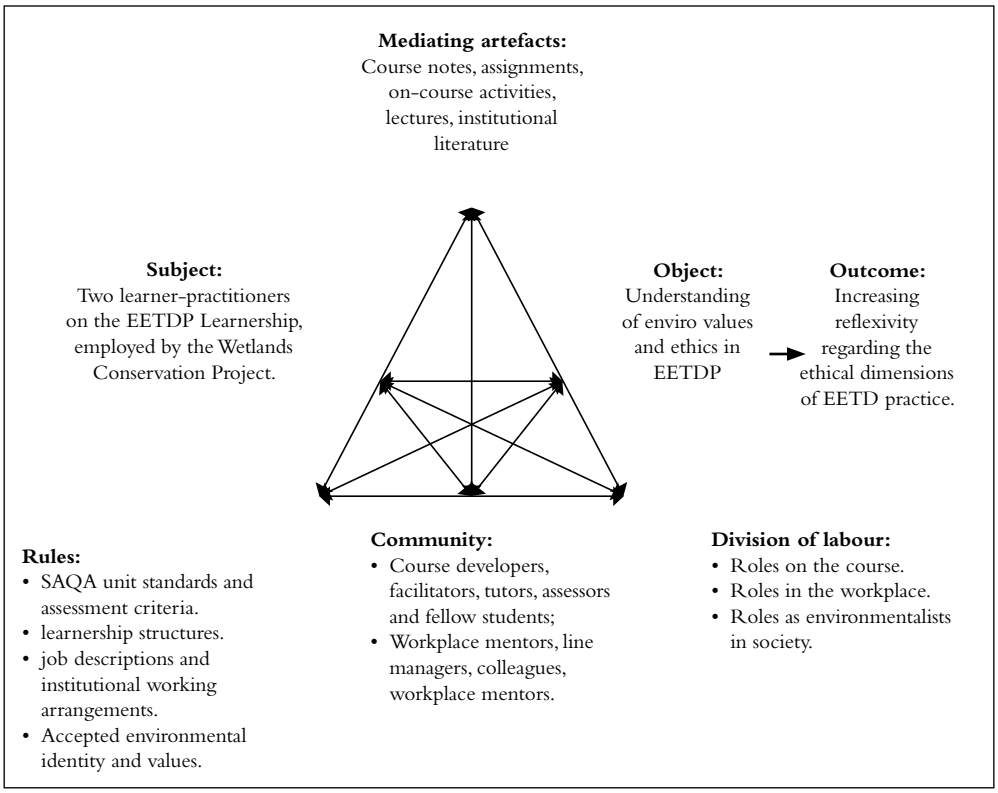
relations (Bauman, 1998). Today these development approaches are marred by unsustainable practices such as the production of pollution and waste and economic activities that appear to be allowing inequalities to thrive despite unprecedented economic growth and development. Such concerns are fundamental to all sectors of South African society. They are thus central to most education and training processes because they are both the bearers of culturally and historically situated values *and* the potential catalysts of ethically situated action and socio-ecological change. Environmental education processes imply an ethic of caring for the planet and recognising and acting upon areas where responsible human decision-making is required.

However, the nature of ethics-oriented learning remains poorly understood. Observations and experiences in environmental education in South and southern Africa suggest that the values associated with environmental practices are commonly taken for granted, under-examined or contradictory. Furthermore, course curricula, themselves values-based and conceptually laden, introduce adult learners to new discourses which may be taken up superficially or iconically, sometimes at odds with the deeply embedded history, culture and practices of the learner, and with the less deeply embedded but equally influential history, culture and practices of their workplaces.

Methodology: Third Generation CHAT

CHAT emerged from Lev Vygotsky's work in the 1920s and 1930s on the cultural mediation of actions. His renowned mediational triangle (Vygotsky, 1978) showed how a child's action in relation to an object or motive was mediated by culturally inscribed tools (language, concepts and material artefacts). This first generation of activity theory was advanced by Leont'ev (1978) who described how individual action is not only culturally mediated but also 'always situated in the context of a historically developed collective praxis, an activity system' (Virkkunen & Kuutti, 2000). This was articulated by Engeström, Miettenen & Punamäki (1999) as 'second generation activity theory' (Figure 1) which shows how individual meaning-making and action can only be understood in relation to its socio-cultural context, and how society is in turn acted upon and transformed by individual agency. CHAT's holistic view of learning and action thus disrupts the Cartesian divide between individual and society through its proposition that 'mind is revealed in action on the world' (Edwards, 2005:53), while its dialectical unit of analysis 'allows for an embodied mind, itself an aspect of the material world, stretching across social and material environments' (Roth & Lee, 2007:189).

Figure 1. Second generation CHAT 'activity triangle' commonly used by activity theorists to analyse human activity systems (Engeström, 1987). Here, the activity system is exemplified using the environmental values and ethics component of the National Certificate in EETDP.

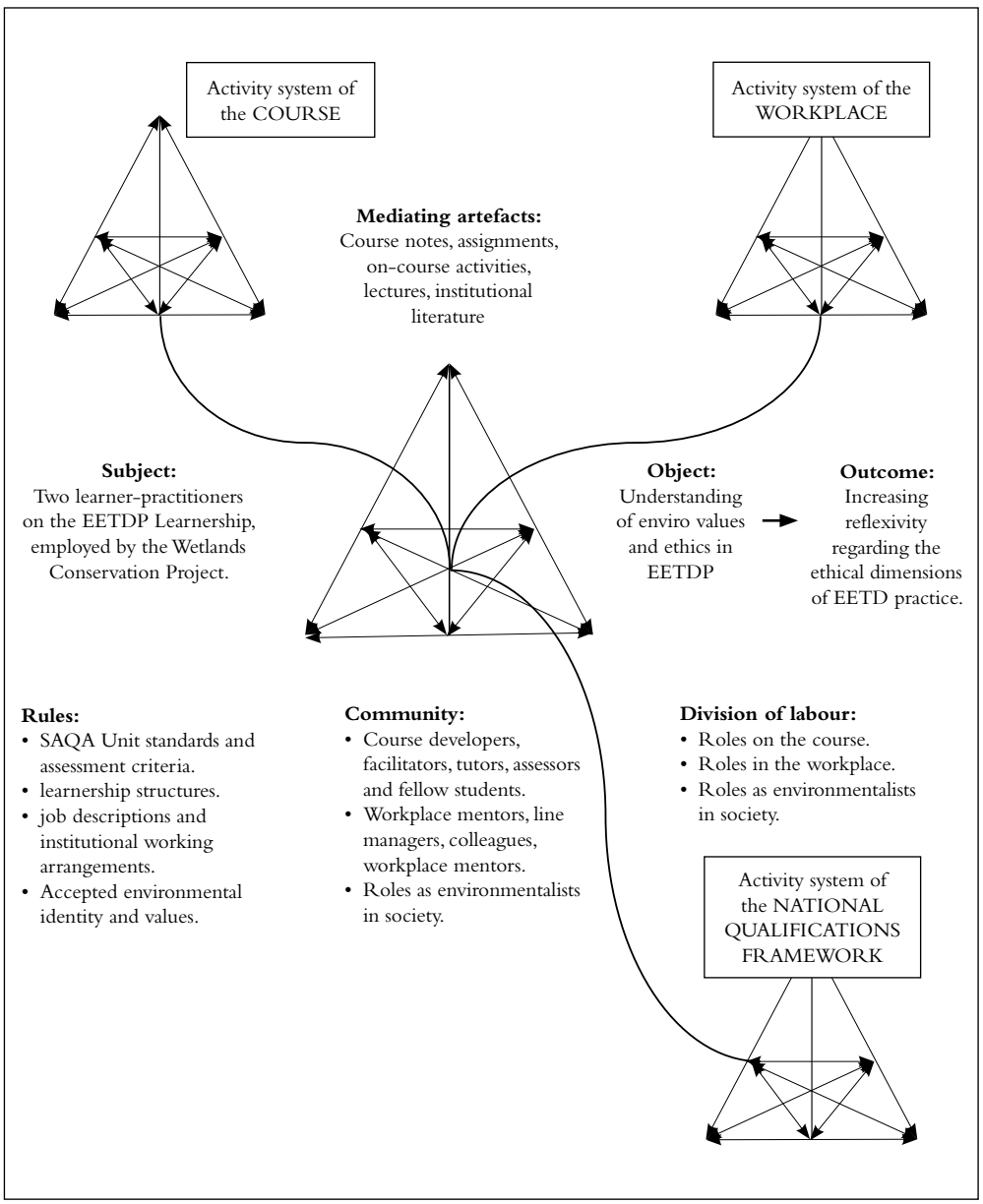


Engeström's subsequent development of third generation CHAT and expansive learning makes its transformative potential more explicit. Where Vygotsky's and Leont'ev's emphasis lay on understanding play and learning among children, more recent work by Engeström (1987, 2000, 2001) and others (see for example: Chaiklin, Hedegaard & Jensen, 1999; Engeström *et al.*, 1999; Virkkunen & Kuutti, 2000; Warmington *et al.*; 2004; Roth & Lee, 2007; Edwards, 2007; Mukute, 2009) explore the implications of the Vygotskian legacy for organisational and workplace theorising.

Third generation CHAT foregrounds the networked and interactive nature of activity systems. Engeström (2001:136) identifies the prime unit of analysis as a 'collective, artefact-mediated and object-oriented activity system, seen in its network relations to other activity systems'. This paper takes as its prime unit of analysis the activity system of two young, black, male learner-practitioners engaging with the ethical dimensions of their environmental education practice within a nature conservation agency. It examines how their activities and progress towards achieving their objectives are bound up in networked interactions with other activity systems, namely: (1) the national qualifications authority and its associated frameworks

and regulations; (2) the environmental education course; and (3) the conservation workplace where the learners are placed for the duration of the course (see Figure 2).

Figure 2. Third generation CHAT 'activity triangle' representing how activity systems occur in relation to other networked activity systems (Engeström, 2001). In this case, the activity system of learner-practitioners engaging with the ethics-oriented dimensions of their work interacts strongly with those of the course, the workplace and the National Qualifications Framework.



Identifying Contradictions Within and Between Activity Systems

Contradictions are 'fundamental tensions and misalignments in the structure that typically manifest themselves as problems, ruptures, and breakdowns in the functioning of the activity system' (Virkkunen & Kuutti, 2000:302), and these give rise to disturbances which Engeström (2000:964) calls 'deviations from standard scripts'. Contradictions are recognised as the main drivers of learning and change because actors respond to the disturbances; for instance, course facilitators might change their pedagogy or develop new meditational tools in response to learners' poor performance. But Virkkunen and Kuutti (2000) caution that an accumulation of contradictions can lead to a loss of direction in the activity system and the production of even more disturbances and ruptures. This paradoxically creates the need for, but simultaneously reduces the prospect of, more learning and change. Seeking an understanding of how to achieve a balance of contradictions sufficient to catalyse learning and change without compromising the activity system's overall focus and value is a primary concern of this paper. Especially in change-oriented learning processes (and this paper focuses on ethics-oriented teaching and learning as one example), careful, open-ended interactions are needed to create spaces for deliberation and change. Wals (2009:43) explains:

> Moving towards sustainability or sustainable living, inevitably involves diverging norms, values, interests and constructions of reality. A key premise of social learning is that such differences need to be explicated rather than concealed. By explicating and deconstructing the oftentimes diverging norms, values, interests and constructions of reality people bring to a sustainability challenge, it not only becomes possible to analyse and understand their roots and their persistence, but also to begin a collaborative change process in which shared meanings and joint actions emerge.

Engeström (1987) identifies four types of contradictions:[2] (1) those occurring within the elements of an activity system (e.g. within the rules of an activity system); (2) those occurring between the elements (e.g. a contradiction between a rule and the division of labour of an activity system); (3) those occurring between the old and new way of doing things (assuming that expansive learning and transformation within the activity system occurs); and (4) between separate activity systems (e.g. the activity system of a course and that of a workplace).

CHAT provides an analytical vantage point and a language to probe such tensions and contradictions, particularly in understanding how the histories and cultures of the various groups have jointly given rise to the current status quo. The activity system under review is thus not seen as a static snapshot, but as a dynamic, historically-constituted process.

The activity systems

The following sections describe the activity systems of the qualifications authority, the course and the workplace before providing a more detailed account of some of the contradictions identified in those systems. These insights are based on workplace observations, document analysis and extensive interviews.

The activity system of SAQA and the NQF

The South African Qualifications Authority Act (RSA, 1995) and the NQF influenced the origination of unit standards – specific outcomes and assessment criteria around which the EETD course curriculum was developed, and in relation to which learner-practitioners' engagement with environmental ethics is assessed. Through its various structures and mechanisms – such as the Education, Training and Development Practices Sector Education and Training Authority (ETDP SETA) – SAQA had responsibility for regulating and quality assuring curriculum design and the assessment of learning, a function which made it influential in all accredited education and training in the country.

The object of the SAQA/NQF activity system is strongly influenced by South Africa's history of inequity and racial discrimination, and by its legislated intention to contribute to post-apartheid education system transformation. In line with the SAQA Act of 1995 (since superseded by the NQF Act No. 67 of 2008 [RSA, 2008]), the objective of the NQF is to create a cohesive national framework for education and training that facilitates articulation and progression within career paths, that enhances the quality of education and training, and that accelerates the redress of apartheid's legacy of an inequitable, discriminatory education, training and employment system (SAQA, 2006). The mediating tools and artefacts of this activity system (for example unit standards, specific outcomes, assessment criteria, embedded knowledge, assessment frameworks, guiding documents, strategies, and so on that were in place at the time of this research) exist for the realisation of these objectives. The 'community' of the SAQA/NQF activity system is extensive, including, for example, the national Department of Education (DoE), the Department of Labour (DoL) (since superseded by the Department of Higher Education and Training), the standards generating bodies (SGBs), sector education and training authorities (SETAs), learners, and accredited education and training providers (such as the Wildlife and Environment Society of South Africa [WESSA] whose activity system in relation to the course is described below). A while ago the study team on the implementation of the NQF (DoE & DoL, 2002) noted, however, that the size, composition, nature and capacity of these numerous groups, and the complexity of their relationships, was hindering NQF progress.

Walters and Isaacs's (2009:25) account of the failings of the NQF reveals several disruptions and contradictions within the activity system of the NQF. They state the following:

> Key amongst external factors was an underestimation of the weaknesses of institutions and the lack of competent educators and trainers inherited from Apartheid. Key amongst the internal factors were conceptual confusions and contestations over what was meant by competences and outcomes (and forms of learning underpinning their achievement) and how they might be best described in qualification statements and used for quality assurance. Central to both sets of factors was a lack of clarity about the purposes of the NQF with stakeholders having very different perspectives and objectives ranging from the state's perspective of an administratively driven quality management system that could steer the education and training system towards its economic and political objectives to organised labour's view of the NQF as a portal to lifelong learning with strong emancipatory and empowering objectives.

From a vantage point provided by CHAT, one can identify in the above statement disruptions between the 'object' of the activity system and its 'community' and the numerous other activity systems with which it interacts ('weaknesses of institutions and the lack of competent educators and trainers'). These disruptions can be traced to systemic contradictions, in this case historically derived through the Apartheid legacy. Also evident are disruptions between the NQF activity system's own 'mediating tools' and its 'community' in the form of 'conceptual confusions and contestations' which, as we shall discuss later, has significant implications for the 'rules' and 'mediating tools' of other interacting activity systems. Finally, they allude to disruptions between the 'rules' of the NQF activity system, and its 'subject,' object' and 'community' ('a lack of clarity about the purposes of the NQF with stakeholders'). These and the preceding disruptions may arise from the more complex systemic contradictions in the overall conceptualisation of the NQF associated with conflicting neo-liberal economic and democratic agendas (Allais, 2003).

Environmental ethics within the activity system of the EETDP course

Aspects of the complexity of the SAQA/NQF activity system outlined above manifested in the curriculum development process of the National Certificate Course in EETDP, as experienced by WESSA and other role-players. In late 2003, WESSA prompted the establishment of the Environmental Learning Forum (ELF)[3] to enable more cooperative responses to environmental education and training opportunities arising out of the NQF, and to function as the interface between ELF member providers, the relevant SETAs, and employers seeking environmental education and training. The forum's founding document notes that:

> … the current engagement with the NQF and accredited education and training by the environmental community is limited and ad hoc. The reasons for this are many and include the complex bureaucracy and administrative burden surrounding the accreditation process, the fact that many environmental organisations are small NGOs and CBOs. (ELF, 2004:3)

Between 2003 and 2006, the needs analysis, collaborative curriculum development, course accreditation and pilot implementation of the National Certificate Course in EETDP were characterised by conflicting advice and directives provided by SETAs, private consultants and members of the environmental education community who had some prior experience with the NQF.

The 'rules' regulating the course's activity system are mostly derived directly from the SAQA/NQF activity system. For example, the qualification is offered in the form of a year-long learnership and is registered as a 121-credit course at Level 5 on the NQF. Similar to the apprenticeship model, the South African 'learnership' model inducts adult learners into a particular type of work through a curriculum that is required to be 70% workplace-based and 30% formal instruction. As all qualifications through the NQF are unit standards-based,[4] the curricula of learnerships are more formalised than the traditional apprenticeship model of learning, having more formally constituted assessment requirements and delineated course-based and workplace-based components. Learners are placed in relevant workplaces for the

duration of the course where they compile a highly structured 'portfolio of evidence' of their learning, supported by an appointed course tutor and workplace mentor.

The stated purpose of the qualification is to:

> … prepare candidates to function as entry-level environmental education practitioners. It will apply in particular to part-time practitioners working in environmental education centres and to people who may be employed primarily in fields other than education, but who may develop an environmental education role in their workplace, e.g. field rangers, outreach officers, interpretive officers, etc. (SAQA, 2005b).

One of the qualification's ten exit-level outcomes requires learners to: 'Apply fundamental knowledge of environmental ethics to a field of work or study.' The content, scope and depth of this broad outcome is determined by four unit standards, each with a particular emphasis or application. Table 1 lists the qualification's four ethics-oriented unit standards and their credit value; while Table 2 provides the detail of one of these unit standard's Specific Outcomes (SO) and Assessment Criteria (AC).

Table 1. Ethics-oriented unit standards within the National Certificate: EETDP

Unit standard title	Credits
13668: Work ethically and professionally as an environmental education practitioner	3
13649: Apply fundamental knowledge of environmental ethics to a field of work or study	6
13640: Research and analyse an environmental issue in terms of principles of environmental justice and sustainability and recommend possible solutions	8
8367: Understand and develop conservation ethics	4

Course developers, facilitators, tutors, learner-practitioners, mentors and assessors agree (albeit citing different reasons) that the environmental ethics dimension of the course is very challenging, to the point of being problematic. Ethics-related questions in the assignments were simply left blank by many learners, course facilitators and tutors expressed uncertainty around the pedagogy associated with the ethics component of the course, and assessors expressed concern about their own competence to assess others' ethical engagement, and whether ethics can be assessed at all.

Due to the structure of the learnership, 70% of learning is required to take place in the workplace. The assumption in the course curriculum was that time spent on the ethics component of the course during contact tutorials (30%) would be extended and enriched by 70% through workplace mentorship and experience. In practice, however, the formal teaching time dedicated to environmental ethics and values was reduced and as explained below, little or no elaboration occurred in the workplace.

