



## Environmental Knowledge, Attitudes and Practices of Secondary and High School Teachers in Swaziland

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### *Abstract*

*The study aimed at investigating environmental knowledge, attitudes and practices of teachers in secondary and high schools in Swaziland. A questionnaire survey was undertaken to collect the necessary data. The findings revealed that the teachers exhibited a high level of environmental knowledge and positive attitudes towards the environment. The teachers were also found to be assisting their schools to mount basic environmentally related activities such as clean-up campaigns and tree planting. This was noted as a benefit to environmental education in the country. There were, however, noted differences in the levels of knowledge and attitudes according to the teachers' gender, subject specialisation as well as level of academic achievements. The study concluded by raising a number of emerging issues from the results which include the mounting of initiatives aimed at enhancing the level of environmental awareness, knowledge and attitudes among all teachers. This was noted as a fundamental step towards facilitating environmental education in local schools.*

### *Background and Rationale of the Study*

In Swaziland, as in other developing countries, human interaction with the environment has resulted in a number of environmental problems which have been observed over the past years. The problems include destruction of natural vegetation, desertification, threats to biodiversity, destruction of ecosystems, air and water pollution, soil erosion and others (Swaziland Environmental Authority [SEA], 1997). In this context, it becomes important to know how teachers view and relate to these problems and, by extension, what they impart to students concerning environmental issues and problems, particularly as we enter the United Nations Decade of Education for Sustainable Development (DESD) whose vision is that of a world where everyone has the opportunity to benefit from quality education and learn the values, behaviour and lifestyles required for a sustainable future and for positive societal transformation (UNESCO, 2004).

Admittedly, environmental education aims at developing a citizenry conscious and motivated to develop and manage its own environment in a sustainable manner. However, these citizens can only be produced by competent teachers who are also environmentally conscious and motivated to teach environmental education at schools. It is, therefore, important to determine baseline information pertaining to the level of environmental knowledge, attitudes and practices among teachers within the Swaziland school system. The study is of importance in the premise that the implementation of the Environmental Education Strategy for Swaziland,

as recommended in the Swaziland Environmental Action Plan (SEA, 1997; 2000), cannot be effectively executed without knowledge of the level of capability or competence among teachers to offer lessons on environmental content in their various syllabi. The Strategy seeks to coordinate all environmental education and awareness activities in the country. The baseline information may also provide ideas which can inform teacher refresher programmes and in-service workshops on environmental education.

### *Scope of the Study*

The study investigates the environmental knowledge, attitudes and practices among all secondary and high school teachers in Swaziland. Environmental knowledge in the context of the study refers to functional environmental literacy as far as teachers' ability to understand and comprehend biophysical environmental (ecological) facts. The attitudes studied are with reference to teachers' attitudes towards the teaching of environmental issues. The teachers have been selected because they handle students who are on the verge of completing school to join the mainstream Swazi population. As, out-of-school citizens they will be expected to apply principles of environmental education in their day-to-day lives. Among the outcomes of the study is that the teachers are expected to demonstrate a high level of environmental knowledge and positive attitudes towards the environment owing to the environmental awareness campaigns that have targeted mainly schools. However, it is assumed that the level of knowledge among teachers will vary according to their different subject specialisations (Marsland, 1992). Expected outcomes of the study include the development of a national data base on teachers' environmental knowledge and attitudes which may be a launching pad for environmental education in local schools. The aim of the study was to investigate and establish basic environmental knowledge, attitudes and practices of secondary and high school teachers in Swaziland. The main objectives of the study are as follows:

- to establish the level of environmental knowledge among secondary and high school teachers in Swaziland;
- to investigate attitudes of secondary and high school teachers towards the environmental issues and concerns;
- to identify various environmentally related practices, activities and projects mounted or encouraged by teachers in their various schools throughout the country; and
- to provide ideas on the introduction and strengthening of environmental education in secondary and high schools in Swaziland.

### *Literature Review*

More elaborate definitions of environment exist (Botkin & Keller, 1995; Chapman & Reis, 1999; and others); however, generally the word may refer to the physical, chemical, biological and social world around us. Humans as well as flora and fauna occupy the biotic environment known as biosphere, while the abiotic environment is composed of rocks (lithosphere), water (hydrosphere) and gases (atmosphere) (Hagget, 2001). The fact that all organisms are dependent

on and exist within the environment is testimony of the importance of the environment, which must be recognised and acknowledged by human beings. The recognition and acknowledgment is facilitated by human's awareness which could be enhanced by *learning about the environment* – hence the significance of environmental education (Fielding, 1974).

The significance of the environment to living organisms cannot be overemphasised especially when noting the symbiosis between the environment and living organisms to form ecosystems which function as ecological units and are linked through a complex set of energy and material flows (Fielding, 1974; Hagget, 2001). Human beings, on their part, depend on the environment for their livelihoods. With increased population and associated needs, more pressure is exerted on the environment which jeopardises the delicate balance that controls ecosystem processes. According to Ramsey *et al.* (1973) and Green Facts (2005), this leads to the destruction of the earth and its ability to guarantee a satisfactory future environment for humans and other forms of life. Socio-economic development without the due regard to sustainable utilisation of environmental resources is invariably equivalent to self-destruction among human beings. In this context the importance of environmental education is clearly that of creating an environmentally conscious society which will aim for a sustainable utilisation of environmental resources. Environmental education is, therefore, a vehicle for combating inevitable destruction.

The introduction of environmental education in the school system has attracted tremendous regional attention in southern Africa. To this end, a planning conference on environmental education was convened in Botswana in 1992 to, among other intentions, provide background on environmental education, to identify constraints in improving environmental education in the region and draw up a plan of action to facilitate environmental education in schools in the SADC region (Cantrell & Nganunu, 1992). Papers presented in the conference provided insight into environmental education experiences in various countries in the region. Noted, however, were papers reflecting environmental education in current curricula in some countries, as well as assessment of competence among teachers to handle and effectively deliver environmental lessons in their respective syllabi (Makgothi *et al.*, 1992; Marsland, 1992). The former are of the view that current curricula in schools cover an extensive amount of environmental education and there is a lack of emphasis on special environmental education issues.

In Botswana, it was found that teachers' knowledge of the basic environment was lacking to competently identify and teach environmental topics in their syllabi (Marsland, 1992). Consequently, the teachers either failed to recognise parts of the syllabus as being significant environmental content or simply omitted sections of the syllabus with environmental content. This, however, varied from subject to subject where teachers in agriculture, science and social studies were relatively conversant with environmental content in their syllabi.

Currently, schools in Swaziland do not offer a separate environmental education discipline but environmental education is infused into the primary, secondary and tertiary curricula albeit on a smaller scale (Allen, 1992). Environmental education in Swaziland is the responsibility of the Swaziland Environmental Authority (SEA) through the Environmental Education, Public Awareness and Participation Programme (EEPAP). EEPAP collaborates with schools to implement and further the goals of environmental education and environmental awareness in

the country. To date EEPAP has collaborated extensively with schools as well as communities, government agencies and non-governmental environmental organisations to educate and sharpen environmental awareness among citizens of Swaziland in their various domains. Collectively, they have undertaken environmental activities including the commemoration of the World Environmental Day, Convention to Combat Desertification, World Climate Day and others. However, there is no evidence of investigations on the status of environmental knowledge, awareness