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Interpretation and implementation of the environmental education curriculum: a case study of three Lesotho schools

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This study aims to determine how the Lesotho school curriculum promotes environmental learning and how teachers implement this aspect of the curriculum. The framework of teaching about, in and for the environment is used to analyse curriculum documents as well as the way in which teachers at three Lesotho schools implement the curriculum. The results show that the intended curriculum contains laudable goals with regard to learning in and for the environment. However, teachers interpret the curriculum in such a way that they teach mainly about the environment; never in the environment and seldom engage learners in activities where they could develop positive attitudes encouraging them to act for the environment. This has implications for the promotion of environmental education in Lesotho schools.

Interpretering en implementering van die omgewingsopvoeding-kurrikulum: 'n gevallestudie van drie skole in Lesotho

Die doel van hierdie studie is om te bepaal hoe Lesotho se omgewingsopvoedingkurrikulum promoveer asook hoe onderwysers hierdie kurrikulum implementeer. Die konsepte van in en vir die omgewing is gebruik as raamwerk in die analise van kurrikulumdokumente sowel as vir die wyse waarop onderwysers in drie skole in Lesotho die kurrikulum implementer. Die bevindinge wys dat die kurrikulum prysenswaardige doelwitte bevat om leer met betrekking tot in en vir die omgewing te bevorder. Aan die ander kant interpreteer onderwysers die kurrikulum op so 'n wyse dat hulle hoofsaaklik fokus op leer van die omgewing; nooit in die omgewing nie en selde leerlinge die geleentheid bied om betrokke te raak in aktiwiteite waardeur hulle positiewe waardes kan ontwikkel wat hulle sal aanspoor om aksie te neem vir die omgewing. Dit het noodwendig implikasies vir die bevordering van omgewingsopvoeding in Lesotho-skole.

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Lesotho faces numerous environmental problems. The education system is regarded as a vehicle for promoting environmental literacy. While the National Curriculum (2008) includes a variety of environmental topics in a number of subjects, the teachers are responsible for delivering this curriculum. Research was conducted to determine how teachers implement the curriculum with regard to promoting environmental learning.

The following research questions guided the study. What guidelines does the curriculum provide in respect of environmental learning? How do teachers implement the curriculum to promote environmental learning? Why do they implement the curriculum in the way they do?

1. Literature review and conceptual framework

Various researchers have attempted to define what a curriculum is. Stenhouse (1987) identifies two categories. One category defines curriculum as a plan that tends to prescribe what should happen in schools. Aikenhead (2006) refers to this as the intended curriculum. The second category views curriculum as what is in fact happening in schools, regardless of whether or not it is planned. Aikenhead (2006) describes this as the implemented curriculum or instructional practice. Van den Akker (2005: 1-11) presents three forms of curriculum: the intended curriculum; the implemented curriculum, also referred to as curriculum-in-action, and the attained curriculum, the actual learning that has taken place. The various categories defined above point to the complexity of curriculum delivery. Ball & Bowe (1992: 97-115) confirm this complexity and caution against viewing curriculum implementation as unproblematic. They concur with the view that policy is seldom implemented and interpreted in the way in which it was intended. In addition, an abundance of research of the way learners learn has demonstrated that learners may not be attaining the intended curriculum (Hewson 1988: 317-26). Reasons for the failure of the link between the intended and the attained curriculum may occur at the level of the teacher, where the teacher's knowledge and pedagogy may result in an implemented curriculum that is very different from the intended curriculum.

As it became increasingly true that human beings and their environments are interlinked, the view of the environment gradually changed from one of exploitation to one of conservation. This led to the notion of formalising environmental learning and to the first definition of Environmental Education (EE) (Stapp *et al* 1969). At this point environment was viewed in the context of the biophysical environment. At an international level, EE gained prominence as numerous conferences and workshops attempted to define EE in broader terms (UNEP 1972). This culminated in the Tbilisi declaration which explicitly stated the objectives of EE, namely awareness, knowledge, attitudes, skills and participation (UNESCO 1977). Consequently, the 1970s and early 1980s experienced a growing emphasis on experiential learning. Acknowledgement of the importance of experiencing the environment depends on how this experience is conceptualised. In an environmental context its benefit may lie in contributing to the development of values that assist the individual in making informed decisions with regard to the environment, as well as prompting action with regard to environmental problems.

Another development in the field of environmental learning was the view that EE also encompassed socio-ecological and socio-cultural dimensions (O'Donaghue & Russo 2004: 331-51). The economic, political and social dimensions of the environment are intertwined with the biophysical and cannot be ignored. This view created the foundation for the emergence of the concept of education for sustainable development. The current view of education for sustainable development promotes action-based environmental learning and requires teachers to be active in transforming learners' attitudes and values by involving them in addressing environmental problems in their communities. Hattingh (2002: 5-16) notes though that 'sustainable development' is interpreted differently by different groups. The interpretation which views sustainable development as caring for the community of life on earth promotes improvement in human life within the boundaries of the carrying capacity of ecosystems. This is the social justice view which emphasises a socially critical approach to the environment and includes social change and values education. This approach to the environment necessitates engagement with environmental issues and teachers often find

themselves having to manage conflicting views in the classroom (Cotton 2006b: 223-41).