Table 2. Detail of unit standard 13649, including specific outcomes and assessment criteria

Unit standard 13649: Apply fundamental knowledge of environmental ethics to a field of work or study	
Specific outcome (SO)	**Assessment criteria (AC)**
SO 1: Demonstrate fundamental knowledge and understanding of environmental ethics	AC 1: Demonstrate broad knowledge and understanding of key concepts related to environmental ethics. AC 2: Demonstrate some depth of understanding of different perspectives in environmental ethics and associated value positions. AC 3: Demonstrate an understanding of the practical implications of the contested and ambivalent nature of environmental values
SO 2: Analyse a range of environmental practices and problems and develop a synthesis	AC 1: Analyse a range of environmental and development practices in the light of a fundamental knowledge of environmental ethics. AC 2: Analyse a range of environmental problems in the light of a fundamental knowledge of environmental ethics. AC 3: Describe the variety of environmental value positions held by stakeholders associated with these environmental practices and problems. AC 4: Summarise and describe the ethical dilemmas reflected in the scenarios analysed. AC 5: Recommend ethically responsible alternatives or solutions to these practices and problems.
SO 3: Demonstrate an understanding of the environmental value positions	AC 1: Demonstrate knowledge of key international and South African environmental policies and legislation that have a bearing on the learner`s field of work or study. AC 2: Where relevant, demonstrate knowledge of workplace-based environmental policies and procedures. AC 3: Analyse selected policies and procedures and identify environmental value positions reflected in these. AC 4: Compare the environmental value positions reflected in environmental policies and procedures.
SO 4: Develop a code of environmental ethics guiding practice within the field of work or study	AC 1: Describe the learner`s current or future work context. AC 2: Identify responsibilities, procedures or practices that may have an impact on the environment. AC 3: Identify characteristics of environmental best practice in the field. AC 4: Draw up a code of environmental ethics to guide workplace practice. AC 5: Critically evaluate own performance against these criteria.

Environmental ethics within the activity system of the workplace

The Wetlands Conservation Project (WCP) is a long-term, donor-funded project within a national environmental NGO. Its focus is on capacity development with key stakeholder groups to achieve the rehabilitation and wise use of wetland systems, training, community management, lobbying and government cooperation. As part of its strategy to build capacity of young, black conservation leaders within the project and the sector more broadly within the transformation objectives in South Africa, the WCP trialled an internship programme

to mentor young black professionals in wetland conservation practices. Initially, the WCP appointed degreed young professionals, but in two consecutive cases lost them to better paying jobs once they had accumulated reasonable work experience with the WCP. Thereafter, the project appointed two young, unqualified and inexperienced interns in a part-time capacity with the goal of supporting them to develop their capacity and careers within the project. The candidates were, prior to their appointment, working mostly in a volunteer capacity for two small, local NGOs. They were identified by a senior colleague and selected on the grounds of their potential to develop successful careers within the EETDP or conservation sector. In the absence of a structured internship programme, it was decided to register the two new interns for the National Certificate Course in EETDP and to use that course's curriculum process to direct their workplace learning processes. The WCP employs only two other full time staff (both young white males who have each worked for the WCP for nearly a decade) at the level of project manager. They were both assigned to the two part-time interns as their workplace mentors.

The main focus of the WCP is to work with stakeholders (e.g. farmers and other landowners) to delineate, conserve or rehabilitate wetlands and related freshwater systems. When asked in an interview to describe the ethical orientation inherent in their work, one of the project managers explained:

> Fundamentally, as a programme, our primary and perhaps unwritten motivation is working with people to manage their wetlands better. We don't come to people saying listen, we're the wetland experts, we've got the answers. We kind of ask what is the problem that we have here, and we share our take on the problem and how do we now solve this problem, how do we work together on it? ... It's not our job to really push a particular set of environmental values because people create their own value systems, their own ethical systems.

The same project manager, who is also the workplace mentor to one of the learner-practitioners, recognises that he and the WCP bring a specific set of environmental values, but it is not his place to dictate or otherwise impose such values on those with whom he works, such as farmers, foresters, and the learner-practitioner to whom he is assigned as workplace mentor.

Both the learner-practitioners and the project managers struggled to identify sites of ethical tension in their work with the WCP. One of the project managers referred to the tension between their organisation's environmental values and national government's legal and policy frameworks regarding freshwater management. One learner-practitioner referred to the tensions between rural communities who traditionally cut reeds and graze their cattle in wetlands and conservationists who aim to protect wetlands from degradation.

But due to the nature of their work (e.g. project managers accustomed to working alone on specific projects, many of which require sophisticated reporting and knowledge specialisation) and the nature of workplace interactions (e.g. interactions were reduced to weekly management meetings, in the absence of other common work), there were minimal opportunities to engage directly with such environmental values and ethics-based concerns. Environmental values and

ethics appear to be under-examined and taken-for-granted in the workplace practices of the WCP, whereas professional ethics such as honesty in the workplace, transparency, openness between colleagues, punctuality and so on appear to be much more explicitly framed and discussed.

Consequently, both workplace mentors reported very little evidence of either learner-practitioner having engaged actively with the ethical aspects of their professional work during the learnership. Additionally, the learner-practitioners appeared to rely almost exclusively on tutor and assessor feedback to guide their responses in the ethics-related workplace assignment tasks.

This does not mean that no opportunities existed for such interactions, nor that ethical deliberation did not occur. It is, however, an indication that dialogue and other forms of learningful interaction around environmental values and ethics in professional practice were sparse in the workplace, despite it being integral to the course content and assessment framework which seems to have assumed that EETDP workplaces would provide such opportunities.

Guided by this section's emphasis on historicity and structure, the following section reviews a range of contradictions within and between activity systems as the two learner-practitioners engage with the ethical dimensions of their work.

Identification of contradictions

Contradiction 1: The scope and complexity of the qualification's unit standards, outcomes, assessment criteria and essential embedded knowledge [RULES] exceed the scope and depth of the stated purpose of the qualification [RULE] and are untenable in relation to the credit-weighting of some unit standards [RULE].

This first contradiction is what Engeström (1987) describes as a level one contradiction, occurring *within* the same element of an activity system. In this case, there is a mismatch between the qualification's stated purpose and the requirements and credit weighting of its unit standards.

This is illustrated through the case of Unit Standard 8367 ('Understand and develop conservation ethics') (SAQA, 2001). The unit standard is worth four credits (of the qualification's overall 121) which equates to a recommended 40 notional hours, 70% of which should be workplace-based. The unit standard contains of five specific outcomes: (1) Identify values, situations and behaviours which have caused global environmental crises; (2) Develop a personal set of extrinsic and intrinsic values of ecosystems; (3) Distinguish differing interests and values underlying current practices in 'Conservation'; (4) Interact with people to address issues of conflict of a bioregional context; and (5) Explain differing interests and values underlying local environmental conflict.

Over and above the achievement of these specific outcomes, learners must be assessed in terms of the unit standard's essential embedded knowledge (EEK)[5] which is listed as follows:

The qualifying learner is able to demonstrate a basic knowledge and understanding of:	
1. Broad ethics	10. Emotion and science
2. A 'value'	11. Principle of sufficiency
3. Empathetic skills	12. Conflict management.
4. Risk and decision-taking	13. Conservation and preservation philosophy
5. Parallel thinking	14. Sustainability (some practical intergenerational examples)
6. African and western approaches to conservation	15. Bio and cultural diversity issues
7. Wilderness (extrinsic, intrinsic)	16. Negotiation skills
8. Man-Earth-God relationships (spirituality values)	17. Feminism (eco)
9. Politico-ethics (capitalistic-socialistic – green and brown issues)	

This EETDP qualification was developed to: 'prepare candidates to function as entry-level environmental education practitioners' (SAQA, 2005) and the only learning assumed to be in place is a Grade 12 school-leaving certificate. The scope and complexity of the specific outcomes and essential embedded knowledge listed above is incongruous with the stated purpose and starting point of the qualification.

Additionally, the amount of time required to support entry-level practitioners (who have little or no background in environmentalism or philosophy) to achieve the listed specific outcomes and EEKs within the study time associated with four credits, is unrealistic.

This disjuncture between various 'rules' within the SAQA/NQF activity system is traceable to an earlier contradiction in 2001 between the rules and community of that same system. In the formative years of the NQF, standards generating bodies (SGBs) were formed. These consisted of specialists from various fields commissioned to develop qualifications and their associated unit standards. The unit standards for the National Certificate in EETDP were developed by the Environmental Education SGB. However, after the SBG had finalised the qualification, the qualification was amended internally within SAQA to provide specific credit bearing electives (which the SGB thought would be the choice of providers), so that the qualification adhered to a certain number of credits. It was amended to include Unit Standards 8367 ('Understand and develop conservation ethics') and 8385 ('Facilitate conservation understanding'), both of which originated in the Nature Conservation SGB and disrupted the coherence of the ethics-oriented unit standards already in place in the education qualification.

It becomes possible to trace how various occurrences in the historical emergence of the unit standards within the SAQA/NQF activity system determined the nature of the 'rules' that currently direct the activity system of the EETDP course and consequently influence the form and quality of the learner-practitioners' experiences of workplace learning. Contradictions that exist between the activity system of the course and the design of standards therefore need to be brought to the fore and critically engaged with to ensure a stronger and more effective

relationship between these two activity systems. To date, education and training providers have not been adequately empowered to fully understand the historicity of the issues they are dealing with, and thus consequently continue to make more efforts to work with the unit standards in the qualification, rather than requesting a revision or review of the originating problem. If learning is to be more successful, then these contradictions need to be raised and addressed, and education and training providers need to be more fully empowered to understand and critically engage with the construction of the standards that shape their practice.

Contradiction 2: The course's written materials and assessment tasks [MEDIATING TOOLS] are experienced by some learners [SUBJECT] as inaccessible, even alienating.

There is ample evidence to suggest that both learner-practitioners in this case study engage actively with the ethical dimensions of their personal lives and feel strongly about certain socio-ecological issues. For example, the older and more experienced of the two is actively involved in local initiatives supporting orphans and vulnerable children living on the streets, while the younger has recently become involved with a 'dog school' initiative which offers free training in dog care and handling to schoolboys and their dogs in the local township.

The learner-practitioners, however, appear to lack the shared language skills and cultural capital to, firstly, bridge the course materials with their own experiences and, secondly, articulate this within the specifications of the course's assessment framework and tasks, as articulated and expected in and through the course and its discourse and language. Both learner-practitioners can engage well in informal conversations in English, as well as with a number of accessible English texts such as newspapers and magazines. However, interactions involving more advanced field-based discourse and more complex sentence construction appear to disrupt the fluency of their responses. The following is an extract from one learner-practitioner's ethics-oriented assignment response, illustrating challenges associated with articulating sophisticated ideas in an additional language:

> *I would say sustainable development is a process where we have to look after what we have for the next generation, in order to survive. And I can also say it is a demanded thing by the environmental issues which gives us a challenge to Act*. (Student Portfolio of Evidence, p.11)

Both of the workplace mentors (who are proficient in the discourse of the field, and in English as their first language) expressed concern over the learner-practitioners' levels of literacy, noting that they were unable to write professional reports at the required level or engage constructively with most written texts used in the professional context of the workplace. This is an issue reported on more widely in the environmental sector (DEA, 2010), and is an issue that has been discussed in great depth by sociologists such as Bourdieu and Passeron (1977) and Bernstein (2000) (amongst others), who explain the cultural power of language and its exclusions in educational settings.

The EETDP course materials reflect little sensitivity to learners' language proficiency, and to issues of access to new professionalised discourses, as evidenced in the following two extracts from the student handbooks:

> Humanity has been steadily broadening its ethical obligations from members of the same race, to a nation, to the whole of humanity. However we have also seen a steady rise of other concerns since 1960 with rise of animal rights and now we even include inanimate objects (sea, rocks, rivers) into this broadening ethical boundary. (WESSA SustainEd, 2006/2009a, p.35)

and…

> The relatively new philosophy of environmental pragmatism has its foundation in the American pragmatism, which was developed at the end of the 19th century. The main thought of environmental pragmatism lies in the importance of the environment, as it provides humans with experience, which facilitates in developing modifying and changing ethics and values as time goes by. Understanding that it is impossible of finding [sic] one ethic that will completely and accurately solve all conflicts of right and wrong is pragmatism's lead word.
>
> The environment is seen as an important source in the search for a mixture of ethics that will, not solve, but ease many of the problems in the world today. Attempts to dominate nature are, according to environmental pragmatism, not recommendable, as this will annihilate parts of nature that might have served as sources of experience to humans. The exclusion of any environmental ethic (anthropocentrism, eco-centrism, bio-centrism) is also not supported by this philosophy since denying one ethic for another might prevent us from reaching a good value system that can relive [sic] some of our life's burdens. (WESSA SustainEd, 2006/2009b Appendix 2)

Different explanations for the complexity of the course text and mediation languages have been put forward by the community of the course's activity system. Some suggest that it is traceable to the course developer during the course's inception who was finalising a postgraduate degree in environmental education at the time of drafting the materials for the pilot phase of the course. Others suggest that it is not so much the academic intensity of one individual, but rather the general paucity of philosophically and pedagogically robust environmental ethics texts across the course's community of practice that necessitated such a heavy reliance on postgraduate-level texts. The course has, however, been offered six times since its inception and, although time and resources for reviewing and rewriting of materials has been limited, certain revisions have been made. However, these revisions have not extended to the complex texts of the ethics component of the course. Again various reasons exist for this, most notably the tight controls placed on the course designers by the sector education and training authority who use 'tick box' approaches to quality assurance.

It was not only at the linguistic and professional language level that the course's mediating tools were experienced as uninviting. Discourses typical of environmental ethics typologies and philosophy textbooks dominate the course manuals. As noted above in Contradiction 1, their dominance is traceable to the rules regulating the activity system of the EETDP course.

This exploration of a second contradiction enables a tracing of the consequences of those national prescriptions through to the experiences of a learner-practitioner engaging with ethics discourse from his own starting point. When one learner-practitioner was asked if he had encountered these terms before, or had found them useful in the course, he responded:

> *I have not encountered them before and they just don't exist in my lifestyle and in my language. … [W]hen we want to segregate someone from a discussion, so then you can use these words. Eco-centrism! [laughs]. And then people start to say 'I don't belong here', you know, whereas we need collective effort in terms of alleviating what we are doing on our environment and relating it to what the environment does to us…. I can only use these words to meet the requirement of the qualification, but not really at my workplace or at my professional life … Because our communities don't need these words. They only need action that would save their lives. (Interview with anonymous participant)*

From this quotation it is evident that the learner has a clear and nuanced understanding of the development needs of the disadvantaged community where he lives, as well as the power gradients that affect how role-players engage with such processes. His response also shows sophisticated understandings of ethical issues, and while he does not appear to fully grasp the technical ethical discourses as presented in the course, he astutely recognises that he needs to use these typologies and terms in his assignments if he is to be assessed as 'competent' against the relevant unit standards.

The second learner-practitioner noted that he found the course materials interesting and helpful, but also acknowledged that he struggled to complete the readings because the vocabulary was difficult and the texts were long. Beyond such comments in an interview, however, it is difficult to gauge the extent of the readings' usefulness to him because he did not refer to them at all in his responses to the ethics-oriented assignment tasks.

The value of being able to identify and probe this contradiction between the mediating tools and subject of the activity system is that it begins to reveal other existing or potential contradictions. For example, as noted earlier, ethics-oriented interactions in the workplace were sparse, with few if any written texts in circulation. Consequently, almost all tools to mediate ethics-oriented learning were accessed via the formal course teaching sessions and materials. An area for review or change towards better supporting workplace learning processes through a learnership might be to provide more accessible, contextually adaptable course materials that form a more explicit bridge between course content and the dynamics, practices and languages of the workplace, bearing in mind that new professional discourses may also need to be learned in the workplaces. It is not, therefore, simply a matter of simplifying language, but rather a matter of mediating professional discourses more effectively through different iterative teaching and learning strategies.

Conclusion

While only two contradictions have been elaborated upon in this paper, numerous other contradictions can be identified, such as: a contradiction between the 'community' and 'mediating tools' of an activity system, reflected in uneven understandings of environmental values and ethics by course developers, tutors, assessors, workplace mentors and learners, and their limited experience and guidance on how to teach and assess the ethics-oriented component of the course.

This paper has focused in detail on two systemic contradictions that influence the quality of ethics-oriented teaching and learning on the EETDP course. The first was a level one contradiction occurring within the same element of an activity system (in this case, the activity system of SAQA and the NQF), which has implications for effective practice in the related activity systems of the course and learner. The second was a level three contradiction occurring between the mediating tools of the course (language and discourse), and the mediating tools (language and experiences) of the two learner-practitioners registered for an EETDP learnership and placed in the activity system of a wetlands conservation workplace. Cultural historical activity theory has provided an analytical vantage point to probe these contradictions further, in particular to understand how the histories and cultures of the various groups have jointly given rise to the current status quo.

A shortcoming of writing a paper focused on systemic contradictions is that the emphasis lies on (and lays bare) tensions, disruptions and problematic areas which are not balanced here with the strengths, synergies and successes of the EETDP course – of which there are also many. This special focus on the ethics component of the course has forced the creation of a reflective space in relation to it, and this is potentially generative, particularly if the openings provided by the analysis of the contradictions and tensions provide the course designers with tools and insights to improve the learning opportunities for the learner practitioners. The course developers may want to pursue this methodology to review other components of the course, such as how environmental issues are framed in the course, how educational theories are being taught, and so on.

The wider benefit of these analytical tools is the generative potential that their sharpened analysis provides. At the start of this paper it was noted that contradictions are potentially the drivers of learning, change and development in activity systems. Through CHAT and the identification of systemic contradictions, the researcher has been able to probe the ethics-oriented learning processes of the EETDP course in more depth. There is evidence of how the historical development of 'rules' and 'mediating tools' in interacting activity systems influences ethics-oriented teaching and learning in the present. Misalignment between various rules that direct ethics-oriented learning, together with diverse discourses around environmental values and ethics in the course and the workplace activity systems, have created numerous anomalies and tensions, which are openings for new engagement and learning. The process has led to a more nuanced understanding of ethics-oriented teaching and learning processes in a workplace-based course, and has revealed several areas needing more careful research, especially in the area of environmental discourses, and the explicit and implicit language of ethics.

Notes on the Contributor

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Endnotes

1. The name of the organisation has been changed but the pseudonym is adequately descriptive to reflect the focus of its work.
2. Engeström (1987) refers to these four orders of contradictions as phases within an expansive or transformative learning cycle. In this paper, I use them in a more limited way as analytical tools to identify contradictions, while noting that the very act of sharing these insights may be indirectly transformative in relation to the interacting activity systems of SAQA, accredited education and training providers and employers.
3. The following organisations were founding members of the ELF: Department of Environment Affairs and Tourism, WESSA, Rhodes University Environmental Education and Sustainability Unit (RUEESU), Environmental Justice Networking Forum (EJNF), Earthlife Africa, Heinrich Boell Stiftung, South African NGO Coalition, KZN Department of Agriculture and Environment Affairs, Zero Waste Institute of South Africa, Green Network and the SADC Regional Environmental Education Centre (DEAT, 2009).
4. Unit standards are the 'smallest unit of educational achievement that can be credited for certification' (Allais, 2003). According to the NQF Network (1997, p. 2), unit standards: 'describe the result of learning, not the process' and are the 'meaningful end-point of learning that is worth formally recognising'. As these are nationally prescribed standards, their influence on course curricula and hence teaching and learning processes is thus significant and will be considered in this paper in more depth in the later section on the Rules of the course's activity system.
5. See Vorwerk (2004) for some critical perspectives on EEK.

