



Zimbabwe's Better Environmental Science Teaching Programme: A step towards education for sustainable development

Charles Chikunda, Midlands State University, Zimbabwe

Abstract

This paper appraises Zimbabwe's Better Environmental Science Teaching (BEST) programme within the context of education for sustainable development (ESD). The first part of the paper briefly reviews developments in environmental education in southern Africa within the broader scope and goals of ESD and draws some parallels with the theoretical foundations of the BEST programme. The second part uses ESD lenses to reflect critically on a study conducted in 2005 to assess the practical implementation of BEST in a rural setting in Zimbabwe. The paper concludes that BEST advocates for a kind of education that has attributes for education for sustainable development. However, the practical implementation of BEST does not appear to match these intentions. Teachers, and their supervisors, are still tied to neoclassical methodologies in which teachers know and pupils don't. The examination-driven curriculum prohibits the required re-orientation of education towards an education system that provides communities with skills, perspectives, values and knowledge to live in a sustainable manner. Communities themselves appear to find it difficult to conceptualise their role in the schooling of children in a community context. This research points to the often-quoted rhetoric-reality gap between idealistic policies (such as those being put forward in international ESD discourses) and practice, particularly in structured institutional settings such as formal education systems. The paper argues that for this rhetoric-reality gap to be 'closed' there is a need for a re-orientation of educational philosophy in Zimbabwe, as well as for closer relationships between schools and communities in the learning process.

Background

There is no doubt that Zimbabwe, like most Third World countries, is facing various environmental challenges. These include abject poverty, unemployment and underemployment, hyperinflation, shortage of basic commodities, emigration of skilled people, governance, land degradation, HIV/AIDS, incessant droughts, and many more. These environmental problems are varied and can be categorised as political, social, environmental and biophysical. On the whole, these problems are interrelated. For example, a political decision to implement an economic structural adjustment programme resulted in many job losses; these unemployed people then turned to self-help jobs such as gold panning, urban agriculture and many other activities which have since caused pressure on the biophysical systems, resulting in land degradation, biodiversity loss, and water and soil pollution.

It is in view of such challenges that the United Nations launched the Decade of Education for Sustainable Development (2005–2014). As Zimbabwe joins the rest of the world in considering its response to this Decade, it is necessary to critically review curriculum programmes and find ways of re-orienting them in light of the expectations of education for sustainable development (ESD). In this paper, I use the two terms 'education for sustainable development' and 'education for sustainability' interchangeably, although I am aware that they may not have the same meaning for all people. In the context of this paper, environmental education (EE) processes are seen as a vehicle to achieve ESD, and not as something oppositional or different.

Education for Sustainable Development, Environmental Education and BEST

Education for sustainable development: Meaning and scope

The main goal of the UN Decade of Education for Sustainable Development (DESD) is to make education a key agent for change towards sustainable living. There is no single agreed definition of sustainable development but the World Commission on Environment and Development defines it as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Pigozzi, 2003). There is also agreement that sustainable development is built on three 'interdependent and mutually reinforcing pillars', which are economic development, social development and environmental protection (*ibid.*:32). International conceptualisation of ESD proposes that education at all levels and in all forms should help people of all ages better understand the world in which they live and the complexity and interrelationship of problems such as poverty, wasteful consumption, environmental degradation, population growth, gender inequality, health problems, conflict, and the violation of human rights – all of which threaten our future.

Environmental education processes as a vehicle for ESD

Earlier conceptions of environment mainly emphasised natural ecosystems, with little attention given to people's relationships with these ecosystems. Early responses to environmental problems thus focused on protecting species in nature reserves and botanical gardens. The assumption was that people needed to be made aware that nature was at risk, and that nature should be protected from people's interference. The educational discourses at the time also reflected the above perception of the environment (O'Donoghue & Janse van Rensburg, 1995). Prominent methods included show and tell, experiential learning, and field trips, among others.

With time, the perception of the environment changed. It was realised that environmental problems have political, social and economic implications as well. People, rather than nature, slowly became central to environmental education methods (*ibid.*).

