

Linking formal environmental knowledge and everyday practices: a case study of three Lesotho secondary schools

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Abstract

This study explores the link between the formal environmental knowledge encapsulated in the curriculum and the way in which learners are able to translate this knowledge into everyday practices. The research design was a case study of three Lesotho schools. Data were collected through questionnaires. The findings suggest that learners have sound theoretical knowledge and awareness of environmental problems. However, this knowledge and awareness does not translate into action, as learners are inclined to blame authorities for not acting to conserve the environment. This reveals an attitude that does not view education as a solution to solving simple environmental problems as they do not see themselves as responsible for the environment. This inability to transfer their formal knowledge into everyday practices may be due to the fact that learning is not socially mediated within a community of practice. The transmission mode of teaching did not allow learners to construct meaning with the assistance of a more capable peer or peers or even the teacher. The context in which environmental learning occurs provides little opportunity for engagement in environmental problems through socially constructed activities.

Key words: Implemented and attained curriculum; environmental knowledge; attitudes and values; environmentally responsible behaviour.

1. INTRODUCTION

Rapid population growth has put pressure on the land and other resources in many parts of Lesotho, hence the severe environmental degradation and the encroaching desertification. Lack of environmental concern is also evident in the amount of litter generated in urban and peri-urban areas NCDC. (2003). Environmental Education (EE) has been recognised as the key to sustainable development, both locally and globally. Numerous organisations are engaged in efforts to develop a world population that is environmentally action competent. Lesotho has joined this endeavour and ratified several environmental protocols. Since education is a vital factor in promoting environmental responsibility, the study focuses on the way learners respond to the school curriculum and its implementation.

There is clearly a need to understand and develop appropriate reforms to address environmental problems in Lesotho. A number of studies have proposed how these problems may be addressed (de Feiter, Vonk & van den Akker, 1995; Maqutu, 2000; Ministry of Education and Training, 1997; Ministry of Finance and Economic Planning, 1997). Official documents of the Ministry of Education and Training stress the importance of education in promoting conservation values. If policymakers are aware of the urgency to educate people to solve environmental problems, the need to

investigate the lack of transfer from formal environmental knowledge to everyday practices becomes even more apparent.

The purpose of the study is to understand and explain the links made by learners in Lesotho secondary schools between formal environmental knowledge and everyday practices. The national curriculum of Lesotho envisages learners with characteristics that would enable them to change the state of the environment in Lesotho. The problem that this study aimed to address is how formal environmental knowledge as set out in the curriculum, translates into everyday practice in Lesotho secondary schools. The critical question addressed by this study, are:

- What formal environmental knowledge do learners acquire from the implemented curriculum?
- How do they use this knowledge to respond to environmental issues?

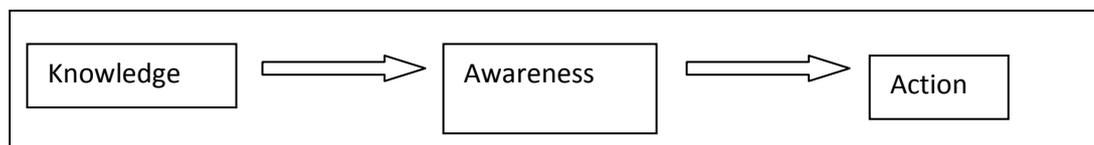
2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Constructivist learning theory suggests that learners come to school with informal knowledge of science, which should not be ignored but be built upon (Bishop & Denley, 2007). The relevance of what they are learning in everyday life situations should be acknowledged in school (Kingdom of Lesotho, 2002). It is also widely advocated in science education research and policy, that learners should learn science that they can use in their everyday lives and build on their experiences, interests and prior knowledge (Stears, Malcolm & Kowlas). Promoting transfer of learning from the school setting to everyday settings is a universal challenge, affecting many spheres of learning.

