

## Grade Six Learners' Perceptions of Environmental Awareness: A Human Ecological Support Programme

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**KEYWORDS** Environmental Education. Environment. Environmental Protection. Environmental Issues. Human Ecology. Conservation Recycling. Pollution

**ABSTRACT** Research has shown that learners' knowledge and awareness of environmental concepts are relatively lower than would be generally expected. This article reports an investigation of learners' knowledge and understanding of conservation, recycling, ecology, pollution and environmental protection. A further aim was to gain an understanding of how the learners' conceptions are developed and how their knowledge of these concepts shapes their environmental awareness and practices outside the classroom. Such information is particularly important for teachers of Environmental Education and for those who develop support programmes for the protection, restoration and enhancement of the quality of the environment. This exploratory study involved 12 Grade 6 learners and was conducted at three primary schools in the North West province of South Africa. Semi-structured interviews were conducted to ascertain details of learners' knowledge and conceptions of environmental issues. The findings indicate that learners' knowledge and awareness of environmental issues are limited and that schools play a significant role in developing and enhancing such knowledge and conceptions in learners. This article emphasises the importance of using the learners' home environment experiences and their understanding of environmental matters in and around the home to make environmental studies at school more accessible to them.

### 1. INTRODUCTION

The issue of knowledge and conceptions has long been of interest to education researchers interested in learners' learning and teaching generally. Some educational researchers have argued that learners' prior knowledge significantly influences classroom learning and teaching (Gambino et al. 2009). That is, it is important for educators to consider learners' prior knowledge and conceptions because learning has to build on learners' existing mental structures. In practice, however, for some such prior conceptions and knowledge translate as previously learned school facts, while for others such knowledge translates as misconceptions to be swept away (Hume et al. 2005). According to Taber (2001), a paramount factor in any meaningful learning is what has previously been learnt. Frick et al. (2004) highlight this aspect by arguing that to be fully effective, educational campaigns need to be designed with a profound understanding of learners' underlying knowledge. It is important to ascertain how much learners already know and what kind of new knowledge is thus essential to promote behaviour in relation to the environment. This article reports on a study that sought to explore this afore-mentioned idea in the context of Environmental Education.

The study was informed largely by constructivist literature and its various applications in Environmental Education and learning. Constructivism suggests that knowledge is created by the learner, and not passively received from the environment. As such, knowledge is constructed on the foundations of learners' existing knowledge. This means that learners create new knowledge by reflecting on their physical and mental actions, and that ideas are constructed or made meaningful when learners integrate them into their existing structures of knowledge. Birbili (2006) argues that no one true reality exists; only individual interpretations of the world. These interpretations are shaped by experiences and social interactions.

The study explored learners' knowledge and conceptions of the environment. Learners' conceptions and assumptions are, unfortunately, often ignored when curricula or lesson plans are developed. There may be two possible reasons for this neglect: we either do not know enough about what the learners' assumptions and conceptions are or we do not take learners' ideas and conceptions seriously enough to base curricula or lesson plans and decisions on them. In South Africa, this is often the case in the teaching of Environmental Education. This article dis-

cusses how primary school learners make meaning of selected environmental concepts and how their meaning making shapes their environmental awareness and practices outside the classroom.

### 1.1 Background to the Study

There is considerable concern about the increasing deterioration and exploitation of the natural environment (Gutti et al. 2012). Some scholars argue that much of the environmental degradation that occurs today is primarily a result of the failure of our society and educational systems to provide citizens with the basic understanding and skills needed to make informed choices about the interactions and interrelationships in the environment. An understanding of the basic interactions between humans and the environment and skills is needed to make informed choices about the environment. In view of the increasingly serious global impact resulting from human activities, it is important that learners understand that “environments change” (Kamara 2006). They also need general principles to find solutions about specific environmental problems confronting modern society. It is against this background that an investigation of the knowledge and conceptions of learners about environmental issues and how their knowledge could influence further learning in Environmental Education becomes important.