Critical orientations to curriculum research brought about multiple discourses and contestation over the nature and meaning of environmental education within an emerging discourse of sustainable development. Fien (1993, drawing on earlier work by Lucas, 1979) identified three relatively discrete forms of environmental education, which are education *about* the environment, education *through* the environment and education *for* the environment. Education *about* the environment, which in earlier times was a common form of environmental

education (Robottom, 1987 and Spork, 1990 in Fien, 1993), emphasises knowledge about natural systems and the ecological, economic and political factors that influence decisions about how people use the environment. Within this conceptualisation, the integration of natural and social systems was often neglected in education about the environment.

Education *through* the environment, which was seen to be more learner-centred, aimed to increase reality congruence, relevance and practical experience to learning. Its aim was to provide learners with an appreciation of the environment through direct contact with it (Fien, 1993). Educational approaches develop skills such as data collection, observation, sketching and interviewing, as well as cooperation and group responsibilities (*ibid.*).

Education *for* the environment, as a curriculum theory for environmental education, took account of the educational implications of ideology. Education *for* the environment is neither neutral nor is it value-free – rather, it is a critical approach to education. Huckle, in the early nineties (1991), identified three characteristics of education for the environment, which are:

- (1) shared speculation with pupils on those forms of technology and social organisation that enable people to live together in harmony as people and with the natural world,
- (2) it is a form of praxis in which teachers and pupils seek to democratically transform society through reflectively constructing and reconstructing their world, and thus
- (3) it develops critical and active citizens who are able to bring about the transition to sustainable development.

The underlying assumption here was that learners would be empowered within an emancipatory mould.

More recent deliberations on environmental education have emphasised action-centred orientations within a broad critical orientation. White (2004), for example, defined environmental education as an interdisciplinary and holistic force of education that is geared towards action and change, and which promotes the use of participatory, learning-by-doing and action-based methodologies. O'Donoghue (2001) proposed an open learning framework to assist educators to consider the relationship between action and learning in environmental education. The framework focuses on the relationships between dialogue, encounter and reflection with respect to environmental issues and risks. In a southern African context, processes of mobilising indigenous knowledge have also been foregrounded in environmental education responses (see, for example, Mokuku & Mokuku, 2004; Namafe, 2004; Shava, 2005), introducing a concern for culture, context and epistemological relevance into conceptualisations of environmental education.

All this shows that environmental education processes, which are an established vehicle for ESD, are grounded in social constructivism and socially critical orientations, although, more recently, critical realist discussions have started to question earlier socially constructed foundations of environmental education (Price, 2005). Critical perspectives entail questioning appearances and taken-for-granted practices, probing assumptions and implications (Cornbleth, 1990). Social constructivists believe knowledge is a human product, and is socially and culturally constructed by individuals through their interactions with each other and with their environment (Ernest, 1998; Gredler, 1997). McMahon (1997) adds that social constructivists view learning as a social process that occurs when individuals are engaged in social activities

– and not as a passive development of behaviours that are shaped by external forces. Social constructivists thus see learning in ESD as a cooperative process building on learners' prior knowledge. Learners as well as community members are seen as agents for producing worthy knowledge through interaction with others. Learners and the community can engage in collaborative community projects which are a response to community concerns and which engage learners in collaborative reflection and learning from direct experience. A direct result of these perspectives has been the development of action research and community problem-solving methods, amongst other action-centred methods. Environmental education further encourages interaction amongst learners, between learners and educators, and between learners and community members, in order to address local environmental issues and risks. As can be seen from this discussion, the evolution of thinking in environmental education in southern Africa, has provided a rich capital for implementation of the UNDES, as environmental education has considered many of the issues currently being proposed to guide implementation of ESD (UNESCO, 2005).

Historical developments shaping the BEST programme

The evolution of Zimbabwe's primary school science curriculum, especially for schools once reserved for blacks, can be traced to the 1950s. In 1954 the Rhodesian government (now Zimbabwe) implemented science in the primary schools as nature study. The curriculum approach was conservationist; the idea was to raise awareness in learners of flora and fauna that were in need of protection. The syllabus was found to have little relevance to the Zimbabwean context, as highlighted in the Curriculum Development Unit report of 1974 (MEC, 1974). In 1975, a working committee of the Ministry of Education recommended that history, geography, nature study and hygiene be integrated into one subject which was known as environmental studies.