Where transfer has been successful, approaches other than formal classroom learning were required. Experiential learning has been identified by a number of researchers as an approach that promotes successful environmental learning (Ernst & Stanek, 2006; McLure, 2002;). Black (2005) is of the view that experiential learning leads to deeper understanding of environmental concepts, while Prokop, Tuncer and Kvasničák (2007) report on improved attitudes towards the natural environment, as well as a better understanding of Ecology. Lakin (2006), in her discussion of science learning beyond the classroom emphasises the fact that learners' attitudes and feelings are affected by learning outside the classroom.

Universally, in planning a curriculum, curriculum developers assume that the instruction learners receive in the classroom translates into their learning. Similarly there is an assumption that learning about environmental issues has the potential to change learners' attitudes and behaviours toward the environment. The above view reflects a linear model of learning which leads to a change in behaviour. This linear model is illustrated in Figure 1.

Fig 1 Behavioural change system (Taken from Hungerford & Volk, 1990).



Environmental Educationists have moved beyond this simplistic view of what Environmental Education entails as extensive research has shown that knowledge does not necessarily lead to a change in attitudes which are a prerequisite for action (Hewson, 1988). This also applies to learning about environmental topics in subjects such as Science and Geography.

In Lesotho the inclusion of environmental issues is part of the curriculum, and environmental literacy as a goal of science education is mentioned, without policymakers

indicating which level of environmental literacy is seen as a goal for the population of Lesotho. There are differing views as to how EE should be addressed in formal curricula. One approach advocates the establishment of EE as a separate subject. This approach has met with little acceptance as most curriculum planners would prefer to see EE included in specific subjects such as Geography and Biology or, alternatively, integrated into all subjects across the curriculum. This last option appears to have appealed to most advocates of EE. The Lesotho curriculum merely states that environment should be integrated without specifying how that should occur.

It can be claimed that the solution to environmental problems relies not only on technological fixes but also on changing the behaviour of individuals. Education in environmental issues is a key component in environmental plans (The Rio Declaration of Environment and Development IUCN, 1992; The World Conservation Strategy IUCN, 1980). The goal of these education plans is an environmentally literate population. While definitions of 'literacy' may vary, they all agree that a literate person recognises the connections between science, technology, society and the environment. It is a goal of current reform efforts in science that improved educational practice will create a more environmentally literate population. It is also an assumption of the EE movement that increasing an individuals' environmental literacy will lead to more responsible environmental behaviour. If environmental literacy includes the will to act to solve environmental problems, then it may certainly lead to responsible environmental behaviour.

Hawtrey (2007) makes a strong case for experiential learning, which is 'the incorporation of active, participatory learning opportunities in the subject' (p. 144). Learning is by direct 'contact' with the concepts studied, so learning is by doing. This approach is at times called situational learning. It occurs when a learner 'is roused from the role of passive listener to that of active respondent' (p.144). At other times it refers to contextually relevant knowledge acquired through 'hands-on' problem solving, critical reflection, discussion, and decision-making.

2.1. Theoretical Framework

Social constructivism as a learning theory was used as a framework as it is important to understand how learning was constructed by the children in this study. This framework assisted us in analysing the factors which impact on the way in which the attained curriculum unfolds.

The way learners construct reality and make meaning is influenced by social, personal and cultural factors (Stears, 2005). Meaningful learning takes social and cultural environments into account. Social constructivism recognises the communal and individual aspects of learning. It emphasises the importance of way of life and context in understanding what occurs in society, and constructing knowledge based on this understanding. Learners have numerous ways in which they construct meaning from a given state of affairs. While learners' knowledge is personally constructed, the constructed knowledge is socially

mediated as a result of cultural experiences, personal history, interactions with others in that culture, and the collective experiences of the group (Stears, 2005). The social constructivist view of learning stresses the context in which knowledge is constructed. Learning is a social process which does not take place only within an individual, nor is it a passive development of behaviours that are shaped by external forces. Meaningful learning occurs when learners are engaged in social activities. In order to understand learners one must learn how they construct their worlds, not how they compare to predominant social norms. The relationship between an individual and his or her social environment is complex and reciprocal, each affecting the other. Therefore social forces are seen as greatly influencing individuals.