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Youth's Knowledge, Attitudes and Practices in Wildlife and Environmental Conservation in Maasailand, Kenya

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Abstract

The factors influencing formally and informally educated youth's knowledge, attitudes and practices pertaining to wildlife and environmental conservation were assessed in southern Kenya. Using a stratified population sample with evenly spread gender, students in lower primary, upper primary and secondary schools were interviewed. Maasai morans – informally educated Maasai – youth were interviewed as well. Youth whose parents were engaged in tourism-related activities were more positive towards wildlife and environmental conservation. Tourism and foreign exchange were seen as the most important benefits of conserving elephants and other wildlife. Generally male respondents had more positive attitudes towards elephant presence within their land. Schooling and participation in extra-curriculum activities through clubs positively influenced the youth's perceptions of wildlife and environmental conservation. The authors emphasise the role of formal education and environmental clubs in enhancing sustainable environmental and wildlife conservation. Several challenges limit student participation in environmental club activities among most schools. Increased support for education among the youth and improved support for environmental and wildlife clubs can be beneficial to wildlife and environmental conservation.

Introduction

One of the greatest challenges facing environmental conservation is to balance human needs and desires with the needs of the environment. Most protected areas in Africa are only a small proportion of the habitat for the associated wildlife (Douglas-Hamilton, Krink & Vollrath, 2005). Much of the wildlife is distributed within private land outside the protected areas. When Kenya Wildlife Service (KWS) was formed in 1990, a community wildlife department was set up to specifically enhance the role of local communities in wildlife conservation. One of the key targets was to increase the level of awareness of the importance of wildlife conservation amongst rural communities through a wildlife and environmental education program (KWS, 1990). Attitudes are related to a precursor to a particular behaviour (Ajzen & Fishbein, 1980). Selby (2001) as well as Ajiboye and Silo (2008) show the linkage between environmental education and support for environmental conservation. Environmental conservation programmes attempt to halt the disconnect between humans and nature by influencing level of knowledge and attitudes. Some authors argue that environmentally responsible choices that adults make are based on lessons learned in their youth (Eagles & Demare, 1999); while other authors argue that school programmes and clubs have a significant impact in improving children's environmental

consciousness (Eagles & Demare, 1999; Pashby & Weis, 2002; Ajiboye & Silo, 2008).

Currently there is minimal understanding of the attitudes and engagement of youth in environmental conservation issues across much of rural Africa. In Kenya, the community wildlife department of KWS has mostly focused on community benefit and conflict resolution mechanisms, with less emphasis on knowledge and awareness creation programs. Wildlife Clubs of Kenya (WCK), a nationwide youth organisation, was formed in order to educate the youth on wildlife and environmental conservation issues through programmes with member institutions (mostly schools and colleges). Many of the activities of WCK are concentrated within protected areas near urban areas – areas that are easily accessible. Kenya's primary and tertiary education system lack practical and innovative ways of involving the youth in environmental and wildlife conservation and there has been little emphasis on social critical, reflexive and participatory approaches to environmental education (Otieno, 2005).

This study investigates the role of environmental and wildlife clubs as well as formal education in environmental and wildlife conservation in Maasai-land in southern Kenya by comparing youth with different levels of schooling and by comparing formally and informally educated youth. The investigation is broadly based on the broadening base attitude hypothesis that people of a certain class behave similarly at a given time (Jones & Dunlap, 2001). A contrary hypothesis, the economic contingency hypothesis, suggests that concerns over environment are correlated with social class and economic conditions (Jones & Dunlap, 2001). As economic conditions worsen, individuals from the lower class will be less likely to place a high priority on environmental issues.

Methodology

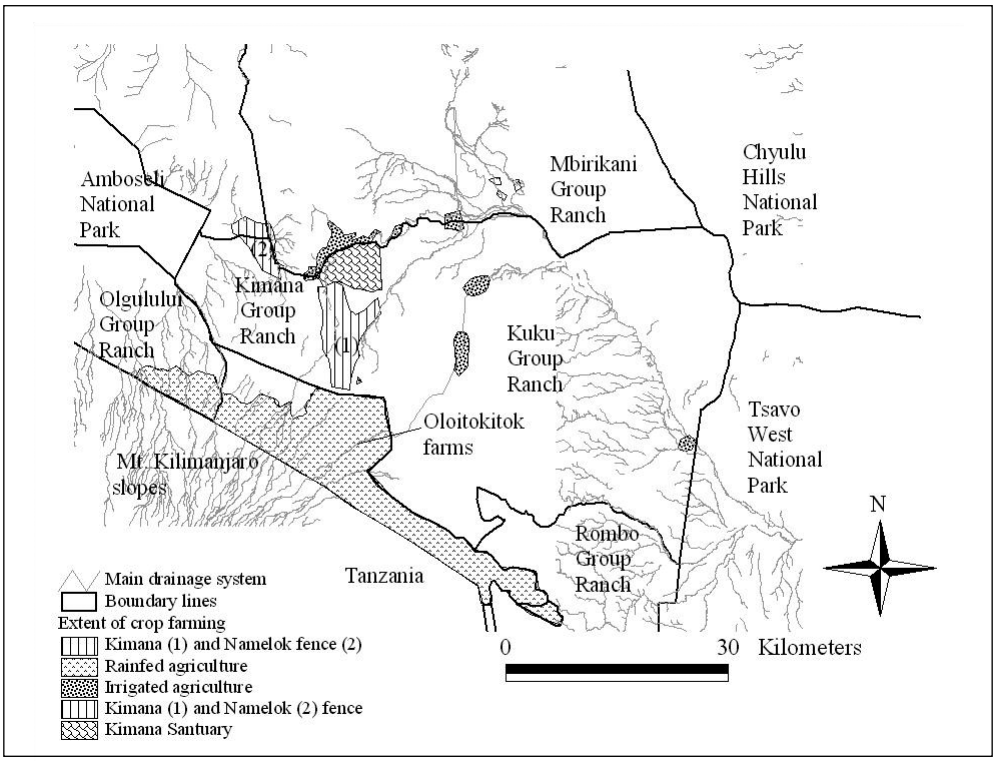
Study area

The study took place within in the Loitokitok District of southern Kenya and focused on Kimana, Kuku, Mbirikani, Olgulului and Rombo group ranches (Figure 1 shows a map representing the study area). The area forms the dispersal area for Chyulu Hills, Tsavo West and Amboseli National Parks. It is semi-arid to arid savannah (Pratt & Gwynne, 1978) and most conducive to livestock grazing, wildlife conservation and tourism. The Maasai people use land for pastoralism, but in the last few decades agriculture has developed within the few wetlands in the area (Campbell *et al.*, 2000). The 2008/2009 drought rendered a large majority of the residents poor due to over 80% loss in livestock numbers per household (KWS & TAWIRI, 2010). The land is largely communally owned in the form of group ranches; large parcels of land that were demarcated under the Land Adjudication Act (Cap 284) of 1968 and legally registered to a Group duly constituted under the Land (Group Representatives) Act (Cap 287, Laws of Kenya) of 1968 (Gok, 1968). However since 1990s, the process of land individualisation has started in the area.

The youth in the area comprise those in the formal school education system and the *morans*. The *morans* are young Maasai men, most of whom do not have a formal education. The schools follow the official government public education system (8–4–4), with eight years of primary, four years in secondary and four years in the university. In the primary schools, most of the

students are from the Maasai tribe while the secondary schools have more diverse ethnic composition among the students.

Figure 1. Map showing location of the study area



Sampling procedure

The sample population comprised schoolgoing children from local primary and secondary schools. Primary schools are divided into lower levels (class one to three) and upper levels (class four to eight). In each school, 40 students (20 boys and 20 girls) were randomly selected for interviews from class three and eight and form four to represent each level. Randomisation was done by having the students count in a numerical sequence. Only students who had a number meeting the stated selection criteria were interviewed. All the students selected for interview were placed in one classroom, from which they were summoned one at a time. After the interview, students were then sent to a separate classroom so that they could not exchange information that could influence the responses. The Maasai *morans* were purposively interviewed in different sections of the study area. All the interviews were conducted in either English or Kiswahili, or in the respondent's local dialect through a translator. Four hundred and fifty (450) students were interviewed – 160 in secondary schools, 290 in primary school students, and 120 *morans*.

Data analysis

Statistical analyses were under undertaken in SPSS 9.0 for windows (SPSS, 1999). Chi-square goodness of fit test and Chi-square cross-tabulation were used to test for differences in responses and relationships among the responses. One-way ANOVA and the post-hoc Tukey test was used to test the differences in the mean quiz scores marks attained among the different groups of youth.

Results

The Maasai were the dominant (71.1%) ethnic group among the youth in these schools. Those interviewed identified livestock keeping (57.9%), crop farming (37.8%) and tourism (2.1%) as their family's primary land use activity.

Factors influencing youths' views on whether elephants (*Loxodonta africana*) should continue using areas outside protected areas

The majority (57%) of the youth felt that elephants should continue using the areas outside protected areas ($\chi^2 = 11.165$, $p = 0.001$). Their views were positively influenced by gender, location of the school, membership to a wildlife club\environmental club and level of education (see Table 1).

The reason for supporting elephants' continued use of the areas outside the protected areas was said to be due to the role elephants play in tourism and people's social-economic welfare. Those who were against elephants' continued use of the dispersal area cited destruction of crops and other property, human death and injury as the main reasons.

Table 1. Views of the youth on whether elephants should continue using non-protected areas

Variable	Statistical result	Responses
Gender	$\chi^2 = 11.162$, $p = 0.001$	More males (62.7%) supportive
Membership to a wildlife/ environmental club	$\chi^2 = 21.141$, $p = 0.001$	62.5 % of club members were supportive
Level of education	$\chi^2 = 30.201$, $p = 0.001$	65.1% of secondary school students and 59.6% of upper primary students were supportive, 64.7% of lower primary students were not supportive
Ethnicity	$\chi^2 = 8.69$, $p = 0.122$	No statistical difference
Home district	$\chi^2 = 11.56$, $p = 0.172$	No statistical difference
Main form of family livelihood	$\chi^2 = 2.594$, $p = 0.458$	No statistical difference

Perceived importance of protected areas

The value of the protected areas was reported to be tourism (38.7%), species conservation (12.2%), enjoyment (10.0%) and employment (9.2%). More students (51.22%) than *morans* (24.32%) felt

that protected areas were important for tourism (χ^2 = 9.46, p = 0.002) (see Table 2). On the contrary, more *morans* (18.02%) than students (3.12%) felt that employment was a key function of protected areas (χ^2 = 10.71, p = 0.001). Children whose main family livelihood was tourism related cited tourism to be a main role of protected areas (χ^2 = 10.81, df = 3, p = 0.013).

Table 2. Youths' perceptions of the value of protected areas

Perceived value of protected areas	Percentage of respondents
Tourism/foreign exchange	35.0
Wildlife containment	12.6
Recreation/aesthetics	11.8
Species preservation/conservation	11.8
Employment	7.7
School fees/bursaries	3.6
Animal/wildlife products	3.1
Education	2.5
Helps in infrastructural development	1.5
Religious importance	1.2
Cultural value	0.6

Attitudes of the youth towards wildlife conservation

Most of the youth (87.5%) felt that wildlife should be conserved (χ^2 = 315.938, p = 0.001). The perceptions were influenced by gender (χ^2 = 5.260, p = 0.022), location of the school (χ^2 = 27.464, df = 7; p = 0.001) and the main form of family livelihood (χ^2 = 27.50; df = 3, p = 0.001). More males (90.2%) than females (83.7%) felt that wildlife should be conserved. Contrary to the expectations, the opinion was not dependent on whether the respondent belonged to a wildlife/environmental club or not (χ^2 = 2.440, n = 341, p = 118). The reasons given by the youth for supporting conservation of wildlife were that: wildlife earns Kenya tourism/foreign exchange (34%), is important for recreation/aesthetics (12%), assists in wildlife containment in parks (13%), and in species preservation/conservation (12%) among other reasons (see Table 2).

The gender of the youth highly influenced their views on why wildlife should be conserved (χ^2 = 34.960, p = 0.001). More females (21.3%) than males (10.8%) felt that a major reason for conserving wildlife was to contain them. More females (10.6%) than males (9.3%) felt that conserving wildlife was important for species survival. More males (44.7%) than females (34.7%) associated wildlife conservation with tourism and foreign exchange; in addition, more males (9.6%) than females (7.4%) associated wildlife conservation with recreation/aesthetic values.

Support for wildlife conservation was dependent on the respondent's level of schooling (χ^2 = 244, p = 0.001). More students in secondary school (61.5%) felt that wildlife should be conserved for tourism/foreign exchange (see Table 3).

Table 3. Relationship between level of schooling and stated reasons for conserving wildlife

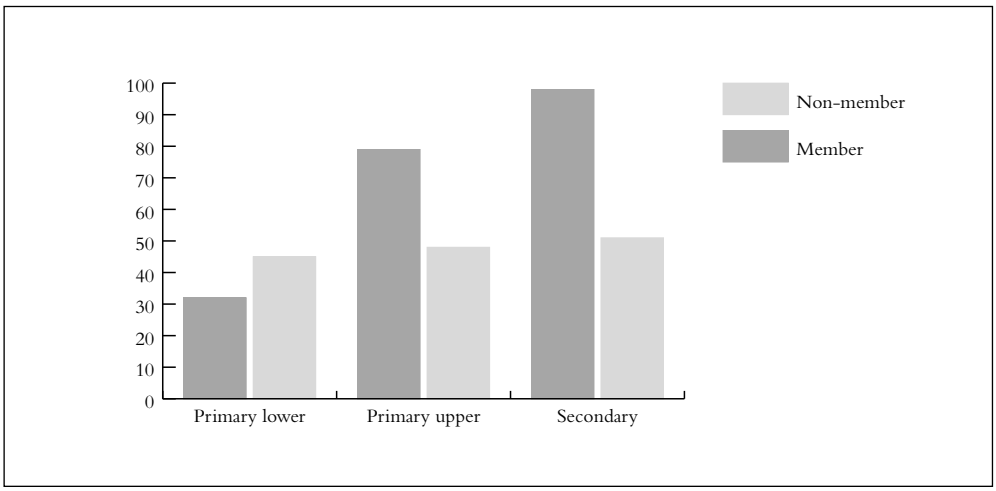
Level of schooling	Tourism/ foreign exchange	Recreation/ aesthetics	Species preservation/ conservation	Wildlife containment
Primary lower	11.8%	4.9%	16.0%	37.5%
Primary upper	48.0%	16.7%	9.3%	4.7%
Secondary	61.5%	8.1%	10.1%	2.7%
P-value	0.0001	0.0001	0.0001	0.0001
Chi-value	244.00	60.00	70.00	92.00

Impact of youth-based conservation education programmes

The majority of students (62%) had not visited the nearby Amboseli National Park (χ^2 = 32.064, $p < 0.001$) and visits to the park depended on club membership ($\chi^2 = 5.851$, $p = 0.016$) and their level of education ($\chi^2 = 11.615$, $p = 0.003$). More club members (44.2%) visited Amboseli National Park compared to (31.2%) non-club members. The proportions of the students who had visited Amboseli National Park in relation to level of schooling were as follows: upper primary (45.7%), secondary (30.4%), and lower primary (28.7%).

The majority of the students interviewed (59.2%) were members of wildlife/environmental clubs. There was a relationship between level of education and membership to wildlife/ environmental clubs ($\chi^2 = 12.758$, $p = 0.002$). Secondary school students had high levels of enrolment in wildlife/environmental clubs, while primary schools had the lowest level of enrollment (see Figure 2).

Figure 2. Percentage of students enrolled in wildlife and environmental clubs



The majority of students (61.7%) reported that they were involved in conservation activities at home ($\chi^2 = 30.591$, df = 1, $p < 0.001$). Their participation in conservation activities at home was influenced by whether the student was a club member or not ($\chi^2 = 9.106$, $p = 0.003$), with more club members (65%) being involved in conservation activities in their home than non-club members. The activities the club members reported undertaking at their respective homes were: tree planting and gardening (56%), garbage collection/ground maintenance (30%), promoting environmental awareness (6%), hygiene/health education (4%), report to KWS about wildlife issues (2%) and erosion control (2%).

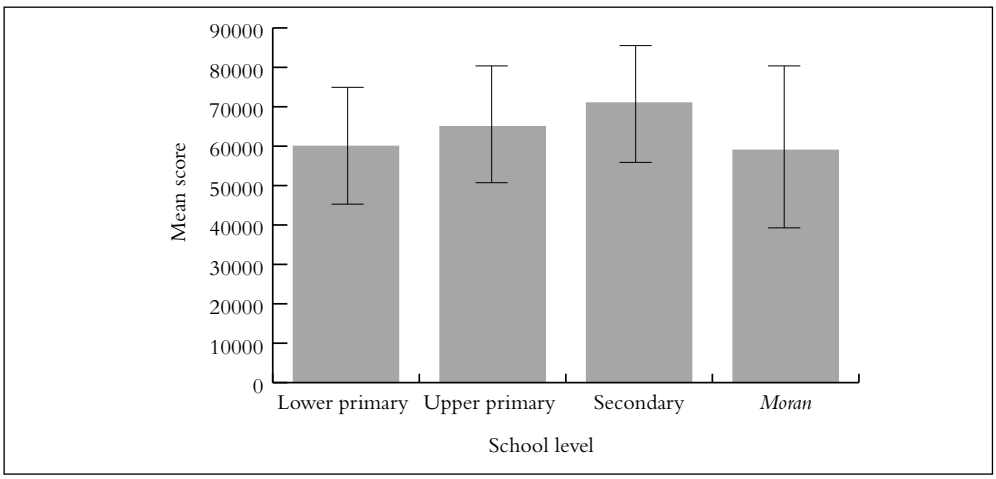
The level of youth's understanding of wildlife and environmental conservation issues, as determined by a set of questions (Table 4) was influenced by whether or not they were a member of an environmental/wildlife club ($F = 5.207$, df = 1, N = 340, $p = 0.023$). Based on quiz test scores, club members had a higher understanding of wildlife and environmental conservation issues than non-members (see Figure 3).

The level of youths' understanding of wildlife and environmental issues was influenced by level of schooling (ANOVA $F = 186.317$, df = 3, N = 3312, $p < 0.001$). Secondary school students were more knowledgeable on wildlife and environmental conservation issues compared to lower primary, upper primary and *morans*.