Environmental studies was further split into two subjects: environmental science (ES) and social studies. The new environmental science syllabus was produced in 1982. It covered 13 topics, with topic content for each grade clearly defined. The syllabus aimed at developing scientific concepts and skills through pupils' involvement in practical activities.

The Curriculum Development Unit report of 1990 (MEC, 1990) highlighted the problems that were identified in implementing the new syllabus. The problems included timetabling, pedagogical use of local resources, linking out-of-class practical activities with classroom learning, community involvement, and teaching methods that were largely content-centred. From 1990 to 1993 the syllabus was revised to meet the demands of different levels of trained teachers, as well as untrained teachers. In 1994 a bilateral agreement between the Zimbabwean and the German governments resulted in the establishment of the project Better Environmental Science Teaching (BEST) to implement the revised syllabus. BEST was installed with the following aims:

- (1) To improve the teaching and learning processes of environmental science quantitatively and qualitatively in Zimbabwe, so that educators and pupils scientifically investigate relevant environmental issues

- (2) To enhance sustainable management of the environment by involving the community
- (3) To improve teaching and learning in all subjects in primary schools through integration of environmental science with other subjects

As an implementation strategy BEST conducted in-service courses at different levels for the key players in the school system, namely: school heads and teachers, school supervisors and teacher training college lecturers.

It is against this background that we sought to appraise BEST as a curriculum approach within the realms of ESD. The first part draws parallels between the theoretical grounding of BEST and pedagogical orientations that inform ESD. The second part analyses the actual implementation of BEST in a rural setting in Zimbabwe. The analysis is done within the broad scope of ESD, which includes recent trends and developments in environmental education (as outlined above), with the hope of further re-orienting the curriculum practice towards the goals of ESD.

Parallels between the theoretical grounding of BEST and ESD

Parallels can be drawn between the theoretical grounding of BEST and the broad-based goals of ESD as outlined above. The first two aims of BEST call for investigation of environmental issues by learners and educators with a view to enhancing sustainable management of the environment by involving the community. This sounds like a curriculum move from the traditional neoclassical orientation towards a more critical, action-oriented approach in which learners and community members are involved in reflecting on, and reconstructing, their world. Further deductions from these objectives may mean that learners are encouraged to make meaning of their learning. Learning also becomes conceptualised as a participatory process, as it calls for the involvement of both community members and learners to manage their environment. One would expect a kind of learning where all forms of knowing, that is, indigenous ways of knowing and scientific knowledge (amongst others), are at play to enhance sustainable management of the environment. Theoretically, this agrees with the thrust of ESD and recent trends in environmental education (as outlined above), which call for re-visioning and revaluing education so that it becomes process oriented and empowering rather than product oriented.

On paper, one can deduce that BEST advocates for a kind of education that has attributes to achieve the goals of education for sustainability. Attributes such as participative, inclusive and lifelong learning for all persons in all areas of life, extending throughout their lifetime, are assumed (Huckle & Stirling, 1996). Learners, educators and local people would be expected to see themselves, their histories and futures in new ways. They are expected under BEST to develop a sense of power to shape their lives and the environment in which they live (Huckle, 1995).

Theoretically this move agrees well with the constructivists (McMahon, 1997) who argue that knowledge is derived from interactions between people and their environments and resides within cultures. The construction of knowledge is thus influenced by the inter-subjectivity formed by cultural and historical factors of the community. Thus the objectives of BEST would

expect teaching approaches, which include reciprocal teaching, peer collaboration, problem-based instruction, case studies, web quest, fieldwork and many others, that involve meaningful learning where learners are involved in advancing community needs.

The other aim of BEST is to integrate environmental science with other subjects. This is in line with the interdisciplinary and trans-disciplinary characteristics of education for sustainability that reflects that no subject, factors or issues exist in isolation (Huckle & Stirling, 1996). This probably sows the seed of a socially critical curriculum in which the whole curriculum is seen as a project. In this case, differentiation of subjects and use of time should be based on negotiation between community, teachers and learners (Kemmis, Cole & Suggett, 1983). One would expect to see under BEST something similar to a thematic approach where pedagogical practice of every discipline is guided by the curriculum project. For example, if the community is facing a problem of soil erosion and siltation of rivers, all the subject disciplines will focus in time and space on this problem. In geography, learning will focus on related concepts and field activities. History learners and community members may try to harness knowledge from previous generations and from other cultures concerning the challenges. Languages and arts could dwell on related passages, as well as dramatising to enlighten the community on problems and expected corrective measures.