The social constructivism framework was used to investigate the difference between learners' formal knowledge and their everyday practice. An appropriate curriculum should facilitate links between the formal and the daily practices. The ways in which learners were influenced by their peers' values and norms were analysed using the framework of social constructivism. The learners construct their own meaning based on shared norms, values and experience. Social constructivism was therefore a valuable framework for analysing the attained curriculum as well as providing possible explanations for the nature of the attained curriculum.

3. Methods

This study is located within an interpretive paradigm as we wished to understand and explain learners' actions and practices. Such insight enabled us to understand how they link their formal environmental knowledge to their everyday practices. The methodological approach is qualitative and the research design is a case study of three schools. While the schools were in different localities, the research meets the requirements of a case study design as the boundaries for all three localities were the same as only teaching and learning was investigated. The schools were selected from urban, peri-urban and rural districts as we wanted to gain insight into the three different contexts. Two classes from each school were used for data collection.

The instrument used to collect data was a questionnaire. The questionnaire was piloted to enable us to identify ambiguities in the instructions, clarify wording, and alert us to omissions or unanticipated answers. The pilot testing was done in one school which was not part of the research as learners all had the same experiences such as having observed environmental issues; they had similar interests, and had the same knowledge background as they have been taught the same primary content. The necessary amendments were made prior to launching the questionnaire to the research population.

The data from the questionnaire provided insight into learners' formal knowledge of environmental issues. This form of data collection has a quantitative focus in the way the data were collected as a survey method was implemented with a questionnaire as instrument to collect data. However, the data was analysed qualitatively as the questions were open-ended. The questionnaire was used to obtain insight, not only into learners'

knowledge about environmental issues, but also their views, attitudes and beliefs, making it an appropriate instrument for this kind of data (Denscombe, 2004).

The first question on the questionnaire administered to each school was different. Two questionnaires had two different photographs illustrating pollution and the third questionnaire had no photograph. The first question on each questionnaire acted as a prompt for the questions that followed. They were therefore the same on all questionnaires. Permission was granted to use unsupervised study periods to administer the questionnaire. Previous research had found that the implemented curriculum focused strongly on content. The questions were designed to determine how learners responded to this curriculum and why they responded in the way they did. Learners' views and perceptions of environmental issues were analysed according to the categories that emerged from the responses. The categories are indicated in the findings.

As external reliability concerns the replicability of the whole study this is a problematic construct for interpretive research. An interpretive approach assumes that participants experience multiple realities; what a participant experiences as reality today, may be different tomorrow. Although different researchers may use the same research methods, phenomena are interpreted differently. However, many extracts of learners' responses appear in the findings and this gives anyone who wishes to duplicate the research a better picture of the situation studied in order to make an informed decision in judging the suitability of the analysis (Lecompte and Preissle ,1993).

Trustworthiness and authenticity are more applicable to this study than validity (Guba and Lincoln, 1998). We regard this study as trustworthy because the findings are supported by long-term observation at the research site, gathering data over a period of time and by peer examination by asking colleagues to comment on the findings.

Although this research was conducted in three different schools, they are sufficiently similar to be collectively regarded as one case study and consequently no attempt is made to generalise the findings to all contexts in Lesotho, although propositions may be presented that could be applied to other contexts. Ethical clearance to conduct the research was obtained by the university ethics committee. Consent was also sought from the Ministry of Education and Training to conduct the research in the schools.

4. FINDINGS AND DISCUSSION

Careful analysis of the questionnaires provided an insight into the ways in which the implemented curriculum was enacted by the learners within the context of social constructivist learning. The questions contained in the questionnaire were based on the assumption that learners construct knowledge within a socially constructed environment, both in and out of the classroom. As learning is socially constructed, it is always situated (Lave, 1996). One would therefore expect that learners, in similar contexts, would construct knowledge that they could apply or transfer to their everyday environments.

