

Full Length Research Paper

Misalignment between policy and practice: Introducing environmental education in school curricula in Botswana

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Botswana introduced environmental education (EE) in its school curricula in 1995 to be infused in all subjects as part of an overall improvement of the school curricula. The actual infusion in practice was left to the classroom teachers offering a unique opportunity to compare what they taught and perceived as being important in environmental education with the official programme and policy. A questionnaire was distributed to sixteen schools to evaluate the interpretation given to, and the impact of, the programme. The results from the analysis of the questionnaire showed that a high percentage of the teachers showed limited understanding of what they were expected to do under the EE programme and many were unable or unwilling to participate in it. The activities pupils/students were engaged in were too localised, mainly to school compounds, to make the impact expected of the programme. The study provided information on the corrections that were necessary to streamline what the teachers are practicing and the policy as originally designed.

Key words: Botswana; environmental education; curriculum development.

INTRODUCTION

Environmental education (EE) has been a major vehicle for developing awareness and sensitivity about major problems of the environment (Smyth, 2006; Kumar and Kumar, 2007; Jickling and Wals, 2008; Kumler, 2010; Strife, 2012). It has also been used to persuade communities to participate in environmental programmes designed to teach and/or encourage responsible use of environmental resource (Hacking et al., 2007; Jickling and Wals, 2008; Bizerril et al., 2011; Hegarty et al., 2011; Francovicola and Porkop, 2011). The importance of EE has been emphasized by consecutive international fora since the United Nation's 1972 Stockholm Declaration (UNEP, 1972) and 1975 Belgrade Charter (UNESCO, 1975). At the World Summit on Sustainable Development in 2002, the role that EE should play in sustainable development was discussed and stressed. This discussion has continued during the UN Decade of Education for

Sustainable Development (2005 to 2015). In spite of this expressed importance of EE, its introduction in regular curricula in less developed countries (LDC's) has been problematic (Bruyelle et al., 2011; Ongevalle et al., 2011). Many countries on the African continent attempted to infuse EE in all subjects in schools in the 1990's (Adedayo and Olawepo, 1998; Jekayinfa and Yusuf, 2008). Evaluations of the introductions were made a few years after EE was introduced and concluded that the immediate impacts were successful (Mansary and Ajiboye, 1997; Okebukola et al., 1997). Some educationalists consider that there is little visible evidence that EE programs have had any significant impacts on the behaviour of students graduating from High Schools and their attitude towards environmental issues. A casual survey of first and second year undergraduates in the Department of Environmental Science at the University of Botswana for three years (unpublished) showed that these undergraduates expressed very little concern about environmental issues. This paper evaluates EE programs in the schools in Botswana after fourteen years of their operation in primary,

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junior secondary and senior secondary schools. Three aspects of the programme are evaluated: the teachers' interpretation of the programme; the students' understanding of the basic expressed principles of the programme as taught by their teachers; and the students' link between what they learn in class and their daily lives.

Definition of Environmental Education (EE)

The twentieth century was famous for educating civil society about environmental problems (Pzmony, 2011). Treaties and regulations agreed upon by many countries were emphasized by EE as a probable long range attempt to overcome environmental degradation and introduce the proper use of environmental resources. The most important definition of EE giving different emphases are from this period and are still quoted in the most recent research. The official International Union for Conservation of Nature (IUCN) definition of EE looks it as "... the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among (human kind), (their) culture and (their) biophysical surroundings" (IUCN, 1971). In clarifying the nature of EE, the 1977 Tblisi Conference described it as a holistic and preferably interdisciplinary lifelong educational process of interactions that occur in the natural, built and social environment. There are also various views as to how EE should be introduced and conducted in both informal and formal education (Santos et al., 2000; Federal Republic of Nigeria, 2004). These differ from institution to institution (Secord and Greengrove, 2002; Coker et al., 2010; English and Mousoulide, 2010) and from country to country (Blignaut, 1991; Clacherty, 1995; Lebeloane, 1995; O'Donoghue and Rensburg, 1995; Iyengar et al., 2011). It is however agreed that the approach should be holistic to encourage learners to look at various components of human life and the bio-physical environment as continuously interrelated. In formal education, EE has been introduced in the curricula in different forms at different levels but "infusion", under which EE is added to the core subjects without being an independent subject at the primary and secondary school levels, has been popular with African countries (Federal Republic of Nigeria, 2004).