Table 4. Questions administered to *morans*, primary and secondary school students

Give the English or Maasai names of any four wild animals found in this area.
Which statement is false? A. Elephants eat tree leaves B. Elephants eat grass C. Elephants play with each other D. An elephant is the tallest animal
Where do you think the springs in Amboseli region get their water from?
True or false? Elephant habitat is threatened by humans.
Which statement is false? A. Elephants eat tree leaves B. Elephants eat grass C. Elephants play with each other D. An elephant is the tallest animal
Where do you think the water springs within this area get their water from?
True or false? Elephant habitat is threatened by humans.
Which of the following is not a way of taking care of the environment? A. Planting trees B. Garbage collection C. Clearing areas to plant crops D. Preventing soil erosion

Figure 3. Mean score results for a quiz on different wildlife and environmental conservation issues among school-going children and morans



Discussion and Conclusions

Generally the youth were had positive perceptions about wildlife and were relatively knowledgeable on topical issues in environmental conservation. Favorable attitudes toward wildlife conservation were higher among the youth in the upper school classes. This supports earlier findings that showed that with education comes a compassion for wildlife (Bradley, Waliczek & Zajicek, 1999). Comparison of mean quiz scores revealed an association between knowledge on wildlife issues and level of schooling. The high school students attained the highest test scores, with the informally educated *morans* having the lowest. Increased schooling increases the probability of joining an environmental club and visits to protected areas, furthermore there is increased coverage of wildlife topics as the level of schooling increases. The lower primary schoolchildren are at a stage of their learning where they do not fully comprehend the socio-economic values of environmental conservation (Pashby & Weis, 2002), which may explain their minimal support for the existence of elephants outside the protected areas. The youth in the schools, who were mostly Maasai, regarded tourism and foreign exchange as the main reason why elephants should be conserved. This can be explained by the fact that they are a primary beneficiary of wildlife through education bursaries (Okello, Seno & Wishitemi, 2004). Each of the group ranches receives USD20 000 annually from KWS to be used towards education bursaries.

The main concerns of the youth regarding elephants were related to the possible benefits and threats they pose to humans. Maasai *morans* had more direct perspective on the benefits of conserving elephants. At this stage of their life, they viewed conservation as an option to fulfill their basic needs through employment opportunities in the wildlife conservation and tourism sector. Norton-Griffiths and Southey (1995) are of the view that traditional lifestyle once compatible with environmental conservation may not persist for long, as it puts the community in a poverty trap due to foregoing 'development'.

Schoolgoing children, on the other hand, linked conservation to tourism and foreign exchange. The school curriculum at both primary and secondary school level in Kenya gives students a good theoretical background on environmental and development issues. The lower primary schoolchildren were more negative towards wildlife and associated wildlife conservation with containment of wildlife in protected areas. To them, wildlife should be separated from humans to avoid harmful effects. Children under the age of seven manifest exploitative attitudes, for instance, prefer pets as opposed to wild animals, and are fearful of predators; it is only after the age of 14 that children begin to understand basic ecosystem concepts and links between humans and the natural environment (Pomerantz, 1987).

The minimal support for conservation of wildlife among female students can be attributed to the fact that views of women towards wildlife are likely to relate to perceived danger caused by wildlife. Borden and Francis (1978) and Van Liere and Dunlap (1980) reveal that females exhibit higher perceptions of risk concerning the environment than males. On the contrary, in the USA it was observed that females show a higher degree of environmental concern through their daily activities than men, though men had a greater degree of knowledge (Tikka, Kuitenen & Tynys, 2000). Among the Maasai, who formed the bulk of the study student population, women are less likely to receive or be aware of financial benefits as men tend to dominate financial matters (Ntiati, 2002). After primary and secondary school, the Maasai girls will most likely get married and thus may not anticipate directly benefiting from wildlife conservation. Most male students, on the contrary, expect to get employment from the numerous tourism and wildlife conservation establishments in the Amboseli ecosystem.

Based on the results of this study, the most prevalent method of practically engaging the youth in environmental education appears to be participation in wildlife club activities. While all the schools had clubs, lack of funds limited club activities to gardening and tree planting within the school. Nevertheless, the clubs played an important role in environmental education. Membership increased the likelihood of students visiting protected areas such as Amboseli National Park. Such visits offer students opportunity to learn more about wildlife conservation (Dale & Carlisle, 2007).

The youth of the Amboseli ecosystem are supportive of wildlife conservation. While younger schoolchildren are especially concerned with the destruction and harmful effects of elephants, older youth are more aware of the financial benefits derived from wildlife-based tourism. Club membership positively affects general attitude and knowledge of conservation-related topics; however, club activities were largely local and severely limited by lack of funding. As environmental conservation becomes an issue of urgent concern across much of rural Africa, the role of environmental education becomes imperative. While environmental clubs can play a significant role in awareness creation and education, their success is hampered by financial and management deficiencies, which limits the scope of their operations. Government and other stakeholder support of environmental clubs in schools is crucial if they are to be an effective tool for environmental education and awareness. It is crucial that government and stakeholder support towards primary and secondary school education is enhanced the depressed economies in many parts of Maasai-land.

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Exploring the Role of Environmental Quality and Time Perspective in the Academic Performance of Grade 12 Learners

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Abstract

The aim of this study was to determine to what extent environmental quality and time perspective can account for the variance in the academic performance of Grade 12 learners. Time perspective was assessed utilising the Zimbardo Time Perspective Inventory (ZTPI). Environmental quality was measured by means of a self-compiled questionnaire. A total of 413 Grade 12 learners from four English medium-schools in the Mangaung area of the Free State Province in South Africa were involved in the study. It was found that time perspective together with environmental quality accounts for approximately 14% of the variance found in the academic performance of Grade 12 learners. Although statistically significant relationships were found between time perspective and academic performance, these relationships were concluded to be of little practical importance.

The academic performance of Grade 12 learners is of great importance as the results obtained from their final examinations are generally viewed as primary selection criteria for access to higher education institutions (Swartz, 1998; Uys, 1993; Huysamen, 2001). Various cognitive, personal and environmental factors have been found to influence learners' academic performance (Moller, 1995; Louw, Van Ede & Louw, 1998; Malefo, 2000). Only a limited number of researchers have investigated the influence of environmental quality as well as time perspective on academic performance within the South African context. It is the aim of this study to explore the concepts of environmental quality and time perspective and their role in the academic performance of Grade 12 learners.

Academic Performance

According to Jansen (2004) and Swartz (1998) academic performance and academic success are problematic concepts to define. Jansen (2004) defined academic performance as the cognitive and associated abilities that enable the learner to master academic information to a given standard to subsequently be able to be promoted to the next year of study. Plug *et al.* (1997) defined achievement as the attainment of the goal of a specific action; that is, the completion of a task or the standard of success obtained with a specific undertaking. For the purpose of this study, academic performance can be defined as the degree of success obtained as determined by the criteria set within the academic context.

Three major factors may influence the academic performance of learners. These are cognitive factors, personal factors and environmental factors.

Cognition refers to the processes and products of the intellect and involves numerous

cognitive factors such as concentration, perception, memory and reason (Louw, Van Ede & Louw, 1998), aptitude and intelligence (Swartz, 1998; Myburg, Grobler & Niehaus, 1999), verbal as well as non-verbal scholastic aptitude (Grobler, Grobler & Esterhuyse, 2001), learning styles and strategies (Ross, Drysdale & Schulz, 2001; Bosch, Boshoff & Louw, 2003). Additional factors that currently receive attention in research are language proficiency (Marais, 1993; Van Eeden, De Beer & Coetzee, 2001; Jansen, 2004;) as well as reading-related skills such as visual cognition and verbal cognition (Watson *et al.*, 2003).

As found in Moller (1995) personal factors refer to factors that are associated with the learner's individual functioning and may directly or indirectly have an influence on the learner's academic performance. These may include the individual's self-concept, time perspective and emotional intelligence (Swartz, 1998; Myburg *et al.*, 1999; Grobler & Myburg, 2001; Grobler, 2005).

Malefo (2000) found that environmental factors might also have an influence on learners' academic performance. Environmental factors can either be of a psychosocial or physical nature. Psychosocial factors include parental involvement (Moller, 1995), parental interest (Cherian & Cherian, 1997; Hong & Lee, 2003), parents' level of education and occupation (Jubber, 1994), as well as parents' educational aspirations and values (Moller, 1995). These factors all contribute to the creation of an environment which will either support or hinder a learner's academic performance. Physical factors refer to the quality of the physical environment and may include housing quality (Evans, Saltzman & Cooperman, 2001). From the available literature it has become clear that little information is available concerning the effect of the environment or environmental quality on academic performance. One reason for this tendency might be the lack of information concerning the concept of the environment and specifically environmental quality as it applies to the South African situation.

Environmental Quality

Definitions regarding the environment variously focus on either the physical conditions (Reader's Digest, 1987) or the social or psychological conditions (Evans, 2004) that surround the individual. Rapoport (1982:59) provided a general definition of the environment when stating that 'the environment can be seen as a series of relationships between things and things, things and people and between people and people'. There are four distinct aspects within the environment that determine the way individuals experience these relationships. These are space, time, communication and meaning (Rapoport 1982).

It can be stated that the environment contributes to physical, social and psychological need satisfaction by the structuring of space, time and communication through the organisation of meaning. The extent to which these needs are satisfied by the environment will depend on the success with which environmental elements can be structured and organised to contribute to need satisfaction (Rapoport, 1982).

Maslow's (1968) basic human needs theory provides a summary of needs; it is, however, unclear how the environment can influence these needs. Evans, Wells and Moch (2003) identified five psychosocial processes that are influenced by the environment, which might

partially account for linkages between the environment and the psychological wellbeing of individuals. These are stress, control, social support, parental behaviour and identity. By reviewing the processes identified by Evans *et al.* (2003) within the context of Maslow's (1970) hierarchy of basic needs, the link between the environment and the basic need satisfaction can partially be explained.

In low-quality housing, concerns about safety and hygiene could reasonably elicit considerably anxiety and worry in both adults and children (Wells & Evans, 2003). The following elements are also associated with increased stress levels and decreased psychological wellbeing in children in particular: inaccessibility to outdoor play areas (Bartlett, 1998), lack of access to green and outdoor spaces (Taylor *et al.* 1998), and the inability to spend time in natural areas (Wells, 2000; Wells & Evans, 2003). Where inadequate residential space is available, adults (Evans *et al.*, 2000) and children (Evans *et al.*, 2001) exposed to chronic residential crowding and noise tend to have strained interpersonal relationships and diminished motivation associated with learned helplessness. Parental behaviour was found to be influenced by the quality of the home environment as parents living in substandard housing may attempt to exert tighter, more rigid control over their children's activities to minimise problems. The cumulative demands of dealing with the disturbances associated with substandard housing might well lead to frustration and irritability that could manifest in more punitive parenting (Evans *et al.*, 2001). Parental self-esteem and confidence as well as feelings of self-efficacy might be impacted on by chronic housing problems (Evans *et al.*, 2001). As regards children, poor housing quality can directly affect children's self-esteem, particularly as they interact with peers (Evans *et al.*, 2001). From this it is clear that the environment can influence the satisfaction of the individual's esteem needs.

From the preceding examples it is apparent that the environment can influence individual need satisfaction and psychological wellbeing. Evans *et al.* (2000; 2001) documented the changes that occurred after individuals moved from low quality to better quality housing. After relocating, psychological wellbeing, social relations with neighbours, and children's school performance improved significantly in relation to residents who did not relocate. The group that relocated showed reduced symptoms of depression and anxiety in comparison with the group that remained behind (Evans *et al.*, 2000; Evans *et al.*, 2001).

Time Perspective

The nature and different types of time perspective will be addressed in the next paragraphs. The exact nature of time perspective is a matter of disagreement as it has diversely been identified as a motive, a personality characteristic and a cognitive schema (Pienaar & Bester, 1996; Lennings, Burns & Cooney, 1998; Zimbardo & Boyd, 1999; Hall & Fong, 2003). For the purpose of this study, time perspective will be understood as being of a cognitive nature, underlying and influencing the individual's personality as well as motives on numerous levels.

A distinction can be made between past, present and future time orientations, or time perspectives. Within the framework of past, present and future time perspective, Zimbardo and Boyd (1999) further distinguish between five different kinds of time perspectives, namely:

future time perspective, present-fatalistic, present-hedonistic, past-negative and past-positive time perspective.

Future time perspective is defined as the timing and ordering of personalised events (Wallace, 1956) as well as a general concern for future events (Platt & Eisemann, 1968). Gjesme (1983) conceptualised future time perspective as a searchlight which helps illuminate events ahead. Future time perspective therefore refers to a general future orientation with behaviour that is dominated by striving towards future goals and rewards.

Present time perspective can be divided into two distinct subtypes, namely present-fatalistic time perspective and present-hedonistic time perspective (Zimbardo & Boyd, 1999). Present-fatalistic time perspective refers to a general fatalistic, helpless and hopeless attitude towards the future and life. Present-hedonistic time perspective refers to a hedonistic risk-taking attitude towards time and life.

Past time perspective can similarly be divided into two sub-types, namely past-negative time perspective and past-positive time perspective. Past-negative time perspective refers to a general negative, aversive view of the past; while past-positive time perspective refers to a general positive view towards the past (Zimbardo & Boyd, 1999).

Various researchers investigated the influence of time perspective on the individual (Pienaar & Bester, 1996; Seijts, 1998; Zimbardo & Boyd, 1999). Concerning the effect of these dimensions on individuals, it was found that high academic achievers seem to be characterised by more optimistic attitudes and a greater concern for future goals (Teahan, 1968; Athawale, 2004). Regarding locus of control, shortened time perspectives are related to a belief in external control of reinforcement. The person who sees the consequences of his/her actions as being under the control of outside forces seems less capable of conceptualising segments of personal and impersonal time, whether past or future, and sees their personal future as being populated with fewer events than does the person who believes in control over the consequences of his or her own behaviour (Platt & Eisenmann, 1968). Individuals with internal control of reinforcement had more active, fuller time perspectives, were better adjusted and were less anxious. Internally orientated individuals are generally more future orientated in their time perspectives, more capable of conceptualising segments of time and might perceive the passage of time in a different manner than externally orientated persons. It is further stated that highly optimistic learners were also more future-orientated than the generally more pessimistic learners (Platt & Eisenmann, 1968).

Various researchers found that time perspective plays an important role in learners' academic performance. Grobler (2005) stated that the dominant way of viewing time in a specific situation will play a role in the way in which the individual experiences and treats the demands of time restrictions. This is also true in the case of academic performance where more efficient time management may lead to better academic performance. Simons, Dewitte and Lens (2000) found that individual motivation is influenced by time perspective. This finding is supported by Lennings *et al.* (1998) who found that time perspective has an influence on decision-making as well as goal-setting. Seijts (1998) stated that time perspective determines, to a large extent, the kind of goals that are set or accepted, and whether goal conflict is likely to occur. This may account for the extensive influence of time perspective on numerous aspects of individual functioning.

Methodology

The aim of this study was to determine to what extent environmental quality and time perspective can account for the variance in the academic performance of Grade 12 learners.

Sample

Four English-medium schools from the Mangaung area in South Africa's Free State province were selected by making use of the incidental cluster sampling method. A total number of 413 Grade 12 learners participated in the study. Of these, 165 learners were male and 243 female. Five learners did not indicate their gender on the questionnaire. The vast majority of learners were black while a small minority were coloured. All learners indicated that they were able to read and comprehend Sesotho as well as English, which is supported by the fact that these are all English-medium schools.

Ethical considerations

Permission to conduct the research was obtained from the Department of Education, as well as the respective principals and the learners. The aim of the research as well as the voluntary nature of participation was explained. An informed consent letter was attached to each questionnaire. By signing this letter, learners granted the researcher the necessary permission to use their survey information and academic results. Learners were able to withhold permission, without any negative consequences, by simply not completing the letter.

A further ethical consideration was the fact that learner participation could not be anonymous as individual academic performance had to be associated with the appropriate time perspective and environmental quality scores. Although this might have had an effect on the research results, no other appropriate method that was practical for the specific situation existed in matching the academic performance of the learners with the time perspective and environmental quality scores. Learners were further assured that, to protect their privacy, no identifying information was to be published in the final research report.

Measuring instruments

Academic performance refers to the degree of success obtained by Grade 12 learners as determined by the academic average each learner obtained in the record mid-year examination. Papers written in this examination were set by the Free State Department of Education.

Two bilingual questionnaires, in English and Sesotho, were used to record information regarding the environmental quality and time perspective of the individual learners. The complete questionnaire battery was originally compiled in English after which it was translated to Sesotho by using the method of back translation.

Although various environmental quality measures have been used with success during previous studies (Khattab, 1993), no existing measure seemed relevant for the environment of this study's target population. During an unpublished pilot study performed by the researcher in 2004 a preliminary measure was compiled. This measure was based on information collected after performing a literature review as well as a focus group session with the target group. The

measure resulting from this discussion consisted of 20 items, and had an alpha coefficient of 0.889. For the purpose of this study, the existing measure was revised by referring to existing literature and additional items were added. The final environmental quality measure used in this study consisted of 51 items. All items except two consisted of a five-point Likert scale. These two items provided a space where the learners were required to write down information regarding their environment and required learners to indicate the number of people who share their bedroom and study with them. By using Cronbach's alpha coefficient the internal consistency of the environmental quality measure, for this study, was determined as 0.932.

Time perspective was measured by means of the Zimbardo Time Perspective Inventory (ZTPI). This inventory consists of 60 Likert-scale items, with five different scales of time perspective, namely: future, present-fatalistic, present-hedonistic, past-negative and past-positive time perspective. The reliability of these scales vary between 0.443 and 0.661. Because this study is considered to be an exploratory study it was decided to continue with the statistical analyses even though the alpha coefficients were found to be low.

Results

Table 1 portrays the averages and standard deviations of the criterion variables as well as the predictive variables for the total research group.

Table 1. Averages and standard deviations for criterion and predictor variables

Variable			N	M	s
Criterion variable	Academic performance		413	39.94	9.89
Predictor variables	Environmental quality		373	164.41	31.37
	Time perspective	Present hedonistic	411	49.33	7.29
		Past negative	413	39.42	6.77
		Future	411	52.85	5.82
		Past positive	412	29.74	4.04
		Present fatalistic	412	26.61	5.83

Note: Questionnaires on which items were left incomplete were not taken into consideration and account for the difference in numbers.

The relationships between the predictive variables in regard to each other as well as in regard to the criterion were determined by using of the Pearson product moment correlation coefficients. The result of this for the total group is shown in Table 2.

Table 2. Correlations between determinants and the criterion variable

Variable	2	3	4	5	6	7
1. Academic performance	0.06	0.09	-0.08	0.15**	0.03	-0.24**
2. Environmental quality		0.21**	0.02	0.04	0.20**	0.11*
3. Present hedonistic			0.34**	-0.07	0.25**	0.42**
4. Past negative				-0.02	0.11*	0.34**
5. Future					0.19**	-0.20**
6. Past positive						0.14**
7. Present fatalistic						

* $p \leq 0.05$

** $p \leq 0.01$

From Table 2 it is clear that there are relationships, significant on the 1% level, between the criterion (academic performance) and two of the predictive variables; namely, future time and present fatalistic time perspective. The coefficient between future time perspective and academic performance is positive while this relationship is negative for present fatalistic time perspective.