A total of 120 questionnaires were completed. A different approach was taken in the way the questionnaire was structured. Learners from each of the three schools received a

questionnaire with a different question one. This question was relevant to the immediate environment of the school.. Each questionnaire had 12 questions which followed the initial question and these questions were identical for all three questionnaires. These questions formed four groups as some questions had sub-questions where learners were asked to explain their answers. These four groups constituted the themes that guided the data analysis. Learner responses in each theme were then grouped into categories and the percentages of students who responded in each category was calculated.

The themes were:

- Knowledge of the causes of environmental problems
- Learners’ participation in solving environmental problems
- Their sense of other peoples’ attitudes towards solving environmental problems;
- Learners’ views about whether formal knowledge assists in addressing environmental issues

Results of the analysis are presented in tables 1-4. The tables show how each theme was subdivided into categories and includes quotes as examples of responses from learners. The percentage of learners whose responses fell into a particular category is indicated. Each theme represents the actual question on the questionnaire

Table 1 Knowledge of the causes of environmental problems

Question	Categories and percentages	Examples of responses
List at least 5 causes of the problem.	Shifting responsibility to authorities 41,7%	“no cleaners, Maseru City Council not picking waste, food sellers, teachers not punishing those who throw papers, government people do not punish those who make the place dirty, police do not check waste pipes”.
	Attitude 35%	“carelessness/ do not care, they can’t even clean the surrounding around their desks in classes, they just feel it’s a free country everyone should do whatever they will, they are also reluctant to apply what they have learned from school in their everyday life most importantly”.
	Lack of facilities 23,3%	“no dust bins with lids, dogs spread things all over, no sewage pipes, damaged pipes”.

Learners’ responses did not reflect any blame on themselves for littering. Instead they were pointing fingers at other people and lack of facilities as the cause of pollution. It was true in some cases that if facilities were not there, individuals polluted but if they felt responsible

for the environment and were environmentally literate they would find ways of disposing of litter responsibly.

Table 2 Learners' participation in solving environmental problems

Question	Categories and percentages	Examples of responses
Explain how you assist in solving the problem.	Changed attitudes 37.5%	"students are very concerned about the dirty school environment and they participate in collecting pieces of paper throughout the school campus on Friday, then burn them, clean toilets and burning rubbish, it is important to clean to avoid disease".
	Available facilities 27.5%	"throwing waste in dustbins that are located in every corner of the school yard, place lids and bricks to stop dogs getting into bins".
	Money 18.3%	"collecting cans for sale for recycling, egg trays and other paper and things like scripts to recycle, so as to show that waste is not a waste in science".
	School rules 16.7%	"plastics not used in the school yard, we have shifted our food-sellers down from the classrooms".

Learners' responses indicated that they participated in activities to address some environmental problems. The table shows four reasons for participating in solving environmental problems. The responses were mostly descriptions of what they did at school. They did not mention what they did at their homes. This may be an indication that formal knowledge does not translate into everyday practices in their communities. Teachers may foster cleanliness at school but at home and out of school there may be no enforcement of good habits.

Table 3 Learners' views about whether formal knowledge assists in addressing environmental issues

Question	Categories and percentages	Examples of responses
Does the science you learned help in doing what you do to solve	Knowledge 57%	we are taught about the green house effect, endangered species, toxic gases, recycling old materials, pollution, help us

the problem? Explain how the science you learned helps.		to live overcoming the diseases caused by pollution, so in science we learn how to protect ourselves from disease and stay healthy.
	Attitudes 17%	we also learn about the problems of pollution which make us want to prevent it; in biology we are taught about pollution and this shows me that I have to care a lot about environment because pollution can lead to some illness.
	Skills 26%	we learn how to keep the environment tidy and clean, through science we learn how to take care of the environment by reducing pollution which cause many diseases.

Knowledge emerged as a dominant aspect of school learning. Most learners felt that they acquired sufficient knowledge, but the examples mentioned were mostly of global problems and there was little evidence that they acquired sufficient knowledge to deal with their immediate environments. Learners' responses pointed to the fact that they were aware that they should care and a number indicated that school taught them skills to be able to act on environmental problems.