The last aim of environmental science learning that focuses on environmental issues, and involves the community in the actual teaching of environmental science, suggests that learners, educators and local people could be involved in action research and community problem-solving activities (and other action-oriented approaches) to improve their lives.

Appraisal of the Practical Implementation of BEST

To appraise the practical implementation of BEST, a study was conducted in 2005 using indicators such as desirability of BEST as a curriculum project, areas in which teachers find BEST most useful, areas of major focus by supervisors such as school heads and their deputies and education officers, and also teaching methods preferred by teachers, as well as community involvement in curriculum implementation.

For this purpose, a survey was done in Buhera district of Zimbabwe. The district is one of the poorest of the country's rural districts. A rural setting was also seen to be suitable – mainly because rural communities derive their survival needs directly from the biophysical environment, which is facing several pressures, and the sustenance and sustainability of which would require the contribution of community members themselves. Sixty out of 300 primary school teachers in the district were randomly sampled for the study. A questionnaire was administered to teachers. Follow-up interviews were conducted with teachers, as well as with heads of schools. Informal interviews were also conducted with community members. Purposive and convenient sampling strategies were employed to engage with community members who were involved in school activities.

Desirability of BEST in schools

The success of a programme depends on how implementers of that particular programme

appreciate it. Elkana (1978, cited in Marufu, 2003) observed that in North America attitudes have been used in order to estimate the condition of science in schools and in society. In the same vein, desirability would act as an indicator of the attitudes of teachers towards BEST as a curriculum programme.

Table 1. Desirability of BEST in schools (n=60)

Category	Yes	Partial	No	Total
No. of teachers	38	18	4	60
% of sample	63	30	7	100

As Table 1 indicates, 63% of the respondents indicated that they supported the retention of the programme, 30% gave the response 'partial', while 7% rejected the programme. The majority of the respondents who have a positive opinion towards the BEST programme in schools pointed out that BEST requires one to carry out experiments, thus developing scientific skills in pupils. The main reason commonly pointed by those who disliked BEST was that it is too demanding in terms of time and resources such as equipment for experiments. The 30% in the partial category said the programme has some advantages and disadvantages and they still need to learn a lot. Teachers in this category indicated that they face problems in linking practical activities done outside with concept development in class. In other words, such teachers are failing to reconcile the demands of a theory-oriented summative evaluation with practical activities done outside the four walls of the classroom.

We noted that all administrators (school heads, deputy heads and teachers in charge) supported the retention of the programme. The main reason given was that BEST assisted administrators in supervision as it provides them with a framework to supervise their staff. They believe that BEST sets standards of operation in schools.

School administrators also see BEST as useful in schools because it assisted in the running of income-generating projects such as vegetable gardening and poultry. Most school heads felt that BEST provides them with a framework to invite community members to provide seed funding for such projects.

Through BEST, schools can also involve communities to take part in school environmental activities such as tree planting, water harvesting and so forth. As a result, parents have an opportunity to plant different types of trees in the schoolyard. For school heads, this was a milestone in fulfilling BEST's aim of involving communities in managing the environment.

Areas in which BEST was found to be useful

Areas that are covered in BEST programme in-service workshops, and which were found useful in the teaching of environmental science by a number of respondents, are summarised in Table 2.

Table 2. Areas in which BEST is found useful (n=60)

Area	% of Sample
Use of various teaching methods	90
Assessment	80
Development of primary science	80
Scheming	70
Syllabus interpretation	70
Community involvement	22
Integrating environmental science with other subjects	5

All the teachers surveyed indicated that they had attended at least one environmental science in-service course. Generally the courses were considered to be a worthwhile experience. The respondents cited the BEST programme as being useful in a number of areas: 90% indicated that it was useful in teaching methods such as experimentation and demonstration; 80% in developing scientific skills in pupils such as experimentation, and also in assessment; 70% in syllabus interpretation, and in scheming; 22% in community involvement, especially in carrying out a project; and 5% in integrating environmental science with other subjects. Lack of teaching and learning support materials was cited as a major drawback in the teaching of environmental science.