The above discussion demonstrates how the conceptualisation of EE has changed from a notion of conservation, through experience of the environment, to active participation with a view to transformation. This approach focuses on engagement with environmental issues in the environment. The Lesotho curriculum is guided by a number of policies and guideline documents that refer to the development of competencies related to environmental literacy.[1] The objectives of the Tbilisi declaration abound in Lesotho policy documents as do references to sustainable development. Like many other curricula (Cotton 2006a: 67-83), the Lesotho curriculum places emphasis on changing attitudes through action. Teachers are required to encourage learners to take action by participating in problem-solving activities in their communities. While the National Curriculum Development Centre (NCDC) has attempted to integrate environmental topics into the Lesotho curriculum, policy documents do not refer to EE as the holistic concept defined by environmental educationists such as O'Donoghue & Van Rensburg (1995) who view environment as the interacting social, economic and political dimensions based on biophysical life support systems. The national policy and curriculum documents focus on the biophysical aspects of the curriculum, with scant reference to the other facets of the environment. This is not exceptional as Rickinson (2001: 207-320) alludes to the vast body of research that focuses on learners' environmental knowledge rather than on attitudes, values and actions.

1.1 Learning about, in and for the environment

Environmental learning has been identified as having three dimensions: learning about, learning in and learning for the environment. Learning about the environment focuses on key environmental knowledge and understanding of the ecological functioning of the environment. Learning in the environment encourages interactions and experiences in the environment, enabling learners to develop

1 *Cf* Environmental Policy, Kingdom of Lesotho 1996, Environmental Education: A teacher's handbook for primary and secondary schools in Lesotho, NCDC 2003, Vision 2020, Ministry of Finance and Economic Planning, 2005.

positive attitudes and values towards stewardship of the environment. Learning for the environment focuses on learners taking action for the protection or conservation of the environment. This includes the development of the skills to enable learners to be active and informed participants in the environmental decision-making policy. This is stewardship of and action for the environment (Disinger 1990: 29-36). If the environment is viewed holistically as encompassing the biophysical, economic, social and political environment (O'Donaghue & Van Rensburg 1995), learning *for* the environment may be viewed as action towards a radical transformation of the environment. However, the Lesotho national curriculum has a narrow view of the environment, focusing mainly on the biophysical. For the purpose of this study, we define education for the environment as action towards solving problems in the natural environment.

2. Methodology

The study is located within an interpretive paradigm as our purpose was to discover meaning embedded in the texts we analysed as well as the observations and interviews conducted with teachers (De Vos *et al* 2002). The approach is qualitative with a quantitative element as data from the curriculum documents were presented as percentages.

A case study of teachers and learners in three schools was chosen as an appropriate design for this study. While the schools were in different localities, the research meets the requirements of a case study design as all three contexts are similar in their "wholeness", thus allowing us to obtain a holistic and in-depth understanding of the situations (Punch 2009). The boundaries for all three localities were the same as only teaching and learning was investigated. All three sites represented a natural setting as the research was about teaching and learning in the schools.

The original observation schedule was piloted in one class at a neighbouring, non-participating school and proved too complex. It was revised to include only the categories that focus on teachers' pedagogy. Pilot-testing the interview schedule was not possible because we did not know how the teachers in the research schools would teach environmental topics. The interview questions are designed to enable us to probe teachers' interpretation of the intended curriculum.

Critical friends and teachers in the pilot school were interviewed, and a discussion followed on whether the questions would help in answering the research questions.

Data were collected using the following instruments: content analysis of the junior secondary science and senior secondary biology curriculum; classroom observations (each teacher was observed several times teaching environmental topics), and teacher interviews (each teacher was interviewed at the conclusion of the classroom observations).

A criticism often levelled against a case study is the fact that its findings cannot be generalised. In situations where the case is unique, a researcher may not want to generalise. On the other hand, where the majority of case studies may not be broadly generalisable, the purpose of the case study may be to conceptualise or to develop propositions. The findings may then be potentially applicable to other cases (Punch 2009). Consequently, no attempt is made to generalise the findings to all contexts in Lesotho, although the research findings may be applicable in other similar contexts.

Trustworthiness and authenticity are more applicable to this study than validity (Guba & Lincoln 1998: 195-220). We regard this study as trustworthy because our findings are supported by quotes from observations and interviews (Gitlin & Russel 1994: 181-202). Trustworthiness is also enhanced by triangulation. In this context, teacher interviews confirmed what was observed in the classes. Ethical clearance to conduct this research was obtained from the institution at which two of the researchers are based. Permission was obtained from the principals of the schools to observe teachers in their classrooms. The names of the schools are not mentioned in the report and pseudonyms are used for all the teachers who participated in the research.

