CHAPTER THREE
DATA COLLECTION AND ANALYSIS

3.1 DATA COLLECTION

3.1.1 Introduction

This research focussed on the impact of Environmental Education on levels of awareness and behaviour of Grade 9 learners. Data collection was executed through questionnaires and interviews. These research methods gathered data relating to the environmental knowledge, level of environmental awareness, environmental attitudes and behaviour of Grade 9 learners and educators.

Questionnaires were regarded as the best tool for collecting data from Grade 9 learners and educators. Interviews helped to clarify the contribution by the Department of Agriculture, Conservation, Environment and Land Affairs and the Gauteng Department of Education.

3.1.2 Method

A literature review was done to understand the history and to assess Environmental Education and the level of environmental awareness in South Africa and other countries. The literature consulted ranged from books to journals and periodicals.

To complement the literature study, practical research included interviews with officials from the Department of Agriculture, Conservation, Environment and Land Affairs, the Department of Provincial and Local Government, and the Gauteng Department of Education. Furthermore, data concerning the target group, namely Grade 9 educators and learners, were gathered through questionnaires. Twenty of hundreds schools in Soweto were chosen at random. These included schools with both good and bad results.
3.1.3 Interviews

Interviews with officials from the Department of Agriculture, Conservation, Environment and Land Affairs, The Department of Provincial and Local Government, and the Gauteng Department of Education were conducted by posing unstructured questions and dealing with issues and problems that cropped up during the discussions. Aspects covered were the historical background of Environmental Education, the contribution by these departments to Environmental Education, and the fostering of environmental awareness in educators and learners. Interviews confirmed and complemented the information gathered from literature on the contribution of Environmental Education in Gauteng Department of Education.

3.1.4 Questionnaires

Data were gathered through questionnaires (see Addendum A to D) completed by Grade 9 educators and learners in 20 Soweto schools. The questions put to educators enabled data to be gathered on their educational levels, the methods used in their teaching of Environmental Education, the involvement of their schools in environmental projects, the need for additional training, and the effectiveness of training on environmental issues and for fostering environmental awareness.

The questions put to learners - based on Environmental Education and Environmental Awareness - determined their perceptions of environmental problems within their immediate surroundings. They covered problems such as littering, air pollution, the use of newspaper in toilets and the dumping of waste in open spaces.

The total number of learners who completed the questionnaire amounted to 793, with the number of learners per school varying on account of differences in the total number of enrolments per school.
The target group for educators included the Grade 9 educators teaching different learning areas, from the same 20 schools the learners were chosen. Only 35 educators completed the questionnaires.

The researcher requested somebody to distribute the questionnaires on her behalf to schools. The questionnaires were administered in classes with the distributor present. Terminology and the method on how to answer the questionnaires were explained. Educators opted to answer questionnaires during their free time in the absence of the distributor of the questionnaires.

The aim of this researcher had been to study a larger sample than this, but because of the time constraints, this proved to be impossible.

Incomplete questionnaires for both learners and educators proved to be the greatest problem encountered in this study. Gathering data concerning the educators through the questionnaire was difficult since most of them refused to co-operate. Some principals made it clear that they would allow only the learners and not the educators to participate in the project as permission for the educators to complete the questionnaire had to be obtained from the Gauteng Department of Education. Some of the educators used delaying tactics (e.g., they had not had the time to complete the questionnaire and requested that the completed questionnaires be fetched the following day, when excuses were once again made). These were 'cut' from the survey.

Table 3.1 shows the names of the Soweto secondary schools investigated in this study, and the suburbs in which they are located, as well as the number of learners and educators who completed the questionnaires.
### TABLE 3.1: SOWETO SECONDARY SCHOOLS USED IN THE SAMPLE