The General Education and Training (GET) programme in South Africa makes provision for the inclusion of Environmental Education (EE) in schools. The learning outcomes of the learning area Life Orientation clearly state that environmental issues must be dealt with. According to the Revised National Curriculum Statement, assessment standards in this learning area cover participatory activities that are related to problem solving as far as environmental issues are concerned (Department of Education 2002). Barraza and Walford (2002) emphasise the importance of placing EE centrally within the school curriculum. They mention a major educational reform strategy that was announced in Mexico in 1990, which for the first time mentioned EE as a topic to be included in the curriculum (Barraza and Walford 2002). Taking these ideas on constructivism seriously, this study sought to understand how learners think about some key concepts in EE. This study aimed to establish

the learners’ knowledge and conceptions of such critical concepts as environmental protection, pollution, conservation and recycling. These concepts were selected based on the rationale that to be successful in developing an environmentally literate society, educators need to pay attention to some important key concepts in the field and promote environmentally friendly practices around these concepts as a starting point.

Another aspect of priority among environmental concepts and problems is conservation. Magadlela and Mdzeke (2004), whose project was a pioneering environmental initiative in that its implementation combined ecological concerns and social development benefits, argue that conservation in South Africa is of utmost importance. Similarly Vickers (2002) also supports the importance of attending to conservation and finding solutions to the problem by indicating that conservation can and must play a central role in the future if we are to survive and thrive within our existing resource limitations.

Recycling is also a critical environmental aspect. Kamara (2006) mentions that recycling is cheap and emphasises that it contributes to a healthier environment for humans and other species. She further highlights that, with proper implementation, recycling can help boost the economy by generating jobs for low-income citizens while benefiting the environment. A very important environmental issue is environmental protection. We need to conserve natural resources and maintain a clean environment. Various researchers (Kamara 2006; Gutti et al. 2012; Birbili 2006) highlight that environmental degradation and exploitation takes place through overgrazing, chopping trees, ploughing unsuitable soil, demolishing grasslands, soil erosion and degradation and drying up of natural water sources.

Knowledge about pollution, recycling, conservation and environmental protection is of utmost importance because it can help prevent damage to the local environment.

## 2. RESEARCH METHODOLOGY

This research study was aimed at uncovering the knowledge and conceptions of learners about the environment and Environmental Education. In this study, which was aimed at deter-

mining primary school learners' knowledge and perceptions of the environment and other environmental issues, a qualitative research approach was used as the mode of inquiry. The researchers employed data collection strategies that assisted to be closer to the learners, to explore their school environment and to interact with them personally in order to get a clear understanding of how they conceive their environment. Purposive sampling was used, where the researchers targeted schools that were actively involved in Environmental Education Campaigns. Learners were selected from Grade Six classes, due to the fact that this grade was the highest in the school and it was most likely that learners were exposed to Environmental Education.

The main data collection technique used in the study was semi-structured interviews with the Grade 6 learners. The researchers began the study by exploring the literature to get a sense of how such learners' conceptions about the environment have been studied and analysed in the literature. That is, what knowledge already exists with regard to learners' conceptions and views of the environment, and the gaps that exist in this regard. The researchers then arranged for semi-structured interviews with the 12 learners at their schools. The data elicited was based on children's understanding and conceptions of the environment and Environmental Education. The learners' ages ranged from 12 to 14. The interviews were conducted at three different schools in the North West province in the Moretele Area Project Office, with four learners from each school. The Area Project Office (APO) is the new term used for the former circuit office in the North West Department of Education.

The aim was to find out what knowledge and conceptions learners bring along to the learning of EE in the primary school classroom, and how these may be used as a basis for challenging and improving their understanding of the environment and other related concepts. To explore this the researchers used the following three main questions:

- ♦ What are the learners' conceptions about some critical concepts in Environmental Education? (Selected concepts are pollution, recycling, conservation and environmental protection.)
- ♦ How are these conceptions developed; what seems to be their origins and what shapes these conceptions?

- ♦ How do the knowledge and conceptions of these concepts shape learners' environmental practices outside the classroom?