3. Analysis

3.1 The intended curriculum

The official curriculum documents from the National Curriculum Development Centre (NCDC) and the University of Cambridge

International Examinations (CIE) were analysed. The relevant sections were the objectives and content topics for junior secondary science; aims and content topics for senior secondary biology. Only those aims, objectives and content topics that made reference to the natural environment were selected. To enable us to categorise environmental learning into learning about, in and for the environment, we had to analyse the associated learning outcomes of every content topic as the content was just presented as a list of topics. Table 1 gives a summary of the criteria used for deciding whether objectives and learning outcomes pertained to learning about, in or for the environment.

Table 1: Criteria for allocating objectives and/or learning outcomes to the categories about, in or for the environment

Category	Description	Key verbs and/ or verb-noun combinations	Example objective/aim	Example learning outcome
About	Knowledge and understanding of the environment	Know, demonstrate knowledge, identify (where the object is clearly theoretical), explain	Demonstrate the knowledge and understanding of interactions between living things with their environment	List agents of soil erosion
In	Encouraging interactions and experiences in the environment for the development of positive attitudes and values towards the environment	Demonstrate or develop awareness and appreciation, demonstrate positive attitudes and values; identify examples of good and bad practice in the environment	Demonstrate positive attitude and values in caring for the environment	Identify how human beings endanger the environment through dumping and pollution

Category	Description	Key verbs and/ or verb-noun combinations	Example objective/aim	Example learning outcome
For	Learners taking action for the protection and conservation of the environment; active and informed participants in environmental decision-making	Initiate, participate, demonstrate (where the object is clearly practical), apply knowledge in practical contexts	Be able to participate appropriately in environmental activities	Demonstrate methods of controlling soil erosion

3.2 The implemented curriculum

A number of themes were identified that would enable us to interpret a teacher's classroom practice. These themes were used to compile an observation schedule that would assist the observer in focusing on different aspects of environmental learning. While the lesson observations gave an indication of the way in which teachers implement the curriculum, understanding of how they interpret the curriculum was, to some extent, inferred. Interviews enabled us to understand their reasons for doing what they did and gaining a better understanding of why they did what they did.

4. Results

Analysis of both the junior secondary science curriculum and the senior secondary biology curriculum provided information as to what constitutes the intended curriculum in Lesotho schools with regard to environmental learning. Analysis of six teachers' classroom practice and of the interviews conducted with the teachers produced data concerning the implementation of the intended curriculum.

4.1 The intended curriculum

In both curricula, different sections alluded to the environment and careful analysis was required to identify these sections. Reference to

the biophysical environment was found in the aims, objectives and content topics with their related learning outcomes of each curriculum. The junior secondary science curriculum was analysed with regard to objectives and learning outcomes. Table 2 shows that from a total of 38 science objectives, only six referred to the environment. Of the six, three referred to learning about the environment and three referred to learning for the environment.

Table 2: Results of the analysis of the objectives relevant to environmental learning in the junior secondary science curriculum

Subject	Total number of objectives	Number and % of total objectives relevant to the environment		
		'about'	'in'	'for'
Science	38	3 (7.9%)	0	3 (7.9%)

The intention is that learners carry out activities for a sustainable environment armed with the knowledge about the environment. We chose to interpret these three objectives as theoretical exercises that could be done through pictures in a book, or identify by memorising causes of environmental changes. Although the verb "identify" was used, there was no indication that learning would lead to the development of positive attitudes and values as research has shown often happens when learning in the environment occurs (Gurevitz 2000: 253-68).

An equal number of objectives refer to learning for the environment. This is expected as Science would be one of the subjects that made provision for learners to act on issues in the environment and to solve environmental problems. Learners were expected to participate appropriately in environmental activities, to solve local environmental problems and problems related to negative environmental changes. The objectives correlate well with the national aspirations.

Table 3 shows the results of the analysis of the relevant learning outcomes derived from the environmental content in the junior secondary science syllabus. The analysis was also based on the three categories about, in and for the environment.

Table 3: Results of the analysis of the learning outcomes (LOs) of the junior secondary science curriculum

Subjects	Total content topics	Total environmental LOs (% of total content)	Number (% of total environmental LOs) 'about', 'in' and 'for' the environment		
			'about'	'in'	'for'
Science	359	8 (2.2%)	7 (87.5%)	1 (12.5%)	0

Table 3 shows that from a total of 359 science learning outcomes (LOs), only eight referred to the environment. This formed 2.2% of the science content and is surprisingly low as one would expect a subject such as science to focus more strongly on the environment. It is even more surprising that seven topics refer to learning about the environment and one to learning in the environment. The intended Science LOs emphasised construction of knowledge about the environment. The LOs embedded in the content topics state that learners describe effects of pollutants and ways of preventing pollution; describe causes of soil erosion; state water pollutants; describe effects of water pollution on living organisms; describe effects of deforestation, and list common pollutants. The list shows that learners were expected to know about the environment. Half of the science objectives were also about the environment, aligning the LOs with the objectives.