Of notable concern is the low appreciation by teachers of community involvement and integration of environmental science with other subjects. As outlined in the orienting discussion above, these are key aspects of BEST which could enable the teaching of environmental science in primary schools to tackle the problems that bedevil the community.

Follow-up interviews on community involvement revealed that teachers and school heads do not see how villagers can really be involved in the teaching and learning of children. The majority wondered how villagers, who have not received much formal education (Western education), could meaningfully contribute in the learning process in schools. On the other hand, community members themselves are puzzled when schools try to involve them in learning activities. They do not see themselves as having any worth as far as school learning is concerned. As one villager put it,

knowledge learnt in schools comes from learned people in big cities like Harare, and after finishing school children should proceed to look for employment in these cities. This is how our poverty can be reduced when our children are working and look after us.

To summarise the issue, most villagers believe that their plight is not in their hands but that people should seek employment elsewhere. Jackson (2004) also discovered that villagers in India do not see how village life and activities could be of any relevance to education. Weston (1996:117) calls this 'self-validating reductionism', when people are reduced into something less than they are, or could be. Over the years, colonial governments controlled what should be learned in schools and local people had no say – and this continued after independence.

Because successive education authorities have neglected, taught against and looked down upon indigenous practices such as permaculture, traditional ways of grain/vegetable storage, seed selection, crop rotation and sustainable agricultural practices and others, they have been 'left out' of education systems. However, these are some of the concepts which community members could be introducing into school learning, in a bid to improve their lives in a sustainable manner.

Areas of major focus by supervisors

To develop interpretations of aspects of BEST that are privileged by authorities, teachers were asked to indicate those areas which supervisors (heads of schools, deputy heads, teachers in charge and education officers) concentrate on most during lesson supervision.

Table 3. Areas considered important by supervisors (n=60)

Area	No. of Teachers	% of Sample
Charts and pictures	50	83
Science corner	20	33
Pupil-pupil interaction	17	28
Written exercises	15	25
Learning and teaching aids	10	17
Lesson distribution	10	17
Pupils' displays on environmental science	10	17
Projects on environmental science	2	3

As indicated in Table 3, 50 teachers (83%) reported that during supervision of environmental science lessons much emphasis seemed to be placed on charts and pictures. These could be charts produced commercially or at the school by the teachers themselves. The reasons given revealed that charts were considered to be more useful in delivering information to pupils. Only two teachers (3%) reported that their supervisors placed emphasis on environmental science projects. These would be projects which would involve communities in solving problems that communities face on a daily basis, as discussed above.

Areas emphasised by supervisors seem to be those traditional aspects of education considered important in vocational/neoclassical pedagogy. By putting so much emphasis on charts and written work, supervisors show that they believe the teacher should be the bearer of knowledge which should be transmitted effectively to learners. Charts and other teaching and learning support materials such as those in the science corner, aided by other pedagogical dynamics such as pupil-pupil interaction mostly in smaller groups, facilitate the transmission of this knowledge. Written exercises test acquisition and mastery of what is considered worthwhile knowledge. In the learning process, teachers and learners do talk about the environment. Learners bring samples from the environment and there is an appreciation of problems that the environment is facing, but the integration of school activities and community activities is largely neglected.

Preferred teaching methods

Preferred teaching methods were used to develop interpretations of the philosophical orientation of teachers in the district.

Table 4. Preferred teaching methods in BEST (n=60)

Teaching Method	No. of Teachers	% of Sample
Simulation games	57	95
Demonstration	55	92
Experimentation	28	47
Drama	18	30
Project method	16	27
Field trips	11	18
Problem solving and case studies	3	5

As shown in Table 4 above, the two most preferred teaching methods were simulation games and demonstration. The main reason given was that the methods did not demand too much use of learning support materials as compared to other methods. Drama, field trips, project method and case studies were said to be time-consuming. The choice of teaching methods reflects the neoclassical orientation of most teachers. Demonstration, as a teaching method, does not nurture a participatory spirit. Although it may appear to be a practical method, it remains a largely transmission-oriented 'show and tell' method that does not engage learners in critical, co-constructive, action-oriented ways (Lotz & Ward, 2000, cited in Babikwa, 2004).