REVISION OF BOTSWANA SCHOOL CURRICULUM AND THE INTRODUCTION OF EE IN THE 1990'S

In 1994 Botswana revised its education policy and in 1995 introduced EE programmes under the Revised National Policy on Education (RNPE) (Ministry of Education, 1995) as part of a continuous effort to modify, change and introduce new programmes (McColough and Oakes, 1997). Three main policy documents are used to direct the formal education sector in Botswana: namely, the

national development plan (NDP); the revised national policy on education (RNPE); and the national vision 2016. All these documents urge that EE should be important in education in Botswana. The first of these is in a series of five-year overarching documents that guide all government departments on what developments have to be carried out within a five year period. The current, NDP, is the tenth (NDP10) in the series since independence in 1966 and runs from 2009 to 2015 (Ministry of Finance and Development Planning, 2009). In this particular plan period there is emphasis on environmental awareness and protection. While in past national development plans, including NDP 9, environmental impact assessments were done on selected projects, now the plan is to fully integrate environmental issues into all development policies, programmes, and projects whenever it is appropriate.

Revised National Policy on Education (RNPE) is the result of a Presidential Commission set up in 1992 (Ministry of Education, 1992). Its many recommendations to overhaul the education system include recommendation 44 on the environment which recognised the importance of EE at levels of education. It recommended that EE should be infused in all subjects in schools through the normal curriculum development process.

National vision 2016 (Government of Botswana, 1996) is a vision that the country has given itself in all its development efforts. It addresses the aspirations of Botswana about their long-term future. With regards to education, Botswana under this vision are expected to aspire towards an educated and informed nation. This statement is interpreted to mean that by 2016, Botswana should have a system of quality education that is able to adapt to the changing needs of the country as the world around it is changing. Making improvements in the relevance, quality, and access to education lie at the core of the vision for the future. The country sees itself as depending on its total environment for a sustainable future, making the understanding of environmental issues very important in developing an informed nation.

Curriculum processes in Botswana and the problems of "infusing" environmental education

As stated earlier, the method recommended in 1994 by the Presidential Commission for developing environmental education was by infusing EE into all subjects in schools. The effort required in this undertaking was grossly underestimated. *Basic education* in Botswana is based on a nine year (primary and junior secondary) programme. The contents of the basic education programme have been developed by the Ministry of Education guided by the national policies in place. Developments of curricula for any new policies are designed in such a way that they are consistent with the aims of a nine year basic education programme on a subject by subject basis. One of the first steps towards

developing curricula for a new policy is to develop the curriculum blue print, an interpretation of policy into a defined framework and a plan of action, which stipulates how the policy is going to be implemented. It is one of the main processes that has to be undertaken before the actual syllabus and instructional materials for a subject or subjects addressed by the policy can be developed. The Blue Print therefore forms a guide for curriculum developers and provides precise direction and guidance regarding the content, sequencing and development of materials. Within this context national curriculum panels are then set up for each subject area composed of stakeholders such Education Officers for both Primary and Secondary schools and Primary schools, and representatives from the University of Botswana. The panels assist the curriculum officers in the development of syllabi and the development of instructional materials.

The curriculum panels have had three major problems in trying to guide the infusion of EE in the school curricula:

a) Interpretations of the intentions of the RNPE: while the Presidential Commission mentioned earlier provided a good outline of what was expected in the development of the EE programme, it did not give specific goals of EE except for a few general statements that were to be followed at different levels of the school curriculum. For formal school education, the Presidential Commission recommended a progressive understanding of the relevance of environmental issues in the daily lives of pupils and students. In the primary school curriculum (first to seventh years of education), the key objective was to “give the children necessary knowledge and ability to deal with the environment in which they live, including learning about their community, government of their country, the world around them, and need to take care of the environment.” At the early secondary school level, the Junior certificate (JC) curriculum (eighth and ninth years of education) the commission vaguely recommended “an understanding of scientific concepts and interest in the natural world” as one of the goals of the JC curriculum. At senior secondary level (twelfth to fifteenth years of education), mention is made of the importance of EE and the need for the curriculum to go beyond the acquisition of mere awareness of environmental issues to the acquisition of the right values and attitudes, that will lead to desired behavioural changes in using environmental resources. This would be the culmination of what was to be achieved through the infusion of EE throughout curricula from the primary to the senior secondary levels.