The senior secondary biology curriculum was analysed in terms of aims and content, using learning outcomes to interpret the intention of the curriculum with regard to the stipulated content. Analysis of the aims was conducted in a similar manner to that of the junior curriculum aims. Table 4 shows the results.

Table 4: Results of the analysis of the of aims of the senior secondary biology curriculum

Subject	Total number of aims	Total number of and % of aims relevant to environment		
		'about'	'in'	'for'
Biology (5090)	5	0	1.33 (26.7%)	0

One and a subsection of a second of the five aims referred to the environment in the senior secondary biology curriculum. All the aims refer to learning in the environment. Emphasis was placed on sustainable behaviour as the syllabus is designed for the application of knowledge. These aims were stated using terms such as to stimulate interest in, and care for the local and global environment, and promote awareness that applications of biological science may be both beneficial and detrimental to the individual, the community and the environment. The aims were specific in reflecting learning in the environment, as raising awareness indicates that learners may take action in taking care of the environment and prevent any detrimental applications of biological science to the environment. While the aims encapsulate the intention of the curriculum, they do not reflect activities to be undertaken for conservation of the environment. This could be reflected in possible Los, and is not helpful to teachers who may require more guidance as to how they should go about teaching in and for the environment.

The analysis of the content was conducted using the same three categories about, in and for the environment. The curriculum did not include objectives to describe the intentions of the curriculum. A study of the content topics showed that it was more useful to analyse the outcomes embedded in the topics in order to understand what exactly was intended by the syllabus. Table 5 reflects the analysis.

Table 5: Results of the analysis of the senior secondary biology content

Senior secondary subject	Total number of learning outcomes	Number of learning outcomes relevant to environment	% of learning outcomes relevant to environment	Total number of and % of learning outcomes of environment		
				'about'	'in'	'for'
Biology (5090)	170	5	2.9%	5 (100%)	0	0

The senior secondary syllabus did not include objectives; the aims encapsulate the intentions of the curriculum. As in the junior secondary curriculum, the learning outcomes embedded in the content topics were analysed to understand what exactly was intended by the syllabus. Five of the 170 learning outcomes for biology refer

to the environment; this constitutes 2.9% of the total. All five refer to learning about the environment. For example, learners have to describe the effects of human beings on the ecosystem; discuss reasons for recycling, and evaluate the effects of water pollution by sewage, inorganic waste and by nitrogen-containing fertilizers. The learning outcomes focus on theoretical engagement. Without clear guidelines the outcomes can only be classified as outcomes pertaining to learning about the environment.

As was the case with the junior secondary curriculum, analysis of these outcomes showed that knowledge was foregrounded. This was in contrast to the aims which implied a deeper involvement with the environment than simply acquiring knowledge. While the aims emphasise attitudinal development, this will not happen as research has shown that attitudes may only change if learners are actively involved in the environment. As Gurevitz (2000: 265) so aptly put it:

> Affective education emphasises the development of specific kinds of emotional engagements which may provide a more effective way of getting people involved in environmental action.

The intended senior secondary biology curriculum appears to promote learning for the environment through its aims, but this is not extended to the learning outcomes.

4.2 The implemented curriculum: classroom observations

Observations of six teachers in action as well as subsequent interviews produced data with regard to the implementation and interpretation of the intended curriculum. Three teachers were observed teaching junior secondary science classes and three teachers teaching senior secondary biology classes.

All three junior science teachers (Ntina, Bokang and Tefo) taught the same topics. Each teacher was observed several times as topics could not be taught in one lesson. Table 6 shows the categories focused on during observation. These categories provided information as to what teachers emphasised in their teaching. It showed whether teachers placed emphasis on construction of knowledge or provided space for discussions which could lead to the development of positive attitudes and values. Table 6 summarises the three teachers' strategies.

Table 6: Teachers' strategies when teaching environmental topics at junior secondary level

Themes	Pedagogy	Teachers (not real names)		
		Ntina	Bokang	Tefo
1. Teacher preparation		List of topics to be discussed	Notes on topics to be discussed	Notes on topics to be discussed
2.Teaching strategy	Direct instruction	Transmits information	Transmits information	Transmits information
	Question-Answer	Closed questions	Closed questions	Closed questions
	Learners reading	Yes	No	No
	Link with other lessons other subjects	No	No	Ecology, Chemistry
3.Types of questions asked	Recall information	✓✓P	✓✓P	✓✓P
	Application	P	✓✓P	✓✓P
	Everyday knowledge	P	✓P	✓P
4. Learners' engagement	Learner-learner	No	No	Yes
	Learner-teacher	Yes	Yes	Yes
	Learner-content	Reading, copying notes	Meaning of words, copying notes	Copying notes
5. New information	Explain new terms	Recycling	Paper mills	Cash crops

Apart from her direct instruction, Ntina asked learners to read directly from the textbook. Where activities were mentioned in the textbook, she told the learner to skip the activity part. Short, closed-ended questions followed the reading from the textbook.