<table>
<thead>
<tr>
<th>NAME OF SCHOOL</th>
<th>NAME OF TOWNSHIP</th>
<th>NUMBER OF LEARNERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aurora</td>
<td>Zola</td>
<td>34</td>
</tr>
<tr>
<td>Ibhongo</td>
<td>Dlamini</td>
<td>32</td>
</tr>
<tr>
<td>Jabulani Technical</td>
<td>Jabulani</td>
<td>38</td>
</tr>
<tr>
<td>Lavela</td>
<td>Zola</td>
<td>33</td>
</tr>
<tr>
<td>Letare</td>
<td>Jabulani</td>
<td>35</td>
</tr>
<tr>
<td>Mapetla-Tswana</td>
<td>Mapetla</td>
<td>32</td>
</tr>
<tr>
<td>Moletsane</td>
<td>Moletsane</td>
<td>39</td>
</tr>
<tr>
<td>Naledi</td>
<td>Naledi</td>
<td>57</td>
</tr>
<tr>
<td>Ngungunyani</td>
<td>Dlamini</td>
<td>38</td>
</tr>
<tr>
<td>Prudence</td>
<td>Tladi</td>
<td>37</td>
</tr>
<tr>
<td>Reasoma</td>
<td>Protea North</td>
<td>40</td>
</tr>
<tr>
<td>Seanamarena</td>
<td>Molapo</td>
<td>40</td>
</tr>
<tr>
<td>Sekano Ntoane</td>
<td>Senaoane</td>
<td>38</td>
</tr>
<tr>
<td>Senaoane</td>
<td>Senoane</td>
<td>43</td>
</tr>
<tr>
<td>Thabo</td>
<td>Naledi</td>
<td>40</td>
</tr>
<tr>
<td>Thaba-Jabula</td>
<td>Klipspruit</td>
<td>46</td>
</tr>
<tr>
<td>Tetelo</td>
<td>Protea North</td>
<td>41</td>
</tr>
<tr>
<td>Thomas Mofolo</td>
<td>Naledi</td>
<td>42</td>
</tr>
<tr>
<td>Tladi</td>
<td>Tladi</td>
<td>29</td>
</tr>
<tr>
<td>Vuwani</td>
<td>Chiawelo</td>
<td>59</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>793</strong></td>
</tr>
</tbody>
</table>
3.2 DATA ANALYSIS

Data collected through the questionnaires were analysed quantitatively using the Statistical Package for the Social Sciences (SPSS 11) presented by the Statistical Consultation of the Rand Afrikaans University.

Answer sheets for learners were grouped according to school. Answers to each question were compared according to school, and the percentages for the answers per school were calculated. The answer sheets for educators were not grouped according to school.

Histograms were used as a data compression technique to portray the information graphically.

3.3 DATA ANALYSIS CONCERNING EDUCATORS

The responses reflected in this section indicate the educators’ personal details, the extent of their environmental knowledge, their levels of environmental awareness, how they teach Environmental Education, and any additional training in environmental issues that they might have had.

3.3.1 The age and the level of education of the educators

The age of educators was included to determine whether the sample consists of young or old educators or both young and old educators. This can have an effect on their environmental knowledge as they were educated and trained as educators in different times.
The age of the educators ranged from 30 to 55 years, with an average age of 41.3 and a standard deviation of 6.6455 (Figure 3.1). The average of experience in teaching was 14.765 years, with a standard deviation of 7.6398 (Figure 3.2).

![Figure 3.1: Age of Educators](image1)

![Figure 3.2: Years of experience in teaching](image2)

The educators were well-qualified. Figure 3.3 shows that 53% had a teacher’s diploma, 22% had a degree, 14% an honour’s degree and about 5% a master’s degree. According to their responses, 48% of the educators received their Environmental Education from a
secondary school, 29% from a teachers’ training college, 9.7% from a university, while 12.9% had received no Environmental Education whatsoever. This is an indication that the background knowledge in Environmental Education in educators was seriously lacking. Some educators had no formal knowledge of the environment at all.

![Figure 3.3: Educators’ educational levels](image)

3.3.2 Teaching of environmental problems

Out of educators interviewed, 91% believed that the inclusion of the ‘environment’ as one of the main themes in Outcomes-based Education (OBE) was a good thing. Surprisingly, educators did not always present lessons on environmental problems. Only 17% of the educators indicated that they had dealt with environmental problems in their teaching on a regular basis (“always”), 53% had seldom dealt with environmental problems, and 19% had never dealt with environmental problems in their teaching (Figure 3.4).

Educators who dealt with environmental problems employed different teaching methods such as case studies, project work, brain-storming sessions, discussions and debates
involving environmental issues, and experiments, with most educators using the problem-solving method.

![Bar chart showing the importance attached to dealing with environmental problems in teaching.]

**Figure 3.4:** The importance attached to dealing with environmental problems in teaching

### 3.3.3 Effect of Environmental Education on learners

The expectation was that there should be a positive change in attitude towards the environment once Environmental Education lessons had been taught. According to Figure 3.5 only 17% of the educators noticed a positive change at all times ('always'), 8% noticed no positive change whatsoever ('never'), while 56% noticed a positive change only occasionally ('sometimes').

To achieve no outcomes or results after Environmental Education lessons have been taught is disappointing and underlines the futility of the exercise. Littering is a yardstick for measuring the level of environmental awareness achieved in the schools and yet 39% of the educators rated littering in their schools as extremely high (Figure 3.6). This is a
disappointing manifestation of the ineffectiveness of environmental lessons because learners do not apply the information gathered in environmental lessons.