To determine the extent to which the predictor variables (environmental quality and time perspective) contribute to the total variance found in the academic performance of Grade 12 learners, hierarchical regression analysis was used (Howell, 2007). The percentage of variance which can be explained by a specific set of variables is indicated by the squared multiple correlation coefficient which is *R2*. To determine if a specific variable (environmental quality), or set of variables (time perspective), contributes significantly to the *R2*-value the hierarchical *F*-test can be used. To determine the practical importance of the contribution to *R2* of a specific variable or set of variables it is necessary to determine the effect size(f^2) of the contribution of the variable. A value of 0.02 indicates a small effect, a value of 0.15 indicates a medium effect and a value of 0.35 indicates a large effect (Steyn, 1999).

Table 3. Contributions of different variables and sets of variables to R^2 of the academic performance of Grade 12 learners

Variables in analysis	R^2	Contribution to R^2 (total minus decreased model)	F	f^2
1. [environment]+[time perspective]	0.1284	1–7 = 0.1248	12.480**	0.14
2. [environment]+present fatalistic	0.0708	2–7 = 0.0672	33.600**	0.07
3. [environment]+past positive	0.0045	3–7 = 0.0009	0.450	
4. [environment]+future	0.0253	4–7 = 0.0217	10.85**	0.02
5. [environment]+past negative	0.0081	5–7 = 0.0045	2.250	
6. [environment]+present hedonistic	0.0115	6–7 = 0.0079	3.950*	0.01
7. [environment]	0.0036			
8. [time perspective]+[environment]	0.1284	8–9=0.0107	5.350*	0.01
9. [time perspective]	0.1177			

Key: [ ] indicates the sets of variables

* $p \leq 0.05$

** $p \leq 0.01$

From Table 3 it can be seen that the six predictors result in an R2 value of 0.1284, which is significant on the 1% level [F6;362 = 8.89; p = 0.0001]. From this it can be concluded that the five time perspective factors together with environmental quality account for 12.84% of the variance in the academic performance of the Grade 12 learners. The set of time perspective variables explains 12.48% of the variance in academic performance. Although this finding is statistically significant, [F5;406=12.48; $p \leq 0.01$], the associated effect size (f2) of 0.14 is indicative of a finding with moderate practical value.

The contribution of each of the time perspective variables was also investigated. Present fatalistic, present hedonistic and future time perspective respectively contribute significantly to the variance in academic performance (6.72% (F1;410 = 33.6; $p \leq 0.01$); 0.79% (F1;410 = 3.95; $p \leq 0.05$) and 2.17% (F1;410 = 10.85; $p \leq 0.01$) (see Table 3). With the exception of present hedonistic time perspective, which is significant on the 5% level, the other two contributions are significant on the 1% level. The effect size of these three factors is such, however, that the individual contributions of these factors are of little practical importance.

Environmental quality was found to have an R2 value of 0.0107 which indicates a contribution of 1.07% to the variance found in the academic performance of Grade 12 learners. Although significant on the 5% level (F1;410 = 5.35; $p \leq 0.05$), this result is indicative of a small effect size and is subsequently of very little practical value.

Discussion

Although it was stated that the environment can influence the individual in various ways (Evans *et al.*, 2001), it was found that environmental quality contributes approximately 1.07% to the variance found in the academic performance of Grade 12 learners. While this contribution is significant on the 5% level, in practice it is of very little value. Regarding this finding, the research hypothesis which states that environmental quality significantly influences academic performance could not be proven in this study. This may indicate that the quality of the environment, as defined in this study, has little influence on the academic performance of the Grade 12 learners. It may also be that the subjective method used in determining environmental quality may not be the most appropriate method to determine environmental quality.

Although of little practical value, statistical significant relationships have been found between academic performance and future time perspective. Academic performance was found to be negatively related to present fatalistic time perspective, and positively related to future time perspective. This finding suggests that learners who score high on future time perspective and low on present fatalistic time perspective are more inclined to higher academic performance. This finding is supported by Zimbardo and Boyd (1999), who found that a general future time perspective is associated with self-reported hours spent studying per week. Teahan (1968) found that optimism was associated with higher academic performance; while Platt and Eisenmann (1968) found that a relationship exists between future orientation and optimism. These findings can be supported by considering the dimensions of future time perspective. Future orientated individuals are more considerate of the future consequences of their actions.

The negative relationship found between future time perspective and present fatalistic time perspective is supportive of Zimbardo and Boyd's (1999) findings. Although evidence was found that statistically significant relationships might exist between the various types of time perspective, these relationships fall beyond the scope of this project and were subsequently not discussed in depth. It was further found that past positive and past negative time perspective had no significant contribution to the variance found in academic performance, and therefore no practical effect on academic performance. The relative importance of present as well as future time perspective over past time perspective supports the idea of Seijts (1998) who stated that although the past may provide important lessons it is of little interest in itself. This idea seems to be supported by the findings of this study.

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Viewpoint
Fieldwork in Ecology as a Form of Experiential Learning: First-year university students' experiences of a short experiential learning intervention

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Abstract

The small-scale research study reported on in this Viewpoint paper was conducted to determine the extent to which experiential learning in the form of fieldwork contributes to learning in Biology. The participants in the study were 36 first-year students registered for a module on Ecology. The conceptual framework that framed the study is experiential learning, which proposes that students learn more effectively through first-hand experience. The methodological approach to this study was interpretive as it attempted to interpret students' responses to a survey as well as interview. It also attempted to determine whether students believed the fieldwork experience benefited them. The findings suggest that students who have very little prior experience of fieldwork do not benefit significantly with regard to understanding of scientific concepts, as is evident from students' performance in the module. While a substantial number of students indicated in the questionnaire that they benefited from experiential learning, the benefits appear to be largely in the affective domain, rather than in the cognitive domain. The findings have implications for the expectations we have of experiential learning in first-year Biology courses. The paper is published as a Viewpoint paper, as the views developed through this small-scale study can be further analysed and tested through further research. It was a useful 'first step' in exploring a complex topic, that if it is to be fully understood would require further research into the issues raised by this small-scale study.

Introduction

Experiential learning in Biology is not a new concept. It is generally accepted that first-hand experience enhances learning and should be encouraged (Lakin, 2006). Disciplines such as Biology and Geography are traditionally regarded as ideal areas in which to implement experiential learning to enrich the learning experience. This is indeed the approach followed in the School of Science, Mathematics and Technology Education (SSMTE) at the University of KwaZulu-Natal in South Africa, where this research was conducted. The course in which the research was conducted was designed within the framework of experiential learning.

The question that this research attempts to answer is: How does experiential learning influence students' learning of Ecology?

Theoretical Framework and Literature Review

Kolb's Experiential Learning Theory (ELT) (1984), which proposes that students learn more effectively through first-hand experience, served as a conceptual framework for the study. The theory of constructivism underpins experiential learning as it assumes that learning occurs best if it is grounded in the learners' own experience. Kolb's interests lay in the processes involved in making sense of concrete experiences and the different styles of learning that may be involved. In this he makes explicit use of the work of Piaget, Dewey and Lewin (Smith, 2001). Kolb's experiential learning cycle is an appropriate learning theory as it views experiential learning as the process that links education, work and personal development. This concept, as conceptualised by Kolb (HEQCOM, 2006), views learning as a cyclical pattern from experience through reflection to conceptualising and action, returning to further experience.

The term experiential learning is specifically chosen to differentiate it from other learning theories such as cognitive learning theories that focus on cognition, rather than the affective domain, or behavioural theories that deny any role for subjective experience (Kolb, Boyatzis & Mainemelis, 2000). This experiential learning theory model portrays two dialectically related models of how we grasp experience: concrete experience and abstract conceptualisation; and two dialectically related models of transforming experience: reflective observation and active experimentation. Immediate or concrete experiences are the basis for observations and reflections. These reflections are assimilated and distilled into abstract concepts from which new implications for action can be drawn (Kolb *et al.*, 2000). At the heart of this model is a simple description of how experience is translated into concepts that can be used to guide the choice of new experiences (Atkinson & Murrel, 1988). While some people perceive new information by experiencing the concrete qualities of the world, relying on their senses and immersing themselves in concrete reality, others tend to perceive, grasp or take hold of new information through symbolic representation or abstract conceptualisation – thinking about, analysing or systematically planning rather than using sensation as a guide. Similarly, in transforming or processing experience, some people tend to carefully watch others who are involved in the experience and reflect on what happens, while others choose to jump in and start doing things. A person's background, their past experiences and present environment causes them to choose a particular way of learning (Kolb *et al.*, 2000). Conner (2007) describes Kolb's four-step process of learning as watching, thinking (mind), feeling (emotion) and doing (muscle); but learning requires more than seeing, hearing, moving or touching. We integrate what we sense and think with what we feel and how we behave. Without this integration, students remain passive participants and this passive learning alone does not engage higher brain functions or stimulate senses to the point where integration occurs.

Experiential education is not a new concept. In fact, numerous theories have focused on the importance of experience in learning. The theory of experiential learning has been adapted and applied as a process model in numerous fields and training endeavours. Experiential learning is learning that involves a 'direct encounter with the phenomena being studied rather than merely thinking about the encounter or only considering the possibility of doing something about it' (Borzak, 1981), the focus being on engagement (Osman & Castle, 2006). This sort of

learning is sponsored by an institution and occurs within a structured, formalised framework. It is essentially different from informal everyday learning. Experiential learning in this context refers to fieldtrips where students move out of the classroom and learn in the environment. It is the type of experiential learning associated with ecological studies in biology courses. This view of experiential learning is consistent with a total learning environment philosophy that takes into account both content and context. The education process is about more than cognitive factors such as intellect – it includes emotional intelligence, social interaction and classroom culture (Hawtrey, 2007).

A substantial body of research has reported on the benefits of experiential learning in a wide range of disciplines. The research reported on in this paper was based on experiential learning, where the experience was expected to compliment the academic learning the student experienced in the classroom. The experiential learning occurred during fieldwork, which is regarded in many circles as central to the teaching of disciplines such as Geography (Gold *et al.,* 1991; Jenkins *et al.*, 1994; Kent *et al.*, 1997; all cited in Fuller, Rawlinson & Bevan, 2000) and Biology. The assumption is that first-hand experience enhances learning of concepts and principles of a particular discipline. The research reported by Black (2005) confirms this as the 'learning expeditions' researched by Black led to deeper understanding of important concepts. It is worth noting that these excursions were 12-week experiences. Ernst and Stanek (2006) point to research that supports the effectiveness of direct exposure to strengthen knowledge. Their findings support the view that students learn more effectively within environmental-based programmes than within a traditional educational framework, leading to increased performance, enthusiasm and improved attitudes. Mc Lure (2002) contends that science will make a deeper impression if students engage in fieldwork.

While Smith (2004) reports on the decline of fieldwork in schools in the United Kingdom, practical experience in the form of fieldwork is widely advocated in the Life Science document of the South African National Curriculum Statement (NCS) (DoE, 2003). Nevertheless the majority of students who enrolled for this course had very little experience of fieldwork. Engaging in a module where fieldwork constituted a major part of their work and was assessed rigourously, was a new experience for most of the students. Fieldwork was regarded as an essential component of this course and is based on the notion put forward by Rickinson *et al.* (2004) that fieldwork benefits the cognitive as well as the affective domain. If the statement by Slingsby (2006) that all science has its roots in first-hand experience of the environment is supported, it is even more important that a first-year module should focus strongly on first-hand experience of the environment. While the intention is that students develop an understanding of concepts and skills during fieldwork, an important goal is also that they become responsible caregivers of the earth (Johnson, 2004).

In contrast, Pace and Tesi (2004) report that little research has been done to determine the effectiveness of fieldtrips on students' long-term interests, education and overall perceptions. In spite of little empirical evidence to support the exact value of experiential learning, the assumption appears to be that learning would be enhanced if students engaged in experiential learning. Prokop, Tuncer and Kvasnicák (2007) report on improved attitudes towards Biology and the natural environment, as well as a better understanding of Ecology. Fieldwork should

essentially be a means of acquiring knowledge by observation and gathering information (Clark, 1996). Lakin (2006), in her discussion of science learning beyond the classroom, emphasises the fact that not only are learners' attitudes and feelings affected by learning outside the classroom, it enhances social and personal development, as well as knowledge and understanding. Lakin (2006) however stresses the fact that experiential learning outside the classroom should be a continuous process. Outdoor education should become embedded into the routine expectations and experiences of the school so that it becomes an established and normal part of 'what we do here' (Dilon, 2006, cited in Lakin, 2006). The work of Boyle *et al.* (2007) focusing on the effectiveness of field courses found little improvement in the knowledge domain, while the affective domain was positively affected.

Background to the Study

The School of Science, Mathematics and Technology Education is a school located in the Faculty of Education at the University of KwaZulu-Natal in South African. The school offers modules on subject-specific methods as well as content modules for a number of subject specialisations. The participants in the study were first-year student teachers who registered for a module in Ecology, which is part of the Biology Education Programme for students registered for the Further Education and Training (FET) (Grades 10-12) band. Student reflections from previous years indicated that students generally enjoyed excursions and found them useful, but their examination results did not support this. This research was conducted to try to understand what the reason might be for the apparent disjuncture between the students' experiences and actual performance in the module.

All practical work in this module was field-based, involving students in a three-day excursion away from campus, as well as two local half-day excursions and a campus–based investigation. The campus-based investigation served as an introduction to field-based learning while one local excursion was to a coastal forest ecosystem and the second was to a rocky shore ecosystem. During the three-day excursion students stayed at an environmental education centre where they explored freshwater, dune and mangrove ecosystems. As the various investigations exposed students to the natural environment, there was an expectation that they would develop an appreciation of the natural world and come to understand the rich biodiversity of the South African flora and fauna. However, the main purpose of the excursions was to reinforce the ecological concepts covered during lectures. This approach is supported by the relevant literature and implemented in the belief that fieldwork would facilitate conceptual development.

Methodology

The methodological approach to this study was interpretive as it attempted to interpret students' experiences, in terms of their learning, of field work. This was accomplished through a questionnaire, as well as in-depth interviews.

The questionnaire was used with 36 students (20 female, 16 male), out of a total of 40 who registered for the course in the second semester of 2007 (four were absent when the survey

was conducted). Each student was given a questionnaire at the completion of the course with a number of questions that they were required to answer. The purpose of the questions was to find out how students experienced fieldwork in the module, as well as their school experiences of fieldwork. It also attempted to determine whether students believed the fieldwork experience benefited them or not. It further attempted to find out how students believed they benefited.

This was followed up by interviews with eight (four male, four female) of the participants. The purpose of the interviews was to probe responses given in the questionnaires more deeply in an effort to get a better understanding of students' experiences. The interviews also served as a form of triangulation to confirm the data collected, or to identify conflicting perspectives in the data. In an effort to reduce tension students may have had with regard to providing data to a researcher who was also the lecturer of the course concerned, the interviews were conducted by a fieldworker using a semi-structured interview schedule.

The size of the sample was determined by the number of students who registered for the course. It was a purposive sample as the participants were students who were registered for this specific course. The eight students who were interviewed were selected randomly from this group. Eight was regarded as a manageable group and representative of the group of 36 who completed the questionnaire. Interviewees remained anonymous as the fieldworker selected the participants randomly.

Ethical clearance was obtained from the Education Faculty Research Committee to conduct the research. Once ethical clearance was obtained, students were given letters requesting their consent to participate in the research. All students agreed to complete the questionnaire, while 32 students agreed to be interviewed. The eight who were interviewed were selected from this group.

Results and Findings

Analysis of the questions contained in the questionnaire as well as the interviews provided insight into the students' background with regard to field excursions as well as their perceptions of what they had learnt during the various excursions at university. Table 1 contains a summary of the findings with regard to students' school experience of fieldwork.

Table 1. Students' responses to the questionnaire (n = 36)

Section A: School experience of Fieldwork

Questions	Yes	No
Did you study Ecology at school?	86%	14%
Do you believe that your teacher had sufficient knowledge of Ecology?	63%	37%
Did you do practical work in Ecology at school?	24%	76%
Did you do other classroom-based practical work?	47%	53%
Do you think school Ecology contributed to a better understanding of Ecology in this module?	50%	50%

Analysis of the students' responses show that the majority of students studied Ecology at school and had some knowledge of the discipline when they enrolled for the university course. While 86% is high, the fact that only students who offered Biology as a Matric (the final school year) subject are allowed into the course, the expectation would be that everyone had some background in Ecology. This indicates that some schools do not study Ecology although it is part of the curriculum. The value of students' school experience with regard to Ecology is questioned as few of them remembered studying Ecology at school.

Most students who did study Ecology felt that their teachers had sufficient knowledge of the subject, although only a small percentage (24%) were exposed to practical work and of those, 47% were only exposed to classroom-based practical work. The interviews revealed that students judged their teachers' knowledge of Ecology on the basis of their content knowledge and not their knowledge of the environment. When questioned why they thought their teachers had sufficient knowledge, these were the types of responses that emerged:

'Definitely yes – she was confident, knew her work.'

'I think so – she was interested and we asked her a lot.'

'… because he was teaching properly.'

The interviews confirmed that students rarely engaged in fieldwork during their school years, whether on campus or further away. When they were questioned about their experiences of practical work in Ecology, it was noted that half of the students interviewed could not remember if they had gone on excursions. If experiential learning contributes in a major way to students' conceptual understanding, it is significant that these students have no recollection of the events. The following responses came from students who did remember if they had gone on excursions or not.

'No, we never did practical work-never went into the field. Only studied things theoretically.'

'Did work outside, but very minor.'

'No practical work. Studied from the textbook.'

In summary, analysis of the data points to a large number of students in this cohort who have limited exposure to field-based practical work and therefore limited experiential learning prior to joining this course. However, the fact that only 50% of the students believed that their exposure to school Ecology helped them in this course shows that experiential learning was not considered as a possible advantage in contributing to their understanding.

Table 2 contains a summary of the findings with regard to students' experience of fieldwork in the module.

Table 2. Students' responses to the questionnaire (n = 36)

Section B: Experience of fieldwork in the module

Questions	Yes	No
Did this course contribute to improved understanding and knowledge of the environment?	100%	0%
Did excursions contribute to understanding of the content covered in the module?	97%	3%
Would it have helped you to go on more fieldtrips?	5%	95%
Would your marks have been higher if you had done fieldwork at school? (Answered by those who did not do fieldwork)	100%	0%
Did you think of fieldwork as a different way of learning?	92%	8%
Did you think fieldwork was important?	68%	32%
Did your attitude to the environment change in a positive way after engaging in fieldwork?	91%	9%
How did your attitude change?	With regard to conservation, appreciation of the environment: 91%	With regard to improved knowledge: 9%

While all students believed that the course contributed to their understanding of the environment, they appeared to interpret understanding of environment differently:

'Must not litter.'

'Must not cause fires or destroy food chains and biodiversity.'

'I became very interested in issues such as global warming.'

'I notice many things I would not have noticed previously. I am more aware of what I have learnt.'

'I learnt more things that I never learnt at school because I went on excursions and saw many, many things for the first time.'

A significant response was that most (97%) students believed that experiential learning contributed to improved understanding of the concepts, principles and processes covered in the course.

'It helped me to understand content – the activities.'