These three questions were broken down into 19 questions which were used during the interviews. Some were slightly changed, with additions and follow-up done based on the learners' responses. The researchers were guided by Creswell's (2003) observation that in a qualitative approach the inquirer often makes knowledge claims based primarily on constructivist perspectives; that is, the multiple meanings of individual experiences, meanings socially and historically constructed with intent of developing a theory or pattern. Data for this study was collected from three different schools by way of 40-minute recorded interviews with the participants. In addition, the participants agreed to the audio recording of their impressions of their experiences, thoughts and feelings related to the environment. Data was collected after permission to conduct research was granted by the regional department of education, the Area Project Office and the relevant schools.

### 3. FINDINGS

According to the analytical procedure, all data were analysed in a repeated and thorough manner by reading all written materials and noting similarities and differences. The researchers used an analytical scheme similar to the one used by Jeronen and Kaikkonen (2002) and Loughland et al. (2002). Themes were determined by taking the common and central characteristics of the contents as the point of departure. The learners' responses were categorised according to the following themes:

- ♦ Ideas that focus on environmental knowledge
- ♦ Ideas that focus on environmental awareness
- ♦ Ideas that focus on environmental action
- ♦ Ideas that focus on environmental sensitivity

#### 3.1 Ideas that Focus on Environmental Knowledge

In this theme, the answers depicted the areas of knowledge about environmental issues. Learners mentioned different kinds of facts, concepts, environmental phenomena and environ-

mental relationships. Their own words are used to indicate the different issues they addressed under each theme. Examples of the statements that show learners' environmental knowledge are provided below.

*"The environment is a place where we live."*

This response indicated that a good number of learners in the primary school see the environment as only providing a place to stay. One respondent from Swaranang Primary School indicated: "If we destroy the world – our only place – where will we live? We have to take care of the environment." This expression indicates that learners are aware that the environment does something for them and they in turn can do something towards the environment. A respondent from Makeng Primary School indicated that "the environment is our country". In Titso Primary School learners generally referred to the environment as "our world" and "our village".

*"The environment consists of natural and man-made objects."*

In response to the question: "What does the environment consist of?" learners made mention of animate as well as non-animate things. One learner expressed her understanding of the environment as follows: "When I think of the environment, I think about animals (like cows, sheep, goats and cats), people, and also cars on our roads." Another respondent in the same school gave the following explanation: "The environment consists of people who work on our roads and those who work for the government. Again we find water, food, schools and surgeries for doctors in our environment." These expressions indicate that learners' environmental knowledge is local in nature because they mostly referred to their immediate environment. A learner in another school mentioned that the environment consists of "trees, houses, sand and animals". Another respondent indicated: "In our environment we find flowers, clothes and furniture and grass."

*"People's irresponsible actions lead to pollution."*

Most learners are aware that littering is a problem. They also attribute it to people's ac-

tions. In answering the question "What causes pollution?" learners' answers depicted their daily experience and observances. This is evident in the following statement: "People throw away papers, plastics, tins and bottles anywhere in the streets." A learner at Makeng Primary School indicated: "In our village there is a river and learners like to play in there. They must stop this activity because they make the river dirty by throwing tins in the river." Learners are aware that this is not only unhealthy, but dangerous as well. A respondent from Swaranang Primary School reacted in this manner about causes of pollution: "In our village people use the veld as toilets and this leads to land pollution." In the same school another respondent indicated that "people throw away paper, bottles, tins and plastic everywhere because they don't know about recycling". This learner expressed the following sentiment: "I think people must be educated about waste management as this will reduce the littering problem." Most respondents regarded pollutants as being materials such as paper, plastic, tins and bottles. A learner at Titso Primary School mentioned: "Our village is very rural and our road is gravel type. We experience a lot of dust day and night and this affects the air that we breathe." Another respondent expressed the following concern: "There are things like oil and petrol that make our environment dirty when spilled on the roads; they also have a bad smell."

*"Water is important in our lives."*

Learners understand that water is important for personal use. A learner at Makeng Primary School responded by saying: "We have to save water because we use it to cook, bath and wash, clean and in our gardens." Another said: "If we do not save water, it will be scarce one day and we will not survive. We will die of hunger and thirst."