**Figure 3.5:** A positive change in attitude after Environmental Education lessons

**Figure 3.6:** How littering is rated in the schools
3.3.4 The need for training educators in environmental issues

The educators indicated that they needed more knowledge and training on environmental issues. All of the educators (100%) indicated that they needed and would like to be trained in various environmental aspects (Figure 3.7). 42% of the educators were of the opinion that they needed training in teaching methods, 28% in environmental project management, 14% in environmental problems, and 8% in environmental laws.

Figure 3.7: Educators’ perceptions of the environmental aspects in which they need training*

3.3.5 Which body should be responsible for the training and when should training be conducted?

The training of educators could be undertaken by the Gauteng Department of Education, the Department of Environmental Affairs and Tourism, environmentally concerned non-governmental organizations, or private companies. 50% of the educators indicated that

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* E Project Management - Environmental Project Management.
they would prefer to be trained by the Department of Environmental Affairs and Tourism, while 25% preferred to be trained by the Gauteng Department of Education (Figure 3.8).

According to the Gauteng Department of Education, training should be done during the school holidays, after school and on Saturdays, so that it does not impinge on the time set aside for teaching. Figure 3.9 shows that 33% of the educators prefer to be trained during the school holidays, while 25% prefer to be trained after school hours and 25% during teaching time.

![Figure 3.8: Which body should be responsible for the training?](image)
Figure 3.9: When should the training be conducted?

3.4 DATA ANALYSIS CONCERNING LEARNERS

The following conclusions drawn are based on the Grade 9 learners’ responses to questions on the teaching of Environmental Education, environmental awareness, behaviour and attitudes towards the environment.

3.4.1 Lessons on environmental problems

The Grade 9 learners were in their last year of General Education and Training band (GET)* when the data was gathered, their curriculum being outcomes-based with “environment” as one of the “phase organisers” (main themes).

It was expected that at this stage all learners would have been taught lessons on environmental problems. In fact 90% of learners had received such lessons.

* General Education and Training band - Grade 1 to Grade 9.
The Environmental Education is very important to the entire population so that they can be able to manage the activities that led to environmental degradation. On realisation of this importance, the OBE curriculum included the 'environment' as the phase organiser (theme) in all learning areas.

According to Figure 3.10, 6% had been taught lessons on environmental problems in their pre-school years, 32% in primary school, 31% in secondary school, 24% during all phases of their education up to now, while 6% had never had any lessons on environmental issues at all. This indicates that some educators were not teaching Environmental Education at all. Some learners would therefore be unfortunate enough to leave school without any knowledge of the environment.

![Figure 3.10: When lessons on environmental problems were taught](image)

Figure 3.10: When lessons on environmental problems were taught

Different learning areas in the curriculum are expected to impart knowledge regarding the importance of protecting the environment from degradation. It was discovered that some learning areas were contributing very little or nothing towards keeping the environment clean. Figure 3.11 shows that those learning areas contributing a great deal to environmental cleanliness were life-orientation skills (26%), the human and social sciences (24%), and the natural sciences (21%).
3.4.2 Who should be responsible for keeping the environment clean?

‘Clean’ means environment which is free of pollution, and any waste. Every single person should be responsible for keeping the environment clean and for dealing with the waste generated by humans and resulting from their activities. Some learners still believe that only certain people are responsible for keeping the environment clean. This is clearly shown in Figure 3.12. It is encouraging to note that 68% of the learners are on the right track in that they are aware that everyone should be responsible for keeping the environment clean.

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* See list of abbreviations and acronyms page v.
Figure 3.12: Who should be responsible for keeping the environment clean?

Figure 3.13 shows that learners had different views on who the most serious offenders causing the pollution of rivers are: 21% of them believed that the industries were the biggest polluters, 12% believed that households were, 10% that the mines were, 8% that agricultural activities were, while 46% believed that all the activities mentioned above were causing pollution. The last-mentioned response is the correct one.

Figure 3.13: The biggest polluters of rivers
3.4.3 Application of the information obtained from lessons on the environment

The main aim of education is to make learners responsible citizens who are able to take responsible, educated and informed decisions. Lessons on the environment are taught so that the information received can be applied in everyday life.

This is not always the case with the Soweto Grade 9 learners. According to the research results, only 41% always apply the information obtained from environmental lessons; 45% apply the information only occasionally (“sometimes”); and 11% do not apply the information at all (Figure 3.14).