b) Interpretation of “infusion” by the curriculum officers:

During the processes of curriculum development, the curriculum officers are constantly faced with the challenge of making sure that EE is infused into the curriculum. This poses a big challenge for curriculum developers especially those whose subject areas were

perceived not be directly traditionally environmentally oriented such as languages and mathematics. It was realized that the tendency then was for these officers to neglect the infusion of EE issues into curricula. A workshop was mounted by the EE Panel in which all subject officers brought their syllabi for review. However, no clear decisions were made and a follow up after the workshop was not effectively conducted.

c) Advising teachers on how to implement the “infusion” of EE in the classroom: The goals of infusing EE mentioned earlier were merely broad statements that require the teacher in the classroom to interpret and implement them in a way that will be meaningful. The teacher had to work with a few specified objectives stated in the syllabus for specific subjects. Where a subject was seen to easily address environmental issues, perhaps there would be objectives that deal with that specific subject directly. However, it seemed that in subjects which did not have existing textbooks for the school level that addressed the environment, the teacher might not come across objectives dealing with environmental issues easily. In such cases, the teacher is expected to be more innovative. The theoretical framework the teacher was supposed to follow was not clearly specified other than mentioning learn –by doing (Steffes, 2004; Lee and Tsai, 2005; Dana and Yendol-Hoppey, 2008; Armstrong, 2009). From the interpretation of the EE programme, it seemed as if the intention was to introduce EE with constructivism theory (Dangel et al., 2004; Powell and Kalina, 2009; Garvin and Savage, 2010) under which the teacher becomes a guide for the learner, providing encouragement to the learner to generate, and discover his/her own framework of knowledge. Instead the classroom teacher was given a lot of room with no identified theoretical framework to follow.

AN ATTEMPT TO EVALUATE THE IMPACT OF THE ENVIRONMENTAL EDUCATION PROGRAMME IN SCHOOLS

Given the uncertainties of the execution of the EE programme in Botswana schools at all levels of its progress, an attempt was made to evaluate how the teachers interpreted its meaning what impact it has had on the students in the schools. The evaluation was broad ranging and included the interpretation of teachers in schools at various levels (that is primary, junior secondary and senior secondary schools). It also included the attitudes and participation of the students in environmental issues.

METHODOLOGY

On ethical grounds, all participants (pupils/students and teachers) who were engaged in this study participated freely. Data for the research was collected using two methods: face-to-face interviews with the teachers, and a questionnaire filled in by the pupils/students.

Table 1. Infusion of EE by teachers at different levels of the school system.

Officially stated objective	Primary (%)	Junior Secondary (%)	Senior Secondary (%)
(i) No effort to infuse EE in teaching subject (eliminated from further analysis)			
(ii) Main focus of infusion of EE as defined by the EE Program.	44	51	52
[EE program objective for primary] To teach students to have knowledge and ability to deal with the environment in which they live, including learning about their community, government of their country, the world around them and need to take care of the environment.	34	22	12
[EE objective for junior secondary] To give students an understanding of scientific concepts and interest in the natural world.	3	15	11
[EE objective for senior secondary] To make sure students in their learning go beyond the acquisition of mere awareness of environmental issues to the acquisition of the right values and attitudes, that will lead to desired behavioural changes in using environmental resources.	2	8	23

At the primary level pupils included in the study were from fourth year of primary school to improve the reliability of data collected. Only a few of the data collected was discarded as unreliable for various reasons. Otherwise the data collected was considered reliable.