What is soil erosion? What are the causes of soil erosion? These questions were based on factual recall and are the type of questions about the environment that may be asked in tests or examinations.

There were also questions that required understanding, for example Ntina asked learners to explain how running water causes soil erosion. Learners' involvement was in reading and answering the teacher's questions, for those who were selected to read or give responses. While both lessons observed covered topics on the environment, Ntina's lessons were aimed at developing knowledge about the environment. There was little opportunity for learners to discuss environmental issues or to engage in problem-solving activities. As the lessons were classroom-based, learners never had the opportunity to explore environmental problems outside the classroom. Learners' everyday knowledge was often used, for example when they were asked if they had seen the sign *Collect-a-Can.* Ntina continued to tell them that the cans are collected to be used again, drawing into the lesson some of the learners' everyday experiences.

Bokang's lessons were conducted in the classroom using question/answer discussions with learners, in addition to direct instruction. She asked simple factual type questions that related to everyday life. For example, she asked for things that pollute land and the responses were papers, dust in the classrooms, tins, peels, plastics, bottles, and boxes.

Learners also learned new things in the lessons such as paper production. There was some indication that learners were able to apply knowledge learnt when they explained the dangers of plastic bags left lying around. As with Ntina's lessons, all Bokang's lessons covered topics on the environment. These lessons were also aimed at developing knowledge with regard to the environment. Bokang's lessons provided more opportunity for learners to discuss environmental issues, but no opportunity to engage in problem-solving activities. Like Ntina, the lessons were classroom-based and learners never had the opportunity to explore environmental problems outside the classroom. Bokang's lessons may, therefore, be classified as lessons where learners learnt about the environment.

Tefo also made use of notes to guide his teaching. As with Ntina and Bokang, Tefo's lessons were classroom-based and direct instruction dominated. During question-and-answer sessions, Tefo helped clarify and simplify the content. The questions were a mixture of simple recall and comprehension. For example, he asked questions

such as how tins pollute and the responses were: they cut feet, hands and do not rot.

As with the other teachers' lessons, Tefo's lessons were about the environment. He also addressed social problems when they arose. For example, in the case where learners mentioned that dagga (cannabis) was a cash crop, he pointed out that it was illegal to sell dagga. No opportunity arose to engage in problem-solving activities. His lessons were also classroom-based and learners did not have the opportunity to explore environmental problems outside the classroom. The observations produced no evidence of learning in or for the environment.

As in the junior secondary level, all three teachers in the senior secondary phase (Halieo, Moroa and Thato) taught the same topics. Table 7 summarises the three teachers' strategies.

Table 7: Teachers' strategies when teaching environmental topics at senior secondary level

Themes	Pedagogy	Teachers (not real names)		
		Halieo	Moroa	Thato
1. Teacher preparation		Prepared lesson plan	Written notes	Copied past question paper
2. Teaching strategy	Direct instruction	Transmits information	Transmits information	Using past question paper to interact with learners
	Question-Answer	Closed questions and open-ended questions	Closed questions	Closed and open-ended questions
	Learners reading	No	Yes	Reading from question paper
	Link with other subjects	No	No	Some chemistry
3. Questioning	Recall information	✓✓P	✓✓P	✓✓P
	Application	P	✓P	P
	Everyday knowledge	P	X	X

Themes	Pedagogy	Teachers (not real names)		
		Halieo	Moroa	Thato
4. Learners engagement	Learner-learner	No	No	Yes
	Learner-teacher	Responding to questions	Responding to questions	Responding to questions
	Learner-content	Copying notes	Explain terms deforestation; Copying notes	answer question paper, copying notes
5. New information	Explain new terms	desertification	smoking and TB	Sulphur dioxide

Halieo used direct instruction as a teaching strategy and taught the lessons in the classroom. She introduced the lesson with statements that created a context into which more specific information could be integrated. For example, when teaching about the effects of human beings on the ecosystem, she told the learners that human beings as superior animals were able to change the environment to make it suitable for them. She explored their everyday knowledge by asking them to list things people did to make life comfortable and the responses were listed on the chalkboard: man builds cars, roads, houses that have electricity, radios and television.

She told them that cutting down forests leads to soil erosion because the land becomes bare and when it rains soil particles are dislodged and carried away. As was the case with the teachers teaching in the junior phase, Halieo, a biology teacher, focused strongly on the content delivered to learners. While she attempted to link environmental learning to learners' everyday lives, there was no attempt to allow learners to investigate environmental issues in their environment and, thus, no learning in or for the environment was observed.