![Figure 3.14: Applying the information obtained from lessons on the environment](image)

3.4.4 The reasons of reading about keeping the environment clean

The most important reason for reading about keeping the environment clean is to apply the information at all times. Figure 3.15 shows that 63% of the learners do know that the reasons for reading about keeping the environment clean is to apply this information at all times and in all places, 17% apply it only at home, 7% only at school, 6% only when observed, while 4% use this information only to pass the examination.
3.4.5 Littering

Litter is any waste that has been misplaced. Littering is a problem everywhere, and almost all schools are facing this problem. It is an immediate yardstick for measuring the level of environmental behaviour amongst learners.

Only 27.7% of learners in this sample maintained that they never litter; 39% of the learners litter in open spaces; 19% litter at school, 9% litter at home, and 4% litter in town (Figure 3.16). This is a clear indication of negative environmental behaviour.
The learners in the sample lack the desire to care for their environment, to live in a clean environment and to be responsible for their waste. For instance, 41% of the learners in the sample litter to create a job for someone else, 27% think that it is other people's responsibility clean up their mess, 17% have nothing to lose, 5% regard littering as someone else’s problem, and 5% don’t care (Figure 3.17).
Most of the waste in dustbins ends up in open spaces. When dustbins are full, waste is dumped in open spaces, causing more environmental pollution. Some of the waste is burned, resulting in higher levels of air pollution.

According to Figure 3.18, if the dustbins are full, 59% of the households in the sample keep the remaining waste in plastic bags, 18% dump it, 9% burn it, 6% throw it elsewhere and 5% bury it. This may result from either ignorance or a “don’t care” attitude.

Learners would understand the impacts of dumping, burning or of burying waste if they could understand the Laws of Nature such as, amongst others, the Law of Conservation of Matter which states that …

“matter cannot be created or destroyed; it can only be changed from one form to another. Everything we think we have thrown away is still with us in one form or another; there is no ‘away’ (Miller, 1992:61).

This means that we can burn or bury waste, but it is still with us in a different form. For learners to understand these laws and the causes of air pollution, more practical lessons on Environmental Education are necessary.

Figure 3.18  What steps are taken when the dustbin is full before the municipal refuse collection time?
3.4.6 General knowledge and an awareness of the environment

The general knowledge and awareness of the environment is good in the Grade 9 learners in the sample. Most of the learners responded correctly to the statements based on the issues that affect them on a daily basis, such as those indicated in Table 3.2 namely "Acid rain is caused by over-pollution and gases produced by industries, power stations and cars; over-population causes a wide range of problems, including a lack of water, health problems, unemployment, pollution, a lack of basic services and increased crime; the use of electricity results in lower levels of air pollution than when coal is burnt, the removal of grass from the surface of the earth causes soil erosion". 
<table>
<thead>
<tr>
<th>Statement</th>
<th>True</th>
<th>False</th>
<th>Correct response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acid rain is caused by pollution and gases produced by industries, power stations and cars.</td>
<td>72.1%</td>
<td>27.9%</td>
<td>True</td>
</tr>
<tr>
<td>There are laws that have been designed to prevent and to reduce acid rain.</td>
<td>48.3%</td>
<td>53.7%</td>
<td>True</td>
</tr>
<tr>
<td>Overpopulation causes a wide range of problems, including a lack of water, health problems, unemployment, pollution, a lack of basic services and increased crime.</td>
<td>76.7%</td>
<td>23.3%</td>
<td>True</td>
</tr>
<tr>
<td>It is good to use newspaper in a flush toilet.</td>
<td>18.1%</td>
<td>81.9%</td>
<td>False</td>
</tr>
<tr>
<td>Humans live on Earth and depend on the environment.</td>
<td>82.4%</td>
<td>17.6%</td>
<td>True</td>
</tr>
<tr>
<td>The removal of grass from the surface of the earth causes soil erosion.</td>
<td>80.6%</td>
<td>19.4%</td>
<td>True</td>
</tr>
<tr>
<td>Our main source of heat is the sun.</td>
<td>92.6%</td>
<td>7.2%</td>
<td>True</td>
</tr>
<tr>
<td>The United Nations World Summit is to be held in Johannesburg from August to September 2002.</td>
<td>87.3%</td>
<td>12.7%</td>
<td>True</td>
</tr>
<tr>
<td>An outbreak of cholera could result from an absence of toilets.</td>
<td>51.0%</td>
<td>49.0%</td>
<td>True</td>
</tr>
<tr>
<td>The use of electricity results in lower levels of air pollution than occur when coal is burnt.</td>
<td>76.0%</td>
<td>22.0%</td>
<td>True</td>
</tr>
</tbody>
</table>