Some learners reflected knowledge about taking precautionary measures in dealing with water. This is evident in the following response:

*"We must not leave taps dripping, we must close them tightly after use."* Another indicated: "When we open taps, we must do it slowly so that the water does not splash." In answering the question: "How can we save water?" one respondent mentioned: "We (learners) are fond of playing a game called summer time. In this game we fill buckets with water and splash

*each other. We play this game when it is usually very hot and we wear our swimming costumes. It is exciting to play this game but we know that we are wasting a lot of water. What can we do? We do not have swimming pools in our villages."*

The issue of sustainability was raised by a learner at Swaranang Primary School when she indicated that *"we need to store water in drums and buckets for future use because one day water will be scarce"*. Another respondent highlighted the issue of reusing water as one measure to save water: *"When we water the garden, we must use water that has already been used, like water that we used for washing clothes, dishes, or we can fetch water from the river."* A learner at Makeng Primary School indicated that *"it is important to build walls around dams so that people do not pollute them"*. *"Animals need shelter, food and water."*

Most learners displayed knowledge of taking care of animals but the idea of conservation was not quite clear to all of them. In answering the question: *"How can animals be taken care of?"* a learner at Titso Primary School mentioned that *"animals need to be provided with food, water and shelter"*. Another indicated that *"animals must not be abused. Some people throw stones at animals and climb on their backs and this is not right."* An interesting response was given by a learner from Makeng Primary School when he mentioned that *"animals, like human beings, have to be taken to the doctor when they are sick. I don't know what name they use for such doctors but I know that there are doctors and hospitals for animals too."*

The next question about animals was: *"How can animals be protected?"* The following responses were noted:

*"We can make a fence around our village to stop wild animals to come to our village because they are dangerous, and to keep our domestic animals within our village."* *"All animals can be taken to the zoo or the game lodges. There, they look after them, feed them, provide shelter for them and ... give them medicine when they are sick."*

*"My uncle and his friends sometimes go hunting in the forest. I feel sad about the hare that they kill and bring home. The meat is very tasty, but I heard our teacher saying hunting is against the law and has to be reported. In order to protect animals we must take them to the zoo."*

The following responses were noted to the question: *"Why should animals be protected?"* *"Animals help us. They give us meat ... like a cow, sheep, goat. Some give us milk ... a cow, feathers ... ostrich, and we get wool from sheep."* *"At home we have two dogs ... Snowy and Bruno. They bark at night to alerts us if something is wrong."* *"We use a donkey cart to fetch water from the river and wood from the forest."*

*"Animals also are created by God. We have to take care of them and protect them against danger."* From the responses given by learners it is evident that the information they have is basically from their direct experience with animals, especially domestic animals, as they are common in rural areas.

Most learners were able to mention different kinds of wild and domestic animals. This was because of their daily experiences and observations within their neighbourhood. One respondent from Swaranang Primary School was able to mention the game farm Mabula Lodge, which is not far from where she lives. This is how she expressed herself:

*"My mother works at this lodge and usually takes us with during the school holidays. We get to see the animals that are kept there. We see how they feed them and take care of them daily."*

### 3.2 Ideas that Focus on Environmental Awareness

Within this theme the answers are related to various types of environmental destruction. The learners' statements reflect the various aspects of destruction and the concerns about nature. The learners reflected an awareness of their local environment. They referred to the following aspects of environmental destruction:

#### 3.2.1 Littering

One respondent mentioned that *"learners are the ones who litter and they should clean up"*. This statement reflects awareness on the side of learners. Another indicated that *"after eating fruit, learners just throw peels everywhere"*. Learners are also aware of improvisation. One learner from Titso Primary School said: *"If people cannot afford dust-bins, they can dig holes in the backyard and dispose of their waste."* Another learner, from Makeng Primary School,

stated: "We do not throw plastic bags away; we use them to carry our books to school." Some learners were able to relate littering to recycling. Examples of responses to the question: "How can we solve the littering problem?" are provided below.