Table 4 Learners sense of other peoples' attitudes towards solving environmental problems

Question	Categories and percentages	Examples of responses
Do other pupils in your school take part in solving the problem?	No education 58.3%	ignorant people those who do not care, they don't fight against pollution but continue to pollute the environment, they throw plastics everywhere they like.
	Neglected duty 41.7%	it is the responsibility of cleaners', 'teachers must punish those who make the place dirty.

An aspect that emerged from the questionnaires that generated this theme, was learners tendency to blame other people for the problems observed in the environment. They believed that some people did not care enough and neglected their duty. Some learners went so far as to suggest that some people were ignorant and had to be punished for littering.

4.1. The extent to which formal learning is transferred

The responses showed that learners have sound knowledge of the environment. This is to be expected as the implemented curriculum places emphasis on learning about the environment. Some learners wrote that they take action for a sustainable environment, but no concrete evidence of this emerged from the questionnaires. Most of them mentioned learning from the subject science only, yet the curriculum analysis conducted in a related study, showed that at a number of subjects at primary level have environmental content as well. At senior secondary level agriculture and geography also include environmental content in their syllabi. This shows that transfer of learning between subjects may be limited.

4.2. Enactment of the attained curriculum

Learners' responses suggest that they are environmentally literate with sound knowledge and keen awareness. With regard to knowledge it is significant that their knowledge is mostly linked to the effect of environmental degradation on people rather than on biodiversity in general. For instance water pollution was described as affecting humans but no mention is made of the effect on aquatic organisms.

A second significant response was the fact that learners do not appear to have the necessary attitudes to want to take action of their own accord. They were inclined to blame authorities for not acting to keep the environment clean or not providing proper facilities. Their attitudes seemed to be that if there were no facilities such as bins, it justified littering. Reference was made to solving environmental problems, but these were all related to the school environment and were either linked to teachers instructing learners to clean and pick up litter, or they act when they receive money for recycling. This points to external agents driving their behaviour, rather than an internal conviction. This is supported by the fact that the one school which was without litter was the one where the principal and teachers were very strict in maintaining clean surroundings.

While learners indicated that education is important, they simultaneously shift responsibility to cleaners. This reveals an attitude that does not view education as a solution to solving a simple environmental problem such as littering. Furthermore, the notion that punishment is a solution to solving environmental problems strengthens the view that learners do not really view education as an option to solving environmental problems. Statements such as 'we are taught to care' and 'we learn how to take care of the environment' also point to awareness rather than the ability or will to take action. The data with regard to solving environmental problems suggests that learners may be giving responses that they believe we want to hear, for example saying that they plant endangered plants at home is probably not true as it raises the question of where learners would find such endangered plants.

A further significant aspect that emerged was the fact that 44% of the responses with regard to listing environmental problems were of a socio-economic nature. Learners appear to have a broader understanding of the environment than solely the biophysical environment.

The fact that so many listed social problems is an indication of the importance they attach to these problems, rather than the problems of the biophysical environment.

5. Conclusion

The findings point to the fact that acting environmentally responsibly is not attained through formal schooling. The questionnaires reveal that learners have adequate theoretical knowledge, but a superficial attitude towards the environment. A deep environmental ethos appears to be lacking. The evidence from the local environment was that the community as a whole was not applying what was being taught in schools. The behaviour of learners outside the classroom confirmed this. Despite environmental learning taking place in a number of subjects in schools, no improvement had taken place in schools, homes, villages, towns and countrywide. Steele (2010) is of the opinion that environmental deterioration is not the work of ignorant people but also the educated, so the problem is the way education prepares learners to act in the world.

Learners' theoretical knowledge was good, since their responses to the questionnaires were mostly correct. They could rightly describe the environment holistically, they could name factors endangering the environment and describe how to live in an environmentally sustainable manner. However, observations revealed totally different individuals confirming that knowledge does not necessarily lead to action competent people.