'Yes – reinforce understand. See what really goes on.'

'Hands-on experience, easier to know how things work.'

'Yes, I think it did, because learning theory all the time could be confusing.'

All students believed that experiential learning contributed to a better understanding of Ecology and would help them to improve their marks. As the research was conducted before they wrote the examination, their responses were based on their perceptions of their understanding of the content at that stage.

'I think so, because I understood some concepts better after fieldtrips.'

'You remember because you engaged practically. Having observed first-hand helped.'

'I think so – I would not have been able to write about Rocky Shore, etc.'

Although students indicated the value of fieldtrips, most of them (95%) thought they had done sufficient fieldwork and more trips were unnecessary. While a number of students did engage with fieldwork at school and thus had been exposed to experiential learning, those who had not been exposed felt that their marks in this module may have been higher if they had been exposed to experiential learning before this module.

'Yes, because if you do things for the first time, it takes time to understand.'

'If I was exposed to these trips at school I would have found it easier.'

'At school we learnt to pass the exam – the teacher teaches what he thinks you need to know for the exam and then starts looking at questions, they don't look at the broader knowledge.'

Although there was some indication that students realised that it was not only a fun experience, but a different way of learning, the realisation came late to some.

'Yes, but did not realise how much had to be done afterwards. Only after a lot of trips did we realise we were supposed to work on the trip.'

The majority of students acknowledged that they learnt through the experience, as illustrated by this statement:

'Yes, I saw it as a means of constructing my own knowledge. I think it is the best way of learning – hands on. Forget what you read in the book, but remember what you did.'

There was also acknowledgement that they were unfamiliar with this type of learning, and that many were hesitant to go on the excursions, as shown by this statement:

'It was different. It was new. It was a good thing that we were forced to go otherwise many would not have gone.'

A significant number of students (32%) thought that although experiential learning is important, the theory covered in lectures is more important. This may be an indication of how they view experiential learning.

'Fieldwork helped, but was not more important. I take theory very seriously- you need theory more.'

'It is quite important. Knowledge in classroom is also important.'

'Lectures are more important. You have to learn theory.'

When they were asked how their attitudes changed, only 9% indicated a change in knowledge. A total of 91% interpreted attitudinal change as a positive change with regard to better appreciation and understanding of conservation.

'Made me more aware. I know about saving the environment.'

'You see the damage we cause.'

'If you understand the environment you respect it and enjoy it more.'

'Makes you more aware and appreciate the environment more.'

The fact that this group of students scored an average of 48% on the examination for this course and 53% scored below 50%, indicated that if they gained knowledge and better understanding during excursions, it was not sustained. There is little evidence from these results that experiential learning, based on this experiential learning intervention, was beneficial with regard to improved knowledge and comprehension, as well as the development of higher order thinking skills such as application and interpretation. Students who obtained a mark above 70% in the examination are students who had considerable exposure to experiential learning during their school years. This may indicate that a longer experience of engaging with diverse ways of knowing may be a more important factor than shorter experiential learning interventions later on in their learning careers.

Discussion and Conclusion

The findings suggest that students who have very little prior experience of fieldwork benefit less with regard to improved conceptual development than students who have experience of fieldwork. This is supported by students' performance in the module. While a substantial number of students indicated in the questionnaire that they benefited from the short experiential learning intervention, the benefits appear to be largely in the affective domain, rather than in the cognitive domain. In fact, Fuller *et al.* (2000) question whether experiential learning stimulates students to start thinking independently in the short term. This certainly appears to be the case with the cohort involved in this research. Although the reflections and worksheets reflect some acquisition of knowledge and skills when experiencing the reality of working in the field, most students are unable to sustain these gains over the long term. A significant number of students had no concrete experience of Ecology and this made it difficult for them to proceed to abstract conceptualisation. As there was no practical experience in the natural environment, students could not develop observational skills in the time allocated, let alone engage in active experimentation. Furthermore, the lack of sustained direct and reflective experiences and involvement with the environment excluded the opportunity for reflection as well.

Interpretation of the findings using Kolb's experiential learning model points to the possibility that students who are exposed to experiential learning for the first time have concrete experiences but fail to reflect on their observations in the field to the extent that their observations are assimilated into the kinds of abstract concepts that are tested in the examinations. The result is an inability to apply what is learnt in one context to another, as well as difficulty in using concepts to guide their choice of new experiences, although this was not tested in this study. While students who have been exposed to experiential learning previously appear to be more able to grasp or take hold of new information through symbolic representation or abstract conceptualisation, those students who are not familiar with experiential learning are more inclined to watch others engaging in the process. This choice is influenced by their background and the environment in which they operated previously. Where learning requires students to integrate what they see, think, feel and do (Conner, 2007), it would seem that students need more time for this integration to occur, without which they remain the passive participants Conner refers to.

In spite of the fact that a number of students did not benefit through experiential learning with regard to conceptual development, all students indicated that fieldwork helped them with regard to aspects such as appreciation and awareness of the environment, responsibility towards the environment, understanding the importance of conservation, as well as understanding environmental issues. It might well be that experiential learning of this nature and duration in this context contributes significantly more to affective learning such as respect for the environment than to cognitive development. Student reflections certainly point to the improvement of their social skills as a result of prolonged periods spent in each others company. The work of Fuller *et al.* (2000) supports the findings of this research which shows that students need to be introduced gradually to experiential learning to enable them to benefit more

fully from the process. As Kolb's model shows, integration of various stages does not occur automatically but requires deep observation and reflection. Bearing in mind that many of these students come from an environment where the transmission of knowledge by the teacher is the only form of learning they are familiar with, more time is required to come to terms with experiential learning as an alternative form of learning that is aimed at developing knowledge and skills to the same extent as classroom-based learning, and not as an informal engagement with the environment aimed at providing only a pleasurable experience.

The findings have implications for the expectations we have of experiential learning in teacher education curricula. While experiential learning is beneficial, it would seem that students need time to internalise this approach and come to accept this as an alternative mode of learning. Students who come from a context where learning is seen as assimilation of information need time to adjust to an approach that requires learners to construct knowledge by experiencing new content in new contexts. The findings of this research may be useful when conceptualising the structure of first-year university courses that include experiential learning. While the nature of the discipline usually determines the structure of the course, it my be prudent to consider the background and learning experiences of the participants more deeply when designing such courses (Cross, 2009), and to make allowance for more regular field-work experiences.

Notes on the Contributor

Michèle Stears is a senior lecturer in Science Education at the University of KwaZulu-Natal. While science learning in the primary school is a special interest that informed her doctoral research, she is currently involved with research related to experiential learning, including service-learning. E-mail: stearsm@ukzn.ac.za.

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Viewpoint
Responding to Risks and Vulnerability Issues Through Interdisciplinary Curricular Teaching: A case example from the University of Zambia

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Abstract

This paper emerges from a keynote presentation at the School of Education, Department of Teacher Education of the University of South Africa Research Indaba in September 2010. The paper introduces the concepts of risks and vulnerability by means of two examples of what happens when development ignores social and environmental impacts. Specifically, it introduces risks and vulnerability in the context of the construction of the Kariba Dam between Zambia and Zimbabwe, and informal settlements in South Africa. It examines what is meant by interdisciplinary approach to curriculum teaching in responding to risks and vulnerability issues. The discussion of interdisciplinary teaching draws on the experience of the University of Zambia which introduced an interdisciplinary taught environmental education undergraduate degree programme. The case of the University of Zambia provides insights into interdisciplinary curricular teaching in environmental and sustainability education. The paper further provides the basis for critical reflections and recommendations on interdisciplinary curricular teaching as a response to risks and vulnerability.

Introduction: Risks and Vulnerability

Risks and vulnerability have been discussed in environmental education in southern Africa by many scholars. Risk comes with probability of exposure to danger and in the context of our discussion, the probability of being exposed to environmental threats. It also examines the capacity of people and communities to cope with threats. Most of the threats are caused by natural phenomena such as floods, droughts, fire, storms, landslides and volcanic eruptions. Risks lie in the probability of exposure to any of these threats. For example, global climate change is likely to amplify existing environmental concerns and risks in southern Africa. According to the UNEP African Environmental Outlook Report (2006), Africa is extremely vulnerable to climatic variability and change, which is likely to worsen the impacts of drought, flooding, desertification and sea-level rise. Southern Africa has been identified as one of the most vulnerable and at-risk regions with regards to the projected impacts of climate change (UNEP, 2006). The links between drought, crop production and malnutrition are probably of most concern, as they highlight the connection between climate, disease, food security and other stresses. The emerging picture from this discussion seems to suggest that human risks and vulnerability are always caused by natural phenomena, yet there are those which are caused by our desire to exploit nature for our benefit. This is often done in the name of development. To illustrate this point I draw on the construction of the Kariba Dam between Zambia and

Zimbabwe. This is an ideal case study that demonstrates what happens when development ignores human and environmental impacts.

Construction of the Kariba Dam

In order to pave way for the construction of the Kariba Dam in 1958, the local Tonga and few Korekore tribes who lived in the Zambezi Valley were relocated to other places. This process was accompanied by armed resistance and violence. A number of local people were killed (Clements, 1959). For millennia the Tonga people had lived on the Zambezi River banks. They had developed a better understanding of their environment. They were great hunters and grew two crops in a year. One was rain fed while the other was planted in the deep alluvial soil deposited on banks as the river's annual floods receded. They were organised as a family rather than on a tribal basis. They had also developed systems for ensuring food security, as Clements (1959:83) notes: 'A characteristic of their kraals was that their storage huts were built on silts. These were the most important structures in the village, and the grain was kept on a high platform to protect it from white ants.'

Their living in harmony with nature was disrupted when they were forcefully relocated to new and strange places, away from the alluvial soils that had given them food. In these new environments cattle had no grazing lands. They had to learn new ways of survival. These who were settled in the Lisutu area on the Zambian side soon discovered that the soils were susceptible to erosion. Nothing could grow easily and thus they were exposed to vulnerabilities such as disease, hunger, cultural erosion, habitat and perennial drought. To date, the Tonga of Lusitu and Gwembe Valley live in abject poverty. Their traditional coping strategies to vulnerability were eliminated from their way of life due to the forced relocation. They have never benefited from the development that hydroelectricity promised would provide. The electricity pylons from the Kariba Hydropower Station now pass over their huts to provide power to the cities of Zambia and some neighbouring countries.

The story of the Tonga people is a good starting point for discussing issues of risk and vulnerability that are human induced. There are many other stories that one can draw on in the Southern African Development Community (SADC) region and elsewhere to discuss risks and vulnerability issues. A recent report in the *Mail & Guardian* (2010) revealed the shock experienced by South African President Jacob Zuma when he came face to face with the risks and vulnerability experienced by an average person in an informal settlement. The president was visiting the Orange Farm informal settlement in Johannesburg when he was almost reduced to tears due to the poor living conditions of the shanty compound dwellers. The paper reports, in part:

> *President Jacob Zuma was nearly reduced to tears when he saw a family's living conditions in a shack he visited in Orange Farm, Johannesburg, he said on Tuesday.*
>
> *"It is not almost every time I feel like crying during my visits…You could swear no-one lived in that shack," Zuma told premiers, ministers and MECs at the President's Co-ordinating Council in Pretoria.*

The family living there had been totally destroyed, he said, explaining that the owner's daughter left home to become a prostitute, and had returned when she fell pregnant.

South Africa has a housing backlog of more than 2.1 million and more than 2 700 informal settlements. A number of people have been subjected to all sorts of risks and vulnerabilities due to forced removals, unplanned settlements, poor water and sanitation conditions. This has been caused by poor or unfair development policies and governance issues such as those installed under the apartheid government.

Often the poor are more vulnerable and do not have coping strategies. There is a large and widening vulnerability gap between the poor and the rich. The rich have better all-round coping capacity. The poor and disadvantaged have fewer or no options to cope with vulnerability. The two examples of how people are exposed to risks and vulnerability require new capacities for adaptation and resilience in southern African. There is need for a paradigm shift in approaches to livelihoods in general. Environment and sustainability education has an important role to play in supporting people and institutions in southern Africa to prepare for, prevent and adapt to the impacts of risks and vulnerability.

An Interdisciplinary Approach to Teaching

The goal to educate current and future generations about risks and vulnerability needs to place emphasis on connections, coherence, civic consciousness and cross-curricular competencies for solving the problems confronting humanity. Most single disciplines would not easily prepare the learners to tackle the many risks and vulnerabilities that we face. Thus, the need for an interdisciplinary approach to the teaching of complex social ecological systems. Innes (2005), in the case of forest training, argues that for several hundred years training in forestry has emphasised the need for a forester to have knowledge of all aspects of forestry. He observes that foresters have been expected to be the ultimate generalists, having sufficient knowledge of each area of their field to enable them to make effective decisions that cover a range of different disciplines. Innes' argument stresses the need for an interdisciplinary approach to teaching if risks and vulnerability in our society are to be reduced.

To discuss the topic 'Responding to risks and vulnerability issues through interdisciplinary curricular teaching: reflecting on environment and sustainability education' we draw on the experience of the University of Zambia (UNZA) who are running an interdisciplinary undergraduate degree programme – the Bachelor of Education (Environmental Education). The case study has been developed from in-depth discussion with the programme initiator and coordinator. It has also been strengthened by discussions with the students as well as interrogating their course work in form of assignments.

Development of the BEd (EE) at UNZA

The Bachelors of Education in Environmental Education (BEd EE) at the UNZA started in 2008, partly to respond to a myriad of environmental risks and vulnerabilities resulting

from deforestation, land and water degradation, unsustainable use of human and natural resources as well as loss of biodiversity and cultural diversity. An interdisciplinary programme in environmental education was seen as the chief educational response to environmental issues and risks that the country faces. This belief was further strengthened by global and local policy pronouncements for the need for holistic approaches to the teaching of environmental education or education for sustainability. Global events that shaped the introduction of the BEd (EE) at UNZA included the 1977 Tbilisi conference. The conference recommended, for example, that environmental education is the result of the reorientation and dovetailing of different disciplines and educational experiences which facilitate an integrated perception of the problems of the environment, enabling more rational actions capable of meeting social needs to be taken. The other global influences came from the 1992 United Nations Conference on Environment and Development (UNCED, 1992) and the World Summit on Sustainable Development held in Johannesburg in August 2002. Local influences include the National Policy on Education known as 'Educating Our Future' (Ministry of Education, 1996) which places emphasis on the production of a learner who is capable of 'participating in the preservation of the ecosystem in one's immediate and distant environments' (Ministry of Education, 1996:5). The National Environmental Action Plan also sounded the need for holistic teaching of environmental education.

In 2000, the University of Zambia introduced a MEd (EE) degree. According to the course coordinator, the experiences of running the postgraduate degree showed that a first degree in environmental education was a must to provide the requisite competences to candidates. Hence the introduction of the BEd (EE) programme also served to fill the existing gap within the university. It is envisioned that the graduates from this programme will service environmental aspects of doing business in the corporate world and industry. The coordinator argues that all institutions of the 21st century and beyond without exception are required to have environmental education officers and, that currently in Zambia many such officers lack a first degree qualification in the field.

The process of eliciting support

Worldwide, universities tend to offer three main types of programmes, namely: majors, major/minor and interdisciplinary (or multidisciplinary) programmes. The most common offerings are majors as well as major/minors and, since its establishment in 1966, UNZA has predominantly been offering major and major/minor degrees. Interdisciplinary degree programmes have historically been rare and quite complex to deliver. Currently the university has only three fully fledged interdisciplinary programmes, namely: the degree in Gender Studies, BEd (Environmental Education) and a degree in Civic Education.

The School of Education and the Department of Language and Social Sciences Education (LSSE), in particular, spearheaded the development of BEd (EE) at UNZA. The process started with identifying concepts, methods and approaches of various academic disciplines across the university faculties. The resulting programme outline was a bigger and more holistic picture than would be generated by single subject offerings. The draft programme outline formed a framework for the programme. It also became the basis for eliciting support from other

academic disciplines. The coordinator recalls that the process was not easy and faced a lot of challenges. He and his Dean moved from school to school within the institution explaining the benefit of the programme. While the Deans agreed to the idea of the new programme in principle, the idea was rejected in two departments belonging to the School of Natural Sciences. The departments of Biology and Geography rejected the programme. The latter went further to suggest that the programme should be scrapped all together. They argued that their department was already teaching the content of environmental issues and that they were the only ones with expertise to teach environmental issues. Suggestions were made that the School of Education should concentrate on the provision of teaching methods to their students and leave the environmental content to specialised schools.

In order to make progress, the School of Education removed Geography and Biology courses from the draft programme outline. Extensive diplomacy and negotiation skills were required in this process. For example, the coordinator ran a number of meetings with various colleagues to convince them about the benefit of the programme. He also drew on the long friendship and trust that he had built with colleagues in other schools. These had worked with him, respected and trusted his intellectualism. He prepared a paper to orient colleagues to the BEd (EE) Programme. His was a plea of support as exemplified by the following statement during the meeting;

> 'The School of Education and the Department of LSSE at UNZA are merely custodians of the programme charged with the responsibility of coordinating it on behalf of us all as Zambians and other people. We trust that you will be counted on to help move the programme to even higher and loftier heights than is the case at the moment.'

With a great deal of persuasion and support from colleagues, the course was approved at departmental, school and senate levels. Since the course has been running it has drawn a lot of interest, even from the schools that rejected it. Some lecturers from the two departments who rejected the course have since expressed interest in participating in the programme. It has become so popular that the Department of Biology is developing a similar programme.

Characteristics of the programme

The interdisciplinary programme at UNZA has the following characteristics:

- It draws upon more than 50 different academic disciplines to create a coherent whole.
- It is driven by the pursuance of development, in general, and sustainable development, in particular.
- It is educationally focused in the sense that the majority of courses are drawn from the field of education, curriculum studies, adult education as well as education for sustainable development.
- It is rigid to some extent in that it offers compulsory courses and flexible in that it provides course alternatives or electives.
- It is holistic in opening up students' minds to diverse ideas, methods and approaches from various subjects. The aim is to generate a rounded student who will be versatile in support of sustainability.

- It deals with cases of vulnerability, specifically as relates to rural environments and women affairs for which affirmative action is required.
- It is rigorous in intent, especially through courses emanating from philosophy, such as environmental ethics.
- It deals with both ecological and economic issues.
- It addresses issues to do with skills (techniques), knowledge and understanding as well as competences and values/attitudes.
- It provides a thorough period of student project work, partly through the long community/school experience period or short duration study visits to environmental sites.
- It critically revives central pieces of Zambian cultural heritage and, hence, a deliberate focus on indigenous African religions.
- It puts issues of sustainability at the core of student work.

Example of Interdisciplinary work done by students

In order to train the students in the field of sustainability, assignments reflect real-life risks and vulnerability issues. This is with the hope that the students will be equipped with knowledge and skills to tackle the myriad environmental risks and vulnerability issues faced by society. As a response to the risks of road traffic accidents, one of the major causes of deaths in Zambia, students were assigned to write an essay describing and analysing the type of values which were being displayed in the public through written inscriptions found on selected public and private vehicles. Their research data on this assignment was revealing in terms of causative factors of road traffic accidents in Zambia. Table 1 shows a summarised outline of the research finding as extracted from the students essay scripts.