A sample of twenty five schools (9 primary, 8 junior secondary, and 8 senior secondary) were randomly selected throughout the country. From these 31, 30, and 27 teachers, respectively from primary, junior secondary and senior secondary schools were picked randomly from the register of teachers, taking between 3 and 5 of the teachers present at the time of the visit at a school. A set of questions was prepared in line with the guidelines at different levels of the school system to infuse EE in the schools' curricula as stated earlier. Detailed interviews were designed to detect if for each class each teacher taught and the activities conducted by each teacher in each of these classes EE was infused in line with the stated objectives of the EE programme. Based on this the classes teachers taught were divided into four categories. One category was of those for which teachers did not make any attempt to infuse EE in the subject taught in the class. These teachers and the classes they taught were eliminated from further analysis. The other three categories of classes were of those where teaching the infusion was according to the primary, junior secondary or senior

secondary level objectives of the EE programme respectively, regardless of what level of the school system their classes happened to be at. For example some teachers teaching classes at junior secondary schools were infusing ideas in their classes expected to be delivered at primary schools according to the EE programme.

At the same schools where teachers were interviewed, pupils /students who were in classes of teachers selected as discussed earlier were also interviewed. In each class this represented between 20 and 30% of all the pupils present at the time of the interview randomly selected by the teacher in each class. Questions in the questionnaire for these pupils/students were directed at: obtaining information on what the students understood by environmental education and environmental protection; who they considered was responsible for the major issues in their environment; and whether they considered themselves participants in environmental issues at school and in the village in which their homes were. To evaluate what students do to participate in learning by doing approach in their environmental activities at school and in their villages, questions were included on the questionnaire to reveal this participation. The same questionnaire was responded to by pupils/students in all the schools selected at all levels of the school system in the sample.

The ideas in the questionnaire expressed made mention of were then summarised into statements each of which the pupils/students at various levels of the school system could complete with one of four phrases. The pupils/students were requested to rank these from 4 to 1 with 4 being the most appropriate. The average rank for each of the phrases used to complete the statements (that is sum of ranks divided by the number of respondents) were calculated for each of the levels of the school system to obtain the overall relative importance of the phrase in completing the statement for each level of the school system. A standard deviation about the mean of the ranks was also calculated to give an indication of the relative degree to which the pupils/students at each of the levels agree on the ranking of the listed phrases.

FINDINGS

Table 1 provides the interpretation that the teachers in the schools gave to the objectives of the programme to infuse EE in their various subjects. Column 1 provides the EE official stated objective at each of the various levels of the school system as explained earlier. Columns 2 to 4 give the

percentage of classes in which teachers, in the interpretation of the researchers, seemed to follow the objectives designed by the EE Programme. The category with the highest percentage of classes throughout the whole school system was that in which teachers did not make any attempt to infuse any EE (44, 51 and 52% for primary, junior secondary and senior secondary respectively). Many teachers had no idea as to what they were supposed to do or what "infusion" meant. At the senior secondary level, some teachers were antagonistic to the idea of introducing topics which were not in their text books and which were not expected to be in the examination in the final year of senior secondary school. After removing these teachers from the total number of teachers interviewed, further analysis was carried out with 263, 220, and 172 teachers from primary, junior secondary and senior secondary schools respectively. Attempts were made to infuse EE in the subjects taught in accordance with the objectives of the EE programme outlined for each level of the school system in only 34, 15 and 23% at the primary, junior secondary and senior secondary levels respectively. Up to 22% of classes at the junior secondary level were taught EE topics designed for the primary school level according to the EE programme. Other details are given in Table 1.

In Tables 2 and 3, the summary statements discussed earlier are given at A and B and the phrases to complete statement A and B are listed in each of the Tables as (i) to (iv) in Column 1. Column 2 in the Table for each of the levels of the school gives the percentage of pupils/students who considered a particular phrase (of (i) to (vi)) to be the most appropriate to the statement at A or B. Columns 3 and 4 are respectively the average rank and standard deviation for each of the phrases (i) to (iv) as discussed earlier for Primary for the whole sample, not just those who are listed for the phrases in Column 2. This is repeated in Tables 2 and 3 for Junior Secondary and Senior Secondary (Columns 5 to 10).