Through considering O'Donoghue's open process framework (mentioned above), one can deduce that simulation allows learners to engage in encounters (do something), reflect and discuss what is happening. It is also possible that learners will draw on their prior knowledge and experience and, therefore, to some extent, simulation can make closer relations with community knowledge and experience possible. Such methods seem to be preparing learners to participate in the reform of their society. The methods reflect the liberal-progressive orientations where the role of the school is seen as civilising young ones, preparing them to be socially responsible in improving their lives (Lotz & Ward, 2000, cited in Babikwa, 2004). While this is a worthwhile departure from the traditional neoclassical and vocational approach in which the school perpetuates and legitimates existing social, economic and political structures, it falls short in some ways. The method is less concerned about learners' action and is weak in practical and cultural linkages with the community. The method does not give learners practical hands-on experience in which learners can be involved in action research and community problem solving. The school remains alienated from its community in terms of solving problems.

Follow-up interviews were done to establish why teachers do not prefer practical and outdoor methods such as case studies, project and community problem solving. Most indicated that time was the biggest impediment since they are following an exam-driven curriculum. They have the syllabus to complete in preparation for the examination. Some also indicated that summative assessment seems not to take into consideration practical activities done by learners

during the course of the year. This is why teachers would rather dedicate more of their time to written exercises and other pen and paper activities, which prepare learners for the written examinations that will determine their progress into the next stage of the school system.

Conclusion

The paper has exposed that the theoretical grounding of BEST is in line with the context of developments in the field of environmental education in southern Africa, and with the broader goals of ESD. Some tensions and constraints are, however, visible when it comes to the practical implementation of BEST in schools. As indicated above, these tensions and constraints are seemingly linked to different philosophical foundations underlying the context of BEST, which shape and inform the education system in Zimbabwe. The discussion above also points to the continuity of these philosophies with earlier forms of colonial education.

BEST is based on the premise of social constructivism and socially critical orientations, and aims to strengthen community participation in education. On the other hand, the education system of Zimbabwe is seemingly based on a neoclassical instrumentalist view of education. This approach has created a technocratic mindset that influences the professional character of teachers, and their supervisors. In the technicist approach, knowledge is treated as a neutral tool to be manipulated by the expert educator for the goals to be achieved (Babikwa, 2004). Educators, in this case, teachers from various teacher education institutions, are assumed to have the right knowledge and capacity to conceptualise on behalf of others with whom they work (Usher, Bryant & Johnson, 1997). Hence, teachers are not comfortable to work with community members whom they think do not possess worthwhile knowledge to be imparted to youngsters. Learners are considered as containers to be filled with knowledge, and reality is regarded as static, changeless and predictable (Freire, 1970), a process which Freire described as 'banking education'. Communities themselves appear to have become alienated from the educational system through this process, as they apparently do not see how they can contribute to learning in schools, and instead project their hopes for poverty relief in the external, longer-term outcomes of education, which they link to urbanisation and modernist views of development. This brings little immediate relief to communities, and appears to do little to address the issue of relevance in education in the context of increased poverty, environmental degradation, economic hardship and other sustainable development issues outlined above.

To achieve the broader goals of ESD, which are linked to societal transformation and improvement in the quality of life of people, it would seem necessary to draw on the experience and practice that has been developed in environmental education in southern Africa over the years, in the process of re-aligning the whole education system with ESD goals. Recently, the 1999 Presidential Commission of Inquiry into Education and Training in Zimbabwe (Government of Zimbabwe, 1999) recommended a paradigm shift in education to make it heavily reliant on local context, knowledge, needs and priorities. As argued in this paper, improvement of basic education and re-orienting existing education should aim at developing knowledge and skills for citizens to jointly identify their problems and act on them in a sustainable manner. This is likely to involve changes in educational philosophy

(see also Babikwa, 2004) and also bring about closer relationships between schools and their communities in the learning process.

Notes on the Contributor

Charles Chikunda is lecturer in the Faculty of Education, Department of Gender Studies, at Midlands State University, Zimbabwe. His research interests are in sustainable livelihoods, gender and science education. Email: chikundac@msu.ac.zw or cchikunda@yahoo.com.

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