Through direct instruction, interspersed with questions and answers, Moroa taught lessons on environmental topics: the effects of human beings on the ecosystem, and pollution and conservation as listed earlier. All her lessons were classroom-based. She asked for their opinions; for example, what they thought about forests being cleared for wood. Her explanations of the problems and their prevention reflected what was in the syllabus, although tropical forest was far

from the learners' everyday experiences. However, learners were able to apply previously learnt knowledge when she asked them to explain the term deforestation and one learner read from the dictionary: clearing forests, and the cutting or burning down of all the trees in an area. She agreed, and then asked questions based on previous lessons: Why would man clear forests? They gave the following responses: wood, planks to make furniture, roofing.

A discussion on pollution involved a number of concepts and terms which learners had knowledge of, and they could, therefore, contribute to the discussion. Moroa's lessons provided learners with much content knowledge and some opportunity to discuss environmental issues. The nature of the topic did not allow learners to learn in the environment as there are no forests in the immediate environment. No opportunity was provided for learners to engage in problem-solving activities related to deforestation.

Thato's lesson was also a classroom-based one. She distributed photocopies of an extract from a past examination paper. She used the diagrams in the question paper as points of discussion. Thato then asked learners to explain the pollution caused by activities of human beings, as illustrated in each diagram. She asked several simple recall questions. For example, of region A she asked:

> Teacher: What are the pollutants in the smoke?
>
> Learners: Carbon dioxide, carbon monoxide, wastes.
>
> Teacher: What wastes?

No response. She decided to stop pursuing that further and asked: "How does carbon dioxide pollute?" The learners answered: "It kills people, because it is a bad air."

She pointed out that they knew that plants take in carbon dioxide to which they agreed, and she told them that animals do not take it in and it does not allow burning.

> Teacher: What does carbon monoxide do as a pollutant?
>
> Learner: It kills because one would not breathe.
>
> Teacher: Is that true?

Learners responded positively and negatively giving this explanation: "It kills when one sleeps in a room full of it and if the windows are not open, so when one breathes it in he will die but if one does not breathe it in it will not kill him."

Thato's approach allowed learners to recall information as well as apply knowledge. In this instance, the opportunity arose to draw on learners' everyday knowledge of the practice of making fires indoors, but the teacher chose instead to concentrate on naming pollutants and discussed in detail fossil fuels and heavy metals as examples of pollution. While Thato's lesson was different in that she used a past question paper, the lesson was dominated by transmission of content, with the teacher doing most of the talking, giving explanations and interpreting diagrams for learners. No opportunity was provided for learners to engage in problem-solving activities related to pollution. While the types of pollution illustrated in the question paper may not have been in their immediate environment, making direct observation impossible, there was no effort to engage in critical thinking or problem-solving activities related to pollution. Consequently, this lesson was also characterised as learning about the environment, with no learning in or for the environment.

4.3 The implemented curriculum: teacher interviews

While the lesson observations gave an indication of the way in which teachers implement the curriculum, understanding their interpretation of the curriculum was, to a certain extent, inferred, based on the observations. Interviews with teachers were essential to understand their reasons for doing what they did and to gain a better understanding of why they did what they did. The interviews focused on eliciting responses from teachers regarding their teaching about, in and for the environment. We wanted to understand why teachers did not use the outdoors when teaching topics related to the environment. It was also important to establish the teachers' views concerning behavioural changes within the context of their teaching strategies. In addition, we wanted to establish whether teachers thought their teaching strategies were appropriate or whether a different approach could contribute to a more positive attitude towards the environment?

Teachers gave a number of reasons for teaching the way they did. Many of the reasons were related to the way in which they interpreted the curriculum. All the teachers justified their strategies, indicating that they acted within the guidelines set out in the curriculum, although they acknowledged that they were not always able to implement the suggested curriculum. Their reasons for this were framed as constraints to taking a more active approach to environmental education. We applied the framework developed by Carr & Kemmis (1986), namely objective and subjective constraints to action, to classify the reasons teachers gave for not implementing the intended curriculum. Objective constraints to action are aspects of the teaching and learning environment that are beyond the power of the teacher to change or to influence. To effect change in their actions would require a change in the way these constraints limit their action. On the other hand, teachers have subjective understandings that act as constraints to action and these understandings can be changed (Carr & Kemmis 1986). The distinction between objective and subjective constraints is not clear and consequently not everyone may agree with our distinction between the two. However, we found this analysis useful as it points to the difficulties in trying to encourage teaching for the environment.

4.3.1 Objective constraints

A number of reasons teachers gave were classified as objective constraints to teaching in or for the environment. Teachers cannot change these constraints within the current context of teaching and learning in Lesotho schools.