Table 2 provides what pupils/students considered to be the definition of a good environment and how that environment can be used sustainably. What was considered a "good environment" varied with different levels in the school system A(i) (Has recycling centres ,.....) is considered important at the primary school level but loses importance at the junior secondary and senior secondary school levels with high within group agreement at the latter levels. A (ii) (Has shops, buildings, street lights.....) represents the built environment including urban areas. It is considered the second best definition of an environment by the pupils at the primary school level with high within group agreement. It is, however, considered a relatively less important definition by the respondents from the junior secondary level with high disagreement within the group. Students from the senior secondary level consider that, of the four, is the worst definition of a good environment selecting A(iv) (Has vegetation, trees...) as the best with a rank average of 3.22 and high within group agreement

(sd = 0.22). As to how can be used sustainably (3B) there is high agreement at all levels of the school system that good techniques in using the land (B(iii)) is the most important.

Table 3 gives in 3A who or what the pupils/students considered is responsible for protecting the environment. Pupils/students seem to progressively realise their own responsibility. In Primary school, the Government and the teachers seem to be looked at as the major players in protecting the environment (a combined percentage of 53%, A (i) and A (iii)) although there was strong group agreement as is shown from the high standard deviation values. Only a fifth of the pupils (21%) considered they and all other people had this responsibility (A (iv)). At Junior Secondary (65%) and Senior Secondary (82%) however, students' secondary school students, showed that they understood that they were key players at this protection.

In 3B, in answering the question what pupils/students have to do to protect the environment, they at them at the Primary level but becomes relatively less important in higher levels in the school system. Alternatively, B(iii) and B(iv) preserving the environment and balancing demand with supply of available resources respectively are considered more important at the Junior and Senior Secondary school level.

Table 4 gives responses that were received from pupils/students to questions in the questionnaire that were meant to help them assess their own participation in creating a good environment as that environment was defined in Table 2. The responses showed that picking litter, and other activities related to cleaning the grounds and classroom are the major activities pupils get engaged in at all three levels of school education both around the homes (A(i)) and around the school. The discussion so far seems to give the impression that there is an increasingly deeper perception of the pupils'/students' responsibility in environmental protection with higher levels of education in the school system. However, for more than 70% at all levels of the school system, the major activities pupils/students engage in both at school and in their home neighbourhoods is litter picking, cutting and burning grass. The prominence of these activities defeats the model of learning by doing expressed in EE programme.

Conclusions

The objectives of introducing EE according to the RNPE were based on emphasizing that all children throughout the school system in Botswana should be introduced to environmental education so that all young people develop certain values, attitudes and behaviours that are needed in environmental conservation. This study shows that it is clear that this has not been achieved. The teachers who have been left to carry the major responsibility to achieve this objective are either unwilling or uncertain on what to

Table 2. Definition of a good environment and sustainability of its use.

Key responses	Primary			Junior secondary			Senior secondary		
	%	Mean	S.D	%	Mean	S.D	%	Mean	S.D
A. A good environment									
i) Has recycling centers, and dustbins. It is clean with no litter	62	2.12	0.22	13	1.61	0.25	5	1.23	0.62
ii) Has shops, buildings, street lights, and people to look after it	9	2.32	0.43	8	2.24	0.33	13	1.52	0.22
iii) Includes wild life	2	1.02	0.25	2	2.25	0.86	16	1.04	0.91
iv) Has vegetation, trees, water and good soils	7	3.21	0.46	39	3.58	1.14	45	3.02	1.65
B. To use the environment sustainably we must									
i) Encourage tourism	5	1.52	0.89	7	1.34	0.21	0	1.02	0.42
ii) Use dustbins, manage waste, use toilets	21	2.52	0.51	4	1.22	0.44	3	2.42	0.34
iii) Apply good techniques in using the land (for example tilling the land rotational grazing , plant trees,)	68	3.54	0.23	79	3.61	0.22	89	3.74	0.21
iv) Reduce pollution	2	1.31	0.23	5	1.53	0.25	5	1.53	0.22

Table 3. Responsibility for protecting the environment.