Table 1. Vehicle inscriptions in Zambia and their underlying values

Inscription	Values (meanings) as interpreted by the vehicle owners
Life is not a race, it's a journey	Life is a journey to be taken one step at a time and not to be rushed through as speed kills.
Terminator II	The terminator in the movie is associated as being swift in everything he does. Like many other industries, the transport industry is very competitive and to make anything out of it, one ought to be fast in order to penetrate where others are failing.
This job is challenging	This gives the reason why bus drivers misbehave sometimes when driving because the job is seen as not being easy.
If you cruise you will crash	Value people's lives by not speeding.
Suffer now and enjoy later	People are always motivated to achieve targets despite challenges faced along the way.
Baba buses	Signifies the status of the minibus owner and the position of the proprietor in his own society. Using his minibus as an instrument of servitude, the minibus owner portrays his subjection as a public servant serving the people in his humblest manner.

They are not dug in a hurry	There are so many things desired in human life. However, a person cannot have all of these things at once, nor can s/he own them overnight.
Voyagers	People in transit – the business of moving people to their destination does not need any interference from anything/anyone.
Moving from glory to glory	Individuals are moving from one level of success to a greater one.
Trust the driver and obey the conductor	Passengers should be aware that a mini-bus driver is qualified to take people to their desired destinations, regardless of the speed.

Interpretation based on the assignment

- Risks: Many innocent Zambian passengers and pedestrians increasingly and unknowingly face daily risks from underlying values on the road held by mini-bus drivers.
- Vulnerability: Many Zambians are increasingly vulnerable to risks of over speeding.
- BEd (EE) students: Are being trained in techniques of sustainability, values and making connections between them in relation to real issues affecting Zambians (i.e. sustainable values, unsustainable values, etc.), but are facing challenges of finding attachment and employment.

Issues and Challenges of Interdisciplinary Teaching

1. As explained earlier, two departments refused to have their courses as part of the programme, yet the two disciplines provide opportunities to learn about environmental risks and vulnerability due to the nature of programme they offer (deep ecology).
2. Currently, the university is under-staffed and there is need for more lecturers for the various disciplines. For example, the university has no expert in environmental journalism and the programme coordinator is not sure how this course will be taught in the fourth year. This is also the case for the environmental law course.
3. Some lecturers in other departments are overwhelmed by the number of students they have to teach since the BEd (EE) students joined their classes, making learner support a significant challenge. It would seem that the stakeholders were not fully aware of the implications of bringing the new students on board.
4. The programme lacks learning and teaching materials in environmental education that are context specific and relevant.
5. Some students are uncertain about job prospects after completing the programme. The most affected are students who moved into the programme directly from secondary school. But those with a teaching qualification at diploma and certificate level are less pessimistic about this because they know they have a foundational teaching career available to them.

Conclusion and Recommendations

Environmental and sustainability education needs more than one discipline if it has to respond to the myriad environmental risks and vulnerability issues. These issues are often complex and a single-discipline approach can not provide all the answers. The richness and diversity provided by multi-dimensional perspectives will help found solutions to environmental issues and risks.

Lessons from the UNZA BEd programme indicate that perhaps it will be a good idea to start at a small scale with two or three disciplines coming together. For example, even when departments refused to take part the programme was implemented, stressing the fact that the number of disciplines involved is not as significant as the interdisciplinary focus.

Different faculties learn and benefit from each other; for example, the science and engineering faculties benefited from the education and vice-versa. Through interdisciplinary teaching, sharing of knowledge between different disciplines is possible but the process must be scaffolded by a coordinating department. It is also important to discuss well in advance the importance of introducing interdisciplinary cooperation in undergraduate degrees; including the expected increase in volume of work for lecturers as a result of the increased number of students. The physical separation of workplaces further discourages interaction. In order to seriously foster interdisciplinary teaching, institutional hurdles such as bureaucratic and institutional obstacles must be evaluated and eliminated.

Interdisciplinary teaching will succeed if the parties involved respect and trust each other. In the case of UNZA, the BEd (EE) programme works well with people who were closer to the programme coordinator. There is need to eliminate prejudice among different disciplines. Instead stakeholders should be encouraged to develop new ideas and dimensions for colleagues who are in touch with experts in other disciplines. Interdisciplinary teaching works well where there is trust, teamwork, understanding, good communication skills and friendship.

Collaboration always fails when different disciplines fail to communicate properly due to differening expectations of one another. Internalised prejudices about alien academic fields, as discussed in the case of the Biology and Geography departments at UNZA, provides a good example of sources of resentment where the two departments feel they are the only experts in the field of environment. The word 'environment' means different things in different disciplines and there is therefore a need for harmonisation of the different terms and concepts. Biologists and educationist will define environment differently and may disagree on how to teach it. Scientists often fear that their 'science' will be diluted by the educationists. These fears can be allayed when interdisciplinary teaching/research is supported with well-articulated materials. Often models and frameworks would help to make others understand what is expected of them and how the programme could be handled. It would also help identify the available expertise in various disciplines well in advance.

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Viewpoint
The Discomfort of Interdisciplinarity: New ways of looking at familiar things

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'No problem can be solved from the same consciousness that created it. We have to learn to see the world anew.' Albert Einstein

'The major problems in the world are the result of the differences between the way nature works and the way people think.' Gregory Bateson

Abstract

As the requirements of sustainable development become less and less questionable and as we discover that many of our issues that are usually considered separate are actually interwoven in all sorts of mutually dependent ways, we are being called upon to consider how to more effectively deal with interlocking issues. This paper introduces some of the issues and challenges around working across disciplines and attempts to draw attention to perceptions, challenges, misunderstandings, contradictions and pitfalls of interdisciplinary initiatives. Overall the paper aims to offer new insights and perspectives and to contribute towards developing more interest, curiosity and competence in this challenging topic. The focus of discussion and the research questions raised relate to the university environment.

Background and Introduction

This Viewpoint paper deliberates the idea that the world today is in the grip of multiple crises, and what this may mean for universities and their traditional history of disciplinarity. It considers the perspective that the livability of our planet is in danger and our current patterns of life are being challenged as they become increasingly untenable and more complex. These views of the current context are linked to an understanding that human activity has expanded to such a degree as to now constitute a global, interdependent society that shapes the biosphere at multiple temporal and spatial scales. Simultaneous transitions are occurring in terms of our economy, urbanisation and our ecological life support systems. This requires a particular kind of societal engagement, one which accounts for complexity and inter-relatedness.

As the public media and numerous scientific products tell us, we are living in momentous, extraordinary times where we are globally aware of each other and the multiple dangers that threaten civilisation. Such meta-understanding is taking place on an unprecedented level, and yet we have remarkably little knowledge about the future. Against a backdrop of multiple crises

that exacerbate poverty and accentuate social risks and costs, and against a backdrop of global environmental collapse as well as potential and real systemic failures, the urgency and viability of education for sustainable development (ESD) is profound and valid. The viewpoint put forward here is that unless people have the tools to understand and analyse the world around them, they will not be able to address the challenges that face society and the environment. Current generations require leaders and citizens who can think ecologically, understand the interconnectedness of human and natural systems, and have the will, ability and courage to act.

In this viewpoint paper, I put forward the position that while there is a growing international environmental education and ESD movement, not enough questions are being asked about the appropriateness of our schooling and university systems for today's world; or perhaps the wrong kinds of questions are being asked. Neither are enough questions being raised about the meaning of human learning in the context of our turbulently changing planetary society as distinct from the much more linearly conceived world of the past. I propose that new interdisciplinary and transdisciplinary approaches to science that cut across scientific disciplines and interact with policy and practice are necessary in the quest for sustainable solutions to the massive socio-ecological challenges facing humanity. This experimental area is particularly important considering the current state of the world. There is an increasing realisation that business-as-usual pathways into the future are not viable. Thus I present an opening perspective on a research agenda for interdisciplinarity in universities in such a context.

This viewpoint piece suggests that by valuing and mainstreaming interdisciplinarity in research and education, universities can contribute to more effectively engage and reverse trends as well as deepen understanding. It raises this as a researchable question.

With this in mind, I discuss and shed some light on the debate and questions about the need for interdisciplinary approaches and for building bridges that link the university's fragmented structures. The purpose of this paper is to review arguments and stimulate discussion and thought on this urgent topic, highlight some unexplored questions and assumptions, and to put forward some ideas on how to nurture and foster skills to better traverse disciplines.

The University Tradition and its Gaps

Sustainable development requires an extension of thought beyond that which was the norm for most of the 20th century, towards a much more integrative perspective that brings together (at least) society, economy and the environment with present and future dimensions (Sterling, 2003). In recent years, there has been an encouraging shift in approaches to sustainable development – partly in response to the limitations of traditional models and partly in response to a global trend amongst scientists, economists and environmentalists away from narrow determinism towards developing a world view that embraces the complexity of natural and social systems.

Sustainability is now largely understood to rest on a simple premise: the interconnectedness of all things. This premise challenges the dualisms subject-object, nature-culture that are at the core of modern thought. There is a need to challenge the old settlements between society and nature, between humans and the rest, between matter and mattering, and to refigure the

ontological practice of research.

Universities and educational institutions have an enormous responsibility to prepare current and next generations for the future. I hold the view that until a realisation of interconnections and interdependencies and more integrative perspectives become part of our education and a principle basis of its orientation, environmental justice, social responsiveness, transformation and restoration are improbable.

There is urgency to bring new depth, clarity and compassion to every level of human endeavour – from unlocking individual potential to finding new approaches to global problems. We need to focus on research, education and leadership for humanity's most pressing problems. This raises the question of whether universities provide adequate tools and are able to generate these new conceptual and experiential resources to prepare students for a preferred future.

The dawn of the 21st century arguably sees humanity in a bind: our most pressing problems are complex and inter-disciplinary. The university, as a long-lived institution has to face deep, unresolved questions. This crisis is more serious in some universities than in others but concerns all of them. Academics, scientific and artistic leaders are trained to be deeply functional experts in one area, while the problems they face spill over every imaginable boundary.

In a collection of essays, *Wholeness and the Implicate Order*, physicist David Bohm (1980) argued that the process of separation has gone too far and that it has become time to reconnect with ourselves and discipline our minds to see wholeness rather than wholes that are reconstituted from independent fragments. This requires having a worldview that we probably all had when we began our lives, but subsequently were taught to lose.

According to Nicolescu (2008) there are more than 8 000 academic disciplines today, which means that one might be an expert in one intellectual task but an 'ignoramus' in 7 999 other things. He argues further that the fragmentation of our knowledge has lead to the fragmentation of our world and societies fanatically committed to individualism (Nicolescu, 2008). A dominant focus on 'I' and 'my' is not commensurate with the current emergence of a new focus on 'we', the global commons and an interconnected global system.

For almost a whole millennium, the university evolved from the general to the particular (Max-Neef, 2005). In the beginning, the focus was on a small set of broad subjects: theology, law, philosophy and medicine. The general movement was towards the definition of clear borders among the disciplines. New fields of science emerged mainly by splitting from existing disciplines, acquiring status of independency and establishing their own rules and codes.

The traditional view of an academic discipline is an area of study with its own theories, methods and content, distinctiveness being recognised institutionally by the existence of distinct departments, chairs, courses and so on. The academic disciplines as we know them today are widely considered to be largely discrete and autonomous, although not homogenous.

Disciplines have been described as providing the structure of knowledge that trains and socialises members of a faculty. It also includes the production of 'relevant' research, the process of peer review and a system of rewards related to these practices. A discipline is a system of concepts; more than a body of content knowledge, it is also a discourse, a use of language and a way of thinking, the latter points often being more hidden, less explicit, and less acknowledged. A discipline further has an epistemic and a cognitive social base – a 'who

is who'. There is an established community of practice, a power hierarchy, an important social dimension of knowledge. Implicit in the structure and organisation therefore is a protocol with regards to how far, how much, and who you can talk to. At times it would appear that one is predominantly encouraged to talk to one's own 'clones', facilitating monologues which paradoxically look like dialogues.

Under this traditional notion of academic discipline as discrete and autonomous, there is a standard educational pathway for students. The disciplines influence students' views about what is known, what is valued and what is capable of investigation.

The way universities evolved by seeking specialisation, as described above, has led to producing a formidable array of disciplines in a growing number of isolated and arguably self-centred fields (Max-Neef, 2005). This circle of segmentation of disciplines arguably increases the gaps that separate them. Integrating parts that seem in many ways to evolve away from each other in an irreconcilable way and implanting interdisciplinary exchanges in an institution not set up originally for this purpose is likely to create problems.

Discussion

The word 'interdisciplinarity' is receiving much attention and the concept is increasingly used, often somewhat meaninglessly, in academic, corporate and business prose to make proposals palatable, relevant, cutting-edge, fashionable and contemporary. As there is an apparent willingness and eagerness to jump on the interdisciplinary bandwagon, the term is readily used in universities to describe programmes and courses. However, to a large extent, many issues, challenges, paradoxes and complexities are ignored – not explicitly addressed, recognised or understood. Also although there are many examples of successful interdisciplinary projects and programmes and faculty in universities around the world, the question is whether universities' procedures, traditions, structures and attitudes towards interdisciplinarity are consistent with these objectives. Well-intentioned efforts towards interdisciplinary research can serve to privilege a single discipline or one epistemology over another in question formulation and research.

Kaplan (2002) states that because we have achieved so much success in our use of the material world which lies outside of ourselves, the way of thinking which supports such usage has come to be taken as the legitimate way of approaching the world. It has come to be taken as given. Yet simply because a particular way works with respect to certain phenomena does not mean that it is universal, it does not mean that all phemomena should be regarded in the same way. Vaclav Havel (in Kaplan, 2002:xv) noted in an address to the World Economic Forum many years ago: 'What is needed is something larger (than the scientific method). Human's attitude in the world must be radically changed. We have to abandon the arrogant belief that the world is merely a puzzle to be solved, a machine with instructions for use waiting to be discovered…'.

Berry (1981) argues further that the problem with our approach to solving problems is that it usually causes a host of other problems in its wake – problems that in turn need solving. Increasingly there are calls to fundamentally change the way science is practiced, to

create more flexible and creative work environments in order to generate new insights and solutions. Human-induced climate change is an obvious example. It is an enormous system-wide challenge that affects every person and every country. It requires sweeping change in every aspect of human life. It also questions many fundamental beliefs about growth and the market economy and threatens powerful interests. We are neither accustomed nor encouraged to address a system of solutions; the current system focuses us on addressing individual solutions. The dominant discourse, approach and negotiations regarding climate change predominantly focus on one aspect (rising temperature), applying a dominant, structurally entrenched yet arguably flawed mechanistic worldview. This approach (e.g. focusing on reduction of parts per million) is not focused on the health and maintaining the integrity of the whole system or living well.

If scientific assessments are to be usefully applied, they should be conducted in a context that situates them within the real world. This requires an accurate understanding of how socio-ecological systems function. In this context the term 'resilience' is appearing more frequently in discussions about environmental and societal concerns. Resilience thinking offers different ways of understanding the world around us and of managing our natural resources (Walker & Salt, 2006). It makes an important distinction between the amount of knowledge and the kind of knowledge we pursue and acquire (Walker & Salt, 2006). The philosophy of resilience emphasises an accurate understanding of socio-ecological systems and how they function – it conceives resource systems and people as part of them (Walker & Salt, 2006).

Adaptation planning for climate change will need to rely on an emerging interdisciplinary scientific field which couples human and natural systems and their interactions. New research fields are emerging that meld science and policy, drawing on complexity studies and systems analysis (examples being the resilience research mentioned above).

Part of the present crisis of the university is due to its ontological dilemma: on the one hand, it is pushed toward a sharpening of its competence and increasing specialisation, at the risk of losing the overall view; on the other hand, there is an increasing need to reconcile with its universal mission and tackle complex interrogations that demand more than specialities (Burzstyn, 2008).

In my own profession, planning professional bodies have agreed that future planners will need to be able to go beyond the 'basics' to be leaders and innovators in promoting sustainability (Birch & Silver, 2009). At recent planning conferences a consensus has emerged with regard to what our next generation of city and regional planners will need to know; such as being able to identify and interact with diverse interests, mediate differences, and undertake consensus building to help different constituencies reach agreement in the face of new global energy and climate challenges. These are all tall orders that assume interdisciplinarity and promoting transformative agendas for sustainability.

Much has been written about universities being emptied of agency (assuming they had such agency in the first place) and becoming appendages of the global political economy. Nandy (2009) asks whether universities are becoming centres of knowledge management rather than knowledge production and creation. Universities are supposed to represent the pinnacle of organised, expert knowledge and the mission of universities across the world is to extend

its activities to the society as a whole. However, with more and more energy being spent on bureaucratic procedures and 'managing' knowledge, universities are arguably more set upon their own agendas than they are concerned with the rest of society (Nandy, 2009).

By interdisciplinary research and teaching, I imagine that we are referring to scientific investigation of questions that require assumptions, methods and tools from fields or disciplines that are traditionally distinct and not formally connected. That this constitutes a departure from 'normal' science and the depth and implications of what that might entail is perhaps not clear and obvious to many practitioners. It might mean opening oneself to a 'fresh degree of truth', new truths, assumptions and behaviours – new ways of looking at familiar things.

Call to Action and Areas for Further Research

A new emphasis on understanding inter-relationships and connections is emerging in all fields. There are also pressures and expectations from outside of our universities, such as requirements for professional accreditation that stress this new emphasis. Teachers are becoming more willing to cross disciplinary boundaries so that learning can become more integrated and students constantly demand broader learning opportunities.

While a theoretical account of critical interdiscipinarity has been offered by a multitude of writers, there is a need to understand how the concept is developing – and the term itself is being understood – in academic environments.

The paper proposes that interdisciplinary teaching and research represent the future. This exploratory discussion is at an early stage, and in ending this paper, I propose a few tentative ideas and suggestions on how to nurture and foster better skills to traverse disciplines and work towards a more pervasive form of boundary crossing – one that involves intersections between all departments and disciplines. These present a potential research agenda that can be considered in more depth and with more rigour in future educational research focusing on this topic in a context of sustainability, and include:

Appropriate systems of reward and institutional support
Purposeful and directed interdisciplinary work requires an appropriate system of reward and institutional support. At present, the principal rewards for academic staff at most universities are by means of disciplinary challenges; such as, for example, publication in top-tier disciplinary journals, evidence of having advanced in their discipline, teaching awards for teaching undertaken in a discipline, and so on. New ways of valuing interdisciplinary work in addition to discipline-specific work needs to be addressed in promotion and recognition criteria.

Creation of interdisciplinary spaces
Universities will need to create interdisciplinary spaces to help look after the 'whole' and to invigorate the creation of knowledge. Bridging boundaries or spaces demands a willingness and legitimacy to connect differentiated entities. Such an interdisciplinary space could serve as an integrating structure and could assist with opening people's minds and creating sectors of sensitivity within all faculties. Values and a common conception of the object/system of inquiry

need to be articulate and shared. Such spaces will help disciplinary researchers working together find ways to accommodate each others' approaches rather than compromise them.