The environmental degradation in Lesotho and globally has influenced the development of the intended curriculum aimed at addressing environmental issues. The issues are integrated into some subjects where they best fit; the intention being that they would be taught. Previous research had indicated that teachers concentrated mainly on teaching facts about the environment. The transmission mode of teaching did not allow learners to construct meaning with the assistance of a more capable peer or peers or even the teacher. No mediation of learning within a community of practice occurred. Learners were therefore left to their own devices with regard to taking action to protect the environment and this resulted in very little development of positive values. Learners simply emulated behaviour of the communities they lived in, despite their theoretical knowledge, pointing to the fact that they had not internalised their knowledge to bring about behaviour change.

6. References

- Black, S. (2005). Adventures in learning. *American School Board Journal*, 3, 42-44.
- Bishop, K. & Denley, P. (2007). *Learning science teaching*. Berkshire: Open University Press.
- De Feiter, L., Vonk H. & van den Akker J. (1995). *Towards more effective science teacher development in Southern Africa*. Amsterdam: VU University Press.
- Denscombe, M. (2004). *The good research for small-scale social research projects*. Berkshire: Open University Press.
- Ernst, J. A. & Stanek, D. (2006). *The prairie science class: A model for re-visioning*

- environmental education within the National Wildlife Refuge System. *Human Dimensions of Wildlife*, 11, 255-265.
- Guba, E.G., & Lincoln, Y.S. (1998) Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *The landscape of qualitative research: Theories and issues* (pp. 195-220). Thousand Oaks, CA: Sage.
- Hawtrey, K. (2007). Using experiential learning techniques. *Journal of Economic Education*, 38(2), 143-152.
- Hewson, M. G. (1988). The ecological context of knowledge: Implications for learning science in developing countries. *Journal of Curriculum Studies*, 20(4), 317-326.
- IUCN/UNEP/WWF. (1980). *The world conservation strategy: Living resources for sustainable development*. Gland, Switzerland.
- IUCN. (1992). *The Rio Declaration of environment and development. (Centre for our common Future)*. Geneva, Switzerland.
- Kingdom of Lesotho. (2002). *Science junior certificate syllabus*. Maseru: National Curriculum Development Centre.
- Lakin, L. (2006). Science beyond the classroom. *Journal of Biological Education*, 40(2), 89-90.
- Lave, J. (1996). Teaching, as learning, in practice. *Mind Culture and Activity*, 3(3), 149-163.
- Lecompte, M. D., & Preissle, J. (1993). *Ethnography and qualitative design in educational research* (2nd ed.). London: Academic Press.
- Maqutu, T. Z. (2000). *Why students fail O-level physical science in Lesotho. An unpublished dissertation submitted in partial fulfillment for the degree of Doctor of Education*. University of Durban-Westville, Durban, South Africa.
- McLure, J.W. (2002). Into the fields we go! *Science Activities*, 39(1), 1-4.
- Ministry of Education and Training. (1997). *Education statistics 1997*. Maseru: Government Printers.
- Ministry of Finance and Economic Planning. (1997). *Sixth national development plan 1996/97-1998/99*. Maseru: Government Printers.
- NCDC. (2003). *Environmental education: A teacher's handbook for primary and secondary schools in Lesotho*. Maseru: Morija Printing Works.
- Prokop, P., Tuncer, G. & Kvasničák, R. (2007). Short-term effects of field programme on students' knowledge and attitude toward biology: A Slovak experience. *Journal of Science Education and Technology*, 16(3), 247-255.
- Stears, M., Malcolm, C. & Kowlas, L. (2003). Making use of everyday knowledge in the science classroom. *African Journal of Research in Mathematics, Science and Technology Education*, 7, 109-115.
- Stears, M. (2005). *The meaning of relevant science in townships in Cape Town*. Thesis submitted to the Faculty of Education in fulfillment of the requirements for the degree of Doctor of Education. University of KwaZulu-Natal, Durban, South Africa.
- Steele, R. (2010). *Reorienting teacher education to address sustainable development: Guidelines and tools for environmental protection*. Bangkok: UNESCO.