Time was a factor identified by all teachers as a constraint. For example, when Ntina was asked why she decided to read instead of visit eroded places as suggested in the book, she responded: "The time (40 minutes) was too short for a field trip. Apart from that learners were familiar with eroded places, so there was no need to visit such places. Also this section was a revision of primary work." Moroa said: "Teacher talk saved time and did not involve travelling that might interrupt other subjects."

Thato added that

> Taking learners on a trip to factories had cost implications to parents who had difficulty in paying fees so trips were an extra cost. Learners

> are told to save time and to enable them to pass examinations which were important for schools and parents.

While time always appears to be an issue in senior classes, it is interesting to note that even the junior secondary teachers were of the opinion that time constraints were important considerations in their teaching. Teachers have limited powers to change the timetable and curriculum content, with the result that time is a constraint they cannot do much about. In addition, pressure from parents ensures that more time is spent on preparing learners for examinations rather than engaging in outdoor activities.

Examinations. Teachers in the senior phase mentioned that they prepared learners for examinations and that was the reason why they taught about the environment. Thato mentioned that she used photocopied extracts from a past question paper because "It was a good method for learners. They became familiar with the style of questions and learned correct responses." Moroa stated:

> The syllabus and examinations required learners to describe, in order to pass examinations. Learners were not awarded marks when they collected cans and kept the environment clean, or planted trees. If they got marks that way, teachers would change their teaching methods and learners would do it daily and they would not only teach about environment.

The way the public judges the performance of schools has a major influence on how teachers execute their duties. All teachers indicated that they felt pressure of ensuring that learners passed. While this sentiment was stronger among teachers in the senior phase, teachers in the junior phase were aware of the status of examinations. The prevailing view of the importance of examinations acts as a constraint which teachers cannot change.

De-contextualised syllabus topics. The biology teachers justified why they taught only about the environment by giving examples of topics from the syllabus that did not apply to the Lesotho context. Thato mentioned: "Learners were aware of some forms of pollution and soil erosion in Lesotho. Other forms of pollution by fertilizers, sulphur dioxide and insecticides were not observed in Lesotho, yet these are in the syllabus."

Thato used pictures from past question papers to illustrate unfamiliar environmental problems. She said that teaching about environment was good because it "Enabled learners to observe and relate pictures to what they learned in class, for example sulphur dioxide, rain, acid rain, soil erosion, fertilizers, water pollution, sewage pollution, insecticides and air pollution." On the same issue, Moroa stated: "As for pollution of oceans by tankers after oil spillage there were no activities or a video." Halieo was "Guiding them about the effects of man on the ecosystem as stated in the syllabus as some effects did not exist in Lesotho, and learners had to be told as they are not observed in Lesotho." Bokang was of the view that: "For some pollutants learners were not in a position to come up with solutions themselves unless they were told. Taking them out would not bring anything new."

Teachers taught both contextualised and decontextualised curriculum topics in the same manner. It was thus irrelevant whether the curriculum was local or not. They appeared to welcome the decontextualised topics in the syllabus as it exonerated them from implementing a more action-oriented approach to their teaching. Nevertheless, curriculum content is a given and teachers have to operate within these constraints.

Parental involvement: Tefo justified teaching about the environment by saying that parents should be involved in their children's learning:

> At school, teachers taught learners to pass examinations. Parents had to play a role too, together all must aim at developing responsible citizens, and teachers alone cannot achieve that goal. Teachers taught science and parents had to teach proper behaviour towards the environment.

While parental involvement is necessary in all spheres of a learner's life, including environmental learning, teachers cannot abdicate their responsibility of educating the child as a whole as they have the expertise to facilitate learning in different contexts. However, these teachers are aware of parents' expectations and the pressure they experience to teach to the examinations.

4.3.2 Subjective constraints

The following constraints are regarded as subjective constraints as the views and attitudes of teachers determine whether a particular aspect is considered a constraint or not.

Overcrowded classes were a factor identified by teachers who taught in the junior secondary classes. For example, Ntina taught about the environment because there were too many learners (80) in her class. It was easier to manage them in a classroom than outside. She regarded reading in class by one learner and others listening as more valuable, as every learner would be concentrating on one issue at the same time.

Large classes are a common feature in Lesotho schools, in particular in urban areas, and innovative strategies are required to manage such classes. It would therefore depend on a teacher's view on how to manage a large class whether they would facilitate learning in the environment.

Familiarity with their environment: Teachers did not teach in the environment because, according to them, learners observe environmental problems on a daily basis and were therefore familiar with their environment. Bokang stated: "Learners are familiar with these polluted places. They mentioned the solutions to such environmental problems as they did in class." Tefo also mentioned the following: "Learners see pollution every day; they know it so there was no need to take them to such places. When asked questions about environmental degradation learners responded correctly."