This interdisciplinary space could further assist with advocacy of interdisciplinary work and being very explicit about the need for paradigm change and tolerance for ambiguity. Such multi-modal spaces could also generate a shortlist of key important contextual challenges and facilitate joint seminars. Tackling such challenges could open up silos, build internal reflexivity and connect people.

The possibilities that emerge as universities employ more faculty not steeped in one discipline is also an interesting terrain for further exploration.

Programmes and degrees

Students need to be encouraged to recognise the value and need of interdisciplinary study and work through formal fieldwork programmes, on-site experience and mentoring arrangements. There could also be inclusion of interdisciplinary expectations in a degreed programme. Joint degrees could be encouraged at the highest level, and their impact and effect monitored.

Academic development programmes

Emphasis on broader personal growth and development of academic staff is critical. The challenges of sustainability pose challenges for learning and unlearning. There is a need for unlearning and updating which is more than merely adding to – it also means modifying, throwing things out, learning to let go, learning humility, rearranging things, making new connections, and doing so carefully considering past experience and how that must be (re-) evaluated in light of new experience.

Release of sufficient institutional resources

All of the above ideas will rely on the release of sufficient institutional resources – financial, intellectual and administrative.

Conclusion

The current period of transition to a more sustainable society, where much of the perceived certainty generated in previous centuries is crumbling, presents unique opportunities. An unfolding human consciousness of an interconnected global system could emerge. This requires engaging with the limitations of a dominance of compartmentalised sciences and epistemologies, which are found wanting in terms of engaging more fully with complexity. I end this Viewpoint with open questions for further perusal. For example, how do we bring diverse people together to think beyond their normal boundaries? How do we aggregate rather than segregate? How do we think, communicate and develop shared understanding *across* disciplinary boundaries when for more than three centuries fundamental differences emerged over how we have conceptualised/used nature, science and society? How do we rethink the metaphysics and ontologies of what we do? How can one produce a common base of exploration and explanation? How can we work on our own practices while deepening

appreciation of others? How can scholars offer a more welcoming home to a wider range of knowledge practices? How can universities facilitate rather than impede interdisciplinary endeavours? In my view, these are important questions to take forward with universities.

Notes on the Contributor

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Viewpoint
The Communities of Practice Approach: A useful way of reviewing education for sustainable development regional centres of expertise?

Sheperd Urenje, University of London, UK

Abstract

This Viewpoint Paper draws on an interpretive case study research project that explored workplace and networked epistemologies of social learning enabled by the establishment of Regional Centres of Expertise (RCE) in southern Africa. The study has its origins in a concern about the potential effectiveness of RCEs in enhancing professional development through social learning towards sustainability. The case study design employed a qualitative methodology using a mixed methods approach of document analysis and in-depth interviews from selected partners of two RCEs in South Africa: RCE Makana and RCE KwaZulu-Natal. By offering deeper insights into the networking and sharing in these communities, the Viewpoint paper argues the case that these are emerging communities of practice in education for sustainable development.

Introduction

Since 2002 the Southern African Development Community Regional Environmental Education Programme (SADC-REEP) has been collaborating closely with the Ubuntu Alliance, a global alliance of 11 of the world's foremost educational and scientific/technological institutions. SADC-REEP works closely with UNESCO, the designated lead agency for the Decade of Education for Sustainable Development (UNDESD), in exploring possible joint actions with relevant organisations. Together they have been directly involved in establishing five Regional Centres of Expertise (RCE) in southern Africa: RCE KwaZulu-Natal and RCE Makana in South Africa, RCE Swaziland, RCE Zomba in Malawi, and RCE Maputo in Mozambique. These five RCEs have become part of a networked worldwide RCE community which comprise a learning space for sustainable development by enabling social learning in the milieu of the local communities of which they are part.

The goal of this study has been to examine the usefulness of the idea of communities of practice in supporting RCEs in southern Africa. The research focuses on RCE Makana in Grahamstown and RCE KwaZulu-Natal in Howick, two RCE examples from South Africa working closely with SADC-REEP. It explores the concept of social learning and its contribution to sustainable development practices. For the space allowed in this paper I will only focus on the first question, whether RCE activities qualify as characteristics of communities of practice, and through this develop a viewpoint on whether communities of practice is a useful way of reviewing the work of RCEs.

Methodology

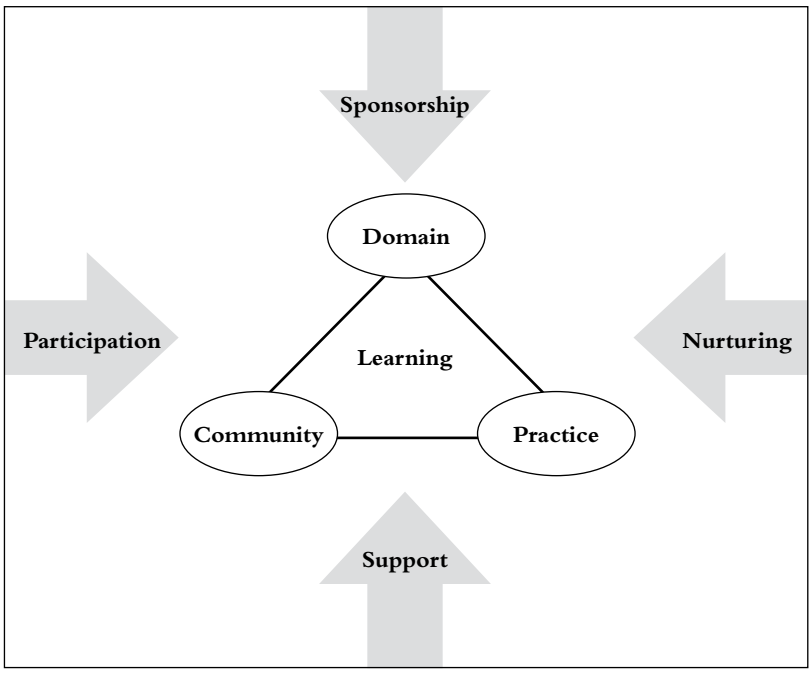
Investigations on the two RCE cases presented here relied on qualitative evidence from multiple sources of data (Lamnek, 2005). To a large extent this research depended mainly on document analysis, 14 interviews with practitioners working in education for sustainable development (ESD) institutions networked with the two RCEs and three interviews with SADC-REEP staff. Analysis of documents established emerging patterns and initial data categories (Webb *et al.*, 2000; Marwick, 2001; Bell, 2005). Document analysis was preferred as an unobtrusive instrument which reduces the biases that may result from the intrusion of the researcher or measurement instrument (Webb *et al.*, 1966). Data from document analysis was supplemented by the 14 interviews with RCE coordinators, their partners and SADC-REEP staff (Krippendorf, 1980). This technique made use of semi-structured and unstructured interviews which provided opportunities to probe some responses further (Patton, 2002; Robinson, 2002). After negotiating with interviewees, all interviews were tape-recorded and transcribed to enable more in-depth details for the purpose of data analysis (Cohen, Manion & Morrison, 2000; Bridges, 2001; Malone, 2008). Field notes and site observations complemented document analysis and interviews.

Research Findings

In order to address the question 'Can RCE activities qualify as characteristics of communities of practice?' it will be useful to summarise the findings of the study in terms of the prerequisites of a community of practice identified in the literature (Wenger *et al.*, 2002). This literature is organised around the key concepts of domain, community and practice. I will argue that the idea of communities of practice is enabling RCEs in providing a platform for ESD practitioners to progress from being *acquiescent partners* to *ESD connoisseurs* through ESD collegiality within the RCE community of practice. The two secretariats assume a hegemonic position because of their local and international prominence. Although RCE stakeholders share a range of interests, the domain is changing in the face of a changing world under pressure from HIV/AIDS, climate change and rising levels of poverty.

The findings of this study are interpreted according to Wenger's (2007) concept of communities of practice (as shown in Figure 1 and Table 1), a useful model for showing how RCEs are functioning as communities of practice.

Figure 1. Wenger's structural model of a community of practice



(Source: Wenger, 2007)

Domain

The domain of the two RCE communities of practice is a response to environment and sustainability concerns through ESD. This domain was also characterised by supporting sustainable living choices and health and nutrition in the community. One of the principal defining factors of community is having a shared interest, goal, or purpose, a *raison d'être* (Lave & Wenger, 1991; Wenger *et al.*, 2002; Wenger, 2007). RCE partners come together around a shared interest in enabling ESD in institutions of learning and the community in line with the SADC-REEP's overall objective to enable environmental education practitioners to strengthen environmental education processes for equitable and sustainable environmental management choices (SADC-REEP, 2005).

That RCE practitioners had a shared purpose or goal might, at first, appear to be a given under these circumstances. There was, however, evidence of multiple goals within each community of practice. One example is Duzi Umgeni Conservation Trust (DUCT), a partner at RCE KwaZulu-Natal, whose common agenda is to promote the health of the Umgeni River. Key stakeholders include the Duzi Marathon community, representing a wealthier community of paddlers who take part in a canoe race between Pietermaritzburg and Durban, South Africa. The DUCT Coordinator, a partner of RCE KwaZulu-Natal, explained his case in this way:

DUCT also has these rich people, engineers and business people who are paddlers because DUCT was started by the people who participate in the famous Duzi marathon. The Duzi marathon paddlers started wetlands conservation because of the high counts of ecoli bacteria that was found in the river. (DUCT Coordinator, interview no. 10)

Mpopomeni community is also a DUCT stakeholder representing economically deprived people with very little resources. These two diverse communities come together with different agendas. The Duzi marathon community strive to uphold the health of the river to protect their sport, while the Mpopomeni community are concerned with a health hazard due to living close to raw sewage as a result of failing sewer drainage facilities. Mpopomeni is in the river catchment area and they are perceived to be the source of pollution finding its way into the river.

While it appeared that both RCE members shared a common set of beliefs and values, differences became apparent at implementing the Eco-Schools Programme. RCE Makana and RCE KwaZulu-Natal on one hand and Midlands Meander Education Project (MMEP) on the other do not put the same strength on the value of portfolios although they are promoting the same agenda of strengthening sustainability education in schools. The RCE Makana Eco-Schools Programme allows schools to participate even though not all of them are able to submit portfolios.

It is usually about ten schools that register per year. They register but we do struggle with attendance. Often only about four or five do submit their portfolios at the end. (Makana Eco-Schools Coordinator, interview no. 2)

This is not the case at MMEP, where if a school cannot do portfolios they cannot participate. MMEP is sponsored by the Midlands Meander Association (MMA) which represents the interests of members of the Midlands Meander, an independent organisation.

Then we started to weed out. Some people left on their own because they didn't like work. They didn't do portfolios and we said if you can't do portfolios you can't be in the programme. (MMEP Coordinator, interview no. 12)

At Makana they value the participation that takes place and assume that learning is taking place even without portfolios. At MMEP they acknowledge that learning is taking place in the absence of portfolios being produced but because they need to show sponsors tangible results they insist on evidence of participation. Although there might be multiple aspirations embodied by individual communities, they are still bound within a domain committed to sustainability education.

Community

The community in Figure 1 is represented by individuals and institutions which are committed to sustainability education and supporting communities in health and nutrition. This community extends further to include other RCEs in southern Africa and the global RCE

community under the banner of the United Nations University. RCE membership is however not a binding association as it gives room for open entry and open exit.

While open entry and open exit enables flexibility in participation, this model was not adopted by MMEP as those who could not produce portfolios were not allowed the privilege of participation. This translates to discrimination by default and shows a tendency of exclusivity by the community of practice which works as a screening strategy because it is highly unlikely that MMEP would take all interested schools even if they produced portfolios. Attendance by schools at Makana Eco-Schools programmes showed little evidence of homogenous commitment to the group because the RCE always struggles with attendance. An electricity supply company withdrew their participation from RCE KwaZulu-Natal after completing their training resource on energy. This company could have benefited more by staying and others could also benefit from their contribution. The company obviously did not see any need to maintain their commitment. This is contrary to the Director of Education's comments that a partnership was a two-way process, involving contributing to and drawing from. If a partnership remains a one-way process it is not a true partnership as participation is not balanced and the relationship becomes hegemonic. It is clear that RCE membership is not a binding association, but shared social learning activities can still be selected to depict a common practice.

Practice

A number of social learning activities can be singled out to profile the practice of RCE communities; these include mentoring, professional collaboration, sharing stories, community collaboration and sustainable agricultural practices. RCEs are in the process of developing a set of practices that help to shape their identity and provide the cohesiveness that sustain them over time (Wenger *et al.*, 2002). They are developing a set of formal and informal norms and responsibilities for expected behaviour. According to Westheimer (1998) and McCotter (2001), responsibility and authority for the community is shared rather than invested in one person. These authors argue that power and organisational structure is flattened rather than hierarchical. In the Makana and KwaZulu-Natal RECs there was however no evidence of the flattened structure as there appears to be an overload on the part of the secretariat. The hegemonic relationship is elaborated in the following quotations:

Rhodes University is viewed as the RCE by its partners:

> *… they [RCE partners] almost like associate us with the RCE, Rhodes Environmental Education and Sustainability Unit. We see ourselves as providing a secretariat for an open membership. (RCE Makana Coordinator, interview no. 1).*

Here the RCE Coordinator is reflexively reviewing the situation as he is from Rhodes University, and is therefore critical of his own situation. MMEP also confirmed an acquiescent relationship with WESSA:

We gain from WESSA opportunities like being invited to workshops because of location. I think we can use WESSA as sort of way to include us. It gives us weight in environmental circles. We can get references from other people but WESSA in environment are the ones that are valued. (MMEP Coordinator, interview no. 12)

Since the early 1990s, SADC-REEP, Rhodes University and WESSA have acquired a great deal of knowledge and competency to act as critical experts in ESD practice, an essential element to be leaders in ESD, an asset I have called ESD connoisseur capacity. The common characteristics strengthening internal capabilities of RCEs as communities of practice are identified in Figure 1 and expanded in Table 1, which shows participation, sponsorship and nurturing, and support.

Table 1. RCE characteristics strengthening internal capabilities

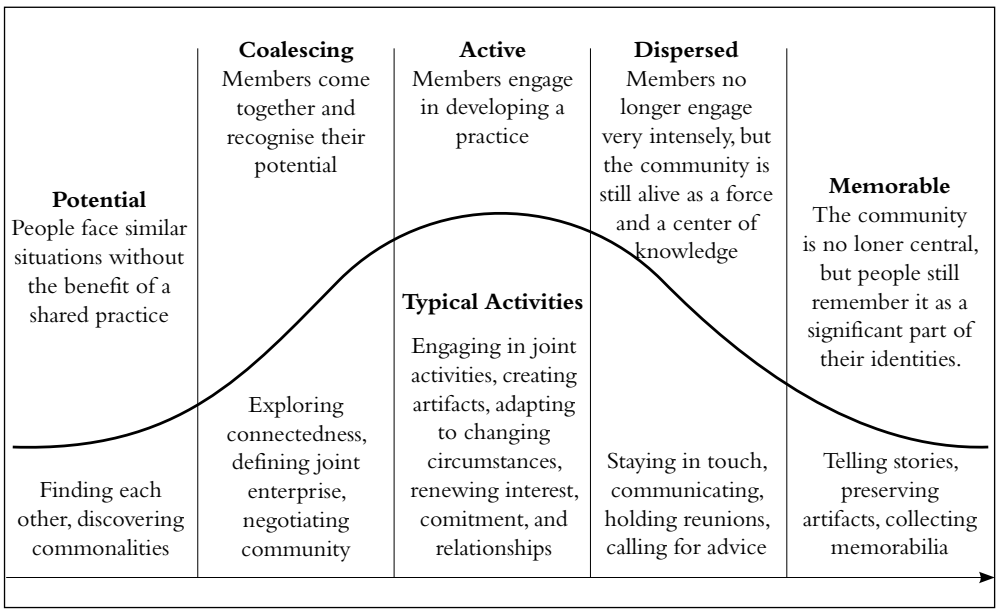
<table>
<tr><td colspan="2">Support Structure – RCE Secretariat
Connoisseur capacity</td><td rowspan="3">Nurturing and conceptual support
• SADC-REEP connecting to international community
• University research community
• University links to international community</td></tr>
<tr><td>RCE Makana
Rhodes University
Department of
Education</td><td>RCE KwaZulu-Natal
Wildlife and Enviroment
Society of South Africa</td></tr>
<tr><td colspan="2">• Administrative RCE home and Interaction hub
• Networking support and venue for meetings</td></tr>
<tr><td colspan="2">Participation
• System of working groups
• Stakeholders meet quarterly
• Open management structure</td><td>Sponsorship
• SADC-REEP seed funding
• No additional funding
• Use of existing funding</td></tr>
</table>

The two RCEs are indeed emerging communities of practice and it is possible to allot their position according Wenger´s model of development of a community of practice.

Community of practice stages of development

Figure 2 shows stages of development a community of practice will go through as it moves from conception through maturity and beyond. When a community of practice is emerging in the organisation, the focus is on promoting learning, networking and collaboration (Wenger, 1998).

Figure 2. Stages of development



(Source: Wenger, 1998)

The SADC-REEP ESD community can be conceptualised within the active stage of this model, where members are engaged in developing practices consistent with SADC-REEP's overall objective of empowering environmental education practitioners in southern Africa. Members are engaged in common activities (course development and participation in regional courses), creating artefacts (Environmental Association of Southern Africa bulleting, newsflashes), adapting to changing circumstances, renewing interest, commitment and relationships. The two RCEs, on the other hand, are situated between the potential and coalescing stages. Although some partners are still finding their way into the community there are a number of partners who have come together, recognised their potential and are exploring their connectedness. It is however important to note that partners operating in the coalescing stage have previously done so without the RCE. What the RCE has done is to make it official and enable partners to come together for official sharing, especially during quarterly meetings.

Conclusion

Since the early 1990s, SADC-REEP, Rhodes University and WESSA have acquired a great deal of knowledge and competency to act as critical experts in ESD practice, an essential component to leadership in an ESD community of practice. I have called this asset 'ESD connoisseur capacity'. RCE partners operating on the periphery still struggle with confidence and competence in participating as equals. Their willingness to accept an unequal position without objection or resistance creates an acquiescent relationship with the RCE secretariat.

It is therefore essential to encourage these partners to participate in other ways. The manner in which ESD practitioners are interacting with one another and the extent to which they approach their work is demonstrated by support for one another through ESD collegiality.

An example of how connectedness has defined joint enterprise can be illustrated through training programmes – such as the attachment programme, a SADC-REEP/WESSA partnership, and the International Certificate Course in Environmental Education, a SADC-REEP/Rhodes University partnership – which provide training opportunities to a number of ESD practitioners. This 'connoisseur capacity' has become a resource upon which RCEs in southern Africa are built. Rhodes University and WESSA have worked and supported ESD in southern Africa through SADC-REEP. As much as this has been positive in many ways like linking partners with international networks, the partnership between SADC-REEP, Rhodes University and WESSA has sometimes been perceived as hegemonic (Lupele, 2007), which needs to remain open to reflexive engagement, as shown by the Rhodes University RCE Coordinator in his reflexive commentary on the membership of the RCE. In conclusion, this short viewpoint paper has shown that Communities of Practice literature can provide useful tools for reviewing the formation and functioning of regional centres of expertise in ESD.

Notes on the Contributor

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