*"In our school we have two steel drums that we use for papers and plastics. We throw them in the drums and at the end of the school day we burn them." "If I use exercise books this year and they are not full, I can still use them next year. This can save me some money." "We can pick bottles and tins from the streets and phone people who use them again or take them to the shops. Our local shopkeeper gives us money in return."*

### 3.2.2 Protection of Animals

In response to this environmental issue, most learners mentioned the animals that they know. They mostly referred to domestic animals – pets and animals that people keep for domestic use. Animals that live free in nature were seldom mentioned or not mentioned at all. Other than chickens, no birds were mentioned. The learners generally referred to animals they knew (pets), animals used for food (cows, chickens, sheep) or for work (donkeys, horses), and animals often mentioned in stories (jackal, elephants, lions). As a primary school educator I have realised that most of the information the learners have about animals is the information that they got from their textbooks. For instance, in the Grade 6 Life Orientation textbook there is a chapter on domestic animals. This chapter mostly describes animals related to producing, with emphasis on what the animals give to us or on what we can get from the animals. In the same chapter there are questions like: "Why do we take care of animals?" The responses provided in the book include "To give us food", "We take raw materials from them" and "They provide service.". This information suggests that some animals are very useful and learners are taught to take care of them and protect them in order to fulfil their own needs. Obviously the responses provided in the books promote a human-centred view of animals.

### 3.2.3 Protection of Plants

Question: "Why is it important to take care of and protect plants?"

The following responses were noted:

*"We must take care of flowers because they decorate our homes."*

*"Fruit trees are important because they give us food, and vegetables are healthy for our bodies." "My grandmother makes medicine from wild plants."*

*"We use flowers to show love on Valentine's Day and we also take them to the graveyard in remembering our loved ones. "Trees provide us with shade and they also break away strong winds that may blow our houses down." "Animals feed on grass; we need to protect this grass because without it they will not survive."*

These responses also indicate that learners are aware of and concerned about protecting the environment. The general responses from the learners were that trees should not be cut because they are important for the survival of mankind. Other responses indicate that plants are also important for animals. A contrasting statement made by one of the respondents from Swaranang Primary School was that the leaves of trees make their environment dirty.

Overall, the learners' answers show concern about plants, animals and nature as a whole. These learners were able to mention the environmental problems and relate them to people's actions. For example, a learner at Titso Primary School responded by saying: "After drinking beer people throw the bottles and tins anywhere. This is dangerous as small learners play with them." Another learner from the same school indicated: "Young people drink beer and when they are drunk they break the bottles and fight with them."

Most learners were able to identify education as the most important aspect in making people aware of issues within their environment. This is evident in the following statements made by respondents:

*"It is the responsibility of the government to educate people about littering, recycling and pollution." "The municipality people must write notices on boards that inform people about ways of solving environmental problems."*

*"At school we can engage in cleaning campaigns together with our communities to show that we really care about our environment."*

The learners also reflected their own experiences and observations when answering the questions.

### 3.3 Ideas that Focus on Environmental Action

Some of the learners' responses reflected the ability to apply their knowledge in attempting to solve environmental problems. In response to the question: *"What can be done do take care of the environment?"* the learners responded as follows: *"Learners must clean up litter."* *"People should collect paper, plastics, tins, bottles and boxes for ... recycling."*

*"We must stop abusing, killing and beating animals."* *"We must use manure when planting trees and flowers."*

These ideas reflect a positive attitude towards the environment and its protection. This attitude involves a range of activities which the learners think would improve the present state of the environment:

*"Make fences around the garden to prevent animals and people from treading on plants."*

*"Make a fence around the village to keep away wild animals."* *"Building cages and shelters for domestic animals ..."*

The learners' responses also indicate that they take pride in what is around them and that they are aware that they need to look after their surroundings:

*"We must remove weeds from our gardens as they will kill our plants."* *"We must protect our plants against the wind and the sun because they make our homes beautiful."* *"Our domestic animals need to be provided with basic needs ... food, water and shelter."*

Their responses again indicate that they are aware that they have a responsibility towards the environment. Some of the learners' statements described direct action of taking care of the environment.