These responses indicate, on the one hand, that teachers see value in staying in the classroom where theoretical concepts may be re-enforced and, on the other hand, the little value placed on what may be learned while investigating the environment. Content knowledge has priority over the acquisition of skills.

Revision of previous work: Senior teachers mentioned that there was no need to teach in and for the environment because the topics of soil erosion and pollution were taught at primary level due to the spiral nature of the curriculum. This indicates that teachers expect that some learning in and for the environment occurs at the primary level and that therefore there is no need for them to pay attention to this.

Syllabus as guide and not prescription: Bokang taught about the environment because the syllabus was a guide and teachers had different strategies with regard to achieving the learning outcomes. She said: "The syllabus was just a guide not a prescription; every teacher achieved the learning outcomes with any teaching strategies and resources available."

Curriculum developers need to specifically indicate how the intended curriculum must be achieved. Teachers' autonomy in the classroom should be guided by the curriculum.

Personal values: Bokang justified teaching about the environment, stating that people have different values and some may practise what they learned in their life: "People are different and have different values and it depends on individuals. If they value the science they are taught, some may learn and live what they have learned, some may not learn and value anything." With this statement she seemed to imply that some learners will become environmentally literate, irrespective of the way they were taught and others would never become environmentally literate, even though they may be exposed to learning in and for the environment. The same applies to teachers.

5. Discussion and conclusion

Lesotho's intended national curriculum envisages learners who are multi-skilled to address the vulnerable Lesotho environment and who have the ability to participate in the country's decisions as critical and action-oriented citizens (NCDC 2003). It also expects learners to have knowledge of both national and global environmental problems. Most importantly, the curriculum envisages learners who have the knowledge and courage to solve environmental problems.

Classroom practice should engage the learner as a whole: mind, elaborating comprehensive knowledge and skills (cognitive domain) and the soul (affective domain), develop the personal and social attitudes and values (NCDC 2003: 22)

The intended curriculum therefore recognised and took into account global and national sustainable development aspirations. The curriculum goals are aligned with the goals of Agenda 21, developed at the Rio Earth Summit (1992) which calls for children's

concerns to be incorporated into all policies for environment and development at local, regional and national levels and, in particular, for the involvement of the youth in decision-making processes (Ansell 2006: 115-35). These goals are encapsulated to a large extent in the aims and objectives of both curricula. Unfortunately, guidelines as to how these goals may be achieved by learning in and for the environment are not articulated clearly in the learning outcomes which are meant to clarify how the content in each curriculum should be addressed. In fact, the learning outcomes, in particular in the biology syllabus, put great emphasis on knowledge acquisition.

The interviews revealed that teachers experienced a number of constraints that limited their ability to engage with action-oriented approaches to environmental learning. Objective constraints, which are strikingly similar to constraints identified in Britian (Cotton: 2006a: 67-93) prevent teachers from teaching in and for the environment.

The subjective constraints discussed in this article are, however, different from the subjective constraints described by Cotton (2006a) in that the teachers in this study consider it important to change learners' attitudes and values, but they believe that such changes can be effected by informing learners. Both classroom observations and interviews revealed that teachers placed a high premium on factual content. They were of the opinion that learners needed knowledge of the environment more than anything else. Once they had knowledge they would be able to act on the various environmental problems facing them. Thus a chalk-and-talk approach dominated their teaching. Unfortunately, the learning outcomes of both syllabi encouraged this approach. They held the belief that taking learners into the environment would make very little or no difference as they are aware of problems in their environment. The notion that action requires some change in the affective domain is not fully understood. While Cotton (2006a) reports on the emphasis on learning for the environment in the international arena, to the exclusion of alternative forms of environmental education, the teachers in this study focus only on learning about the environment. While learners acquire knowledge, but experience no change in their attitudes, it is unlikely that action will be taken to solve environmental problems.

This attitude reveals teachers' poor understanding of experiential learning, the point being that learners should not merely observe environmental problems, but also engage in activities related to the problem. As such they not only acquire knowledge of environmental problems and experience alternative ways of learning, but they also have a greater opportunity of developing positive attitudes towards the environment than classroom-based learning provides.

The findings of this study raise a number of important points. First, teachers are not entirely to blame for their failure to implement the intended curriculum. Failure in curriculum implementation is often due to the incompatibility between expectations of the curriculum developers and the practical demands of classroom teaching. New curricula often present views and strategies that do not match teachers' views and strategies (Cotton 2006a: 67-83, Jansen 2001: 242-6). In an environmental education context, to overcome this would require appropriate environmental learning for teachers. Unless teachers fully understand what it means to learn about, in and for the environment, it is unlikely that they will be able to promote environmental education in Lesotho schools. In addition, as is the case with many curricula (Cotton 2006a), the Lesotho curriculum does not make clear how teachers should educate for the environment. To achieve this, the intended curriculum should provide stronger guidelines as to how environmental education should be promoted through action and problem-solving.

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