Key responses	Primary			Junior secondary			Senior secondary		
	%	Mean	S.D	%	Mean	S.D	%	Mean	S.D
A. The primary responsibility for protecting the environment belongs to:									
i) The Head Teacher and school staff	21	3.21	0.89	4	1.22	0.23	0	1.02	0.27
ii) The Kgotla (village parliament)	16	2.62	1.14	10	1.71	0.22	0	1.03	0.24
iii) The Government of Botswana	32	1.52	0.26	21	2.10	1.21	17	2.20	0.61
iv) All the people including me	21	2.24	1.39	65	3.22	0.52	82	3.74	0.23
B. I have learned in class that to protect the environment we must									
i Keep the environment clean	54	3.65	0.21	24	1.46	0.33	7	1.31	0.32
ii Stop deforestation, plant trees, stop veld fires	9	2.45	0.85	4	2.41	0.23	23	1.72	0.21
iii Preserve the environment, take care of it in its present form	10	2.18	0.75	30	2.71	0.64	27	2.89	1.21
iv Balance demand with available resources	12	1.24	0.43	31	2.84	0.20	40	3.64	0.22

do. It is also clear that what is being taught and the activities that students are involved in are very limited and narrow. The majority of the activities are limited mainly to aesthetics, cleaning up and picking up litter and occasionally planting of trees.

Interviews with teachers showed that these activities do not even involve the whole school. They are done mostly by the members of the EE clubs. While activities such as litter picking teach students to maintain clean compounds, they are

not sufficient to cover the environmental education relevant to sustainable development expected under the EE programme. Specifically, few students have the opportunity in environmental projects organised by schools outside the school

Table 4. Participation in creating of a good environment.

Key responses	Primary (%)	Junior secondary (%)	Senior secondary (%)
A. What do you do around your home to improve the environment			
i Litter picking, cutting and burning grass	75	74	58
ii Planting trees and caring for them	11	12	36
iii Building of toilets	6	4	3
B. What do you do around the school to improve the environment			
i Litter picking and sweeping grounds and classrooms	86	77	77
ii Planting trees or flowers	4	6	13
iii Nothing	2	1	4

compounds. The value of simple activities like litter picking and recycling are often exaggerated and are seen by many many teachers as ways of showing they are concerned about the environment. Many also see them as a way of making students appreciate environmental problems. Unfortunately many students have tended to shy away from such activities and in some instances students have left the EE clubs because they do not want to be the only ones doing the “dirty work” of picking up litter or collecting cans for recycling. Indiscriminate littering is still rampant in the schools. Almost all the teachers interviewed said they needed workshops on how to infuse environmental issues and environmental education in their subjects in general.

Some lessons may be learned from Botswana’s experiences:

a) Botswana’s case shows that a clear idea of what is to be infused in each subject is essential at the planning stage. The planning process within the Ministry of Education should have decided on the content of the programme for each subject in detail instead of leaving much of this decision to the individual teachers. It should then have followed the progress of the infusion of EE in the individual subjects in the schools to ensure that the subject matter delivered in the classroom and the activities on environmental education that students engage in are organized with specific objectives that are in line with the general goals of RNPE.

b) Although the teachers may be expected to be competent in teaching their different subjects in which they were trained, they depend on textbooks approved for the various subjects by the appropriate authorities in their countries. The importance of this fact is commonly not realized. In the case of Botswana, since the EE was introduced new books in various subjects have been approved for use at all levels of the school system. The Department of Curriculum Development and Evaluation (Ministry of Education) has made insufficient effort to ensure that either new books introduced to be used or existing ones are revised to assist the teacher in the

classroom to infuse EE in his/her subject. In addition teachers would need intensive in-service training. A Department of Teacher Training and Development exists but it has not provided sufficient workshops on environmental education throughout the country. More workshops are required to focus on concepts of infusion and integration in curriculum development, awareness of EE issues in general, and methodologies of teaching the environmental education content in each subject.

c) Learning by doing environmental education would require that students get involved in the activities of the communities where they are located not as individuals from schools but as members of a class. Sometimes it should be necessary to take the “classroom” to the communities.

This is not always taken seriously and very limited funds, if any, are made available for these activities. In this study, not one of the schools had a programme for this contact. Links with international organizations that have youth programmes such as UNESCO would be a major advantage to the development of the EE programme.

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