*"In schools we can organise meetings to discuss cleaning campaigns."*

*"We have to use water wisely; learners must not play with water. We have to close taps tightly and we should not pollute water."*

The meaning of consciously working for the benefit of the environment and human beings is seen in all answers. Responsibility in this instance is manifested as protection and respect for nature and respect for life and the environment. The environmental action most commonly cited was taking care of pollution. A respondent at Makeng Primary School indicated that environmental action is a government responsibility.

### 3.4 Ideas that Focus on Environmental Sensitivity

This theme comprises statements which depict feelings, emotions and a sensitive approach towards nature. Within this theme the reasons why the learners think it is important to take care of the environment are positive.

*"It is where we live. We have to be safe where we live. Like ... mmm ... we have to cut the long grass because snakes hide in long grasses."* *"If we do not clean our surroundings, we will get diseases. Dust and smoke will give us TB and dirty water will give us cholera."* *"God created people to look after plants and animals. We must also take care of each other."* *"If we do not take wild animals to the zoo, they will kill us. We must also make shelter for our domestic animals to protect them against the sun, wind and rain."*

They made several suggestions relating to an individual's contribution towards environmental protection: *"Education is very important. I can organise meetings with my friends at school and teach other learners about pollution and recycling."* *"I will encourage other learners to obey the law. We are taught not to kill and abuse animals and how to take care of the environment."* *"We can form cleaning campaigns at schools and set a day to pick up litter in our village. Other members of the community will then join us."*

*"Write notices on boards along the streets, informing people about ways of managing waste material. This will serve as a way of encouraging the community to be sensitive towards the environment."*

Learners overwhelmingly identified "people" as a major cause of environmental problems. The learners particularly identified people's irresponsible actions such as *"littering, polluting water and the air, cutting down trees, killing animals and burning waste"* as major environmental problems in their home area.

All these responses suggest that learners have an individualistic framework for thinking about the causes of environmental problems. However, despite this framework, the learners seemed willing to acknowledge how their own lifestyle could contribute to environmental problems. Indeed they tended to talk in the third person in all the interviews and did not mention how for an example they could reduce their per-

sonal consumption or use resources sparingly. Only when they were asked directly about their own contribution did they change to first person phrases.

In explaining how the environment could be protected, a few learners mentioned personal responsibility as the most important factor. For instance, one said: *"The youth must protect the environment because they are future leaders."* Most learners suggested that increased awareness education is necessary for improving environmental protection.

From the learners' responses it is clear that learners are to a certain extent aware, sensitive and willing to take action towards environmental protection and that they believe that the government needs to enforce laws and penalties towards environmental protection.

The learners' environmental knowledge had been gained through personal observations and experiences. The home was also indicated as an important source of environmental information. An example cited by one learner was: *"My grandmother makes medicine from wild plants." The school was regarded as the most important source of information. For example, one respondent indicated: "Our teacher once told us that paper is re-starched in big machines to make new ones."* Some environmental concepts were learned from other 'learning areas' in the classroom situation. The zoo, game farms and animal camps are also sources of the learners' environmental knowledge. This was reflected in the following response: *"I saw different wild animals at Mabula Game Lodge, which is not far from where I stay."*

#### 4. DISCUSSION

The study established that the majority of learners understand the environment only from a physical and bio-physical perspective. This is characterised by a limited conception of the environment where the environment is thought to be a place, a place with living things and a place with living things and people. Most learners identified the environment with the place where they live: their country, their village or their world. The learners also mentioned that the environment consists of natural and man-made objects such as sand, stones, soil, houses, schools, fences, cars and electricity. It can be concluded that the majority of learners in this study may not be

aware of other types of environments such as the economic, political and social environments. Similar findings have been reported by Conde and Sanchez (2010) for instance, that the majority of learners see the environment as an object. Evidence collected in this study suggests that learners possess some kind of environmental knowledge, even though this knowledge is limited and less sophisticated. This has immediate implications for the teaching of Environmental Education. A more meaningful orientation to this kind of education would be one where learners' own experiences are explored first and foremost, and then challenged.

Learners' perceptions of environmental protection indicate that many of them are concerned about environmental issues. The majority of learners in the study were knowledgeable about the basic facts connected to pollution and conservation, but only in and around their local community. These learners expressed positive views with regard to their immediate environment. The learners are aware that it is their responsibility to clean their homes, their classrooms, their school surroundings and their streets; to take care of plants and protect animals, because the environment is the only place where they can live. This is a critical finding from the perspective of environmental sustainability where the key issue is to learn to respect and preserve the present environment for future generations. This finding is in agreement with that from a previous study conducted by Hume et al. (2005), which revealed that learners are concerned about the maintenance of nature and life, and the survival of the planet. Only a small portion of the sample took the view that it is the responsibility of the government and municipality to ensure that the environment is clean and free of hazards, even though they were not very sure about the role of the government in solving such environmental problems.

The literature reviewed in this study did not cover the issue of the different Environmental Education programmes (field trips, camps, adventure activities and campaigns) that are aimed at developing learners' affective relationship to the environment, environmental sensitivity, or social relationships through personal experiences. However, the respondents in this study referred a great deal to school and community campaigns that are led by the youth and designed to control litter through cleaning-up operations.



The purpose of these outdoor activities should be seen as giving out-of-classroom educational experiences involving direct contact with various environments. These experiences are also intended to give learners in-depth knowledge of environmental issues and to develop their self-confidence, environmental sensitivity, action skills, responsible action in nature and their social relationships. According to the findings and themes in this study, the mission of Environmental Education should be to foster environmental sensitivity, awareness, knowledge, readiness and personal responsibility. This is consistent with the findings of Conde and Sanchez (2010) that environmental awareness and responsibility are key factors that should be taught in schools so that learners can make the right decisions to protect the environment.

The results of this study suggest that these primary school learners' knowledge about plants and animals is inadequate. They are aware of certain types of plants, for example, trees, flowers, vegetables, fruit and grass. The learners also appreciate the value of plants and this was shown in the way they presented the use of trees, grass and flowers (for shade, food, decoration and to send to our loved ones). As far as animals are concerned, learners referred mostly to domestic animals and how useful they are to human beings (for example, they give us meat, skin, feathers and wool, while some, like the dog, guard our houses). These findings are consistent with those mentioned by Hume et al. (2005) who remarked that learners consider anything green that people use for food to be alive. These researchers also found that learners know more about pets and mammals, but do not recognise many kinds of birds or other species. The implication from this study in comparison with these studies is that learners may tend to perceive things from a self-centred or human-centred point of view and that they refer only to those entities and constructs that are linked to their everyday experience. In addition to the concern about the welfare of animals, the learners emphasised the importance of protecting nature in general. Most of the value and concerns were based on personal feelings (such as *"people must not cut trees because they provide shade and they must not kill animals because they also deserve to live"*).

The meaning of the concept of recycling was not quite clear to the primary school learners. However, these learners were able to name a few

things that could be recycled. In their understanding only materials such as paper, plastic, boxes, clothes and containers such as tins and bottles could be recycled. Almost all the learners interviewed had learnt a standard list of 'everyday' recyclables – bottles, paper, plastic and cans. The learners displayed an understanding that recycling is similar to re-using. The learners explained how they re-use plastic daily: they carry their books to school because they cannot afford school bags; they use plastic bags as shopping bags; they use bottles to carry water to school. The learners could not offer an explanation of why materials are recycled, that is, the concept of reduction of waste or conservation of materials. They also did not have an understanding of recyclables other than material and containers: they were not aware that materials are treated differently and that other methods of disposal are used for that which is not recycled. The researchers' analysis of the data provided insights into gaps and errors in learners' thinking and examples of their incomplete knowledge. Only a small number of learners articulated accounts of the actual recycling processes, which touched on reality. These respondents referred to the fact that paper is cleaned in big machines and re-starched to make new paper. One told of how plastic is melted before it can be made into something else. Generally speaking, levels of understanding about recycling did not extend to any further information about the process, but their responses did indicate that learners have some kind of basic knowledge about recycling that can be taken as a starting point in learning in Environmental Education. This is consistent with the findings by John (2004) that many of the incomplete answers and explanations given by learners suggest key areas of knowledge and understanding that could well be focused upon in Environmental Education. The data from this study also revealed a lack of involvement in the recycling process. The majority of the learners see waste disposal and recycling as something that the municipality and the "recycling people" should take care of.

Evidence collected suggests that learners know that waste should not be left lying around; it should be placed in a bin or in a deep hole in the backyard. Explanations of this ranged from *"so our village looks tidy"* to *"so it does not harm us by causing diseases"*. The waste that was being referred to in this instance entailed

papers, bottles, tins, plastic, boxes, fruit peels, and animal and human faeces. Although the learners mentioned environmental problems such as littering, they have difficulties in understanding the consequences of and connections to other global problems. As can be expected from learners at this young age, their knowledge of the problems is still on the local level, still fragmentary and out of the global context. These are facts to be taken into account when planning education programmes in environmental issues for primary schools. The results of this investigation indicate that learners' understanding of the concept of pollution is satisfactory, as they were capable of discriminating between cause and effect. A significant finding from this study is that the majority of learners regard land pollution as a serious problem in their environment.

This study has established that learners' understanding of water conservation is inadequate. This is based on the fact that learners referred only to water for human, plant and animal consumption. However, the majority of the learners' responses indicate that they see water as an important resource. This was clearly reflected in the learners' understanding of the value of water – mainly for personal use and for purposes of hygiene. These learners displayed no knowledge about concepts such as water recycling. The learners generally referred to water conservation as merely taking precautionary measures when using water. Examples of these measures are closing taps tightly after use and storing water in buckets, tanks and drums for household and future use. The learners showed limited knowledge regarding water sources, conservation processes and access to safe drinking water as a basic human right, but their ideas suggest that they are aware that conserving water plays a central role in the future if they are to survive and thrive within existing resource limitations. It remains the role of education in schools to teach learners about water efficiency measures and water systems so that the existing water supplies can be far better and more effectively utilised. This is consistent with a conclusion made by Vickers (2002) that by understanding where and how water is used and wasted, and then applying effective efficiency technologies and practices, we can achieve substantial water savings and other benefits in our homes, factories and farms.

It has been shown that the ideas of the learners in this particular study are well worth noting and utilising. The learners' conceptions of the environment are varied and could be seen in the light of their experiences and the importance of the environment to them. The dimensions of the learners' awareness are significant. Their ideas, which are shaped by their experiences, are important. If we want learners to take ownership of their conservation responsibility, it is necessary in the teaching and learning situation to take their ideas about the environment into account.

## 5. CONCLUSION

The results of this study on the learners' knowledge and conceptions of the environment has implications for Environmental Education in two ways: firstly, that their existing knowledge can serve as a basis for designing a range of activities which would help learners extend their levels of understanding of environmental issues, and secondly, that gaps in knowledge, commonly held misconceptions and sources of false knowledge about environmental issues could be sources of ideas when planning topics and activities. Teachers' knowledge of the way young learners understand different environmental concepts may contribute towards enhancing teachers' facilitation of learning during Environmental Education and interactions with the learners on the subject in a creative manner.

## 6. RECOMMENDATIONS

Both Environmental Education teachers and learners should be empowered with skills to promote environmental awareness among all sections of the society. They should also mobilize people's participation for preservation and conservation of environment. To reduce the amount of energy used, the school should install energy efficient lighting. Incandescent light bulbs should be replaced with energy efficient fluorescent ones. The amount of insulation should be increased to reduce heat loss. Refrigerators, air conditioners and ice-makers which are cooled with wasted flows of water, should be upgraded with air-cooled appliances for significant water savings. Copies of question papers, tests and any typed document should be printed on both sides of each sheet. A waste audit should be performed at school level. In a school setup, the

most recycled materials could be papers. Every classroom should have a recycling bin for putting all materials. In a case where the school meets the fire code requirement, such waste should be burnt. The school should not be littered with empty bottles and cans of drinks. It is imperative that the Department of Basic Education provides advocacy programmes on sustainable environmental projects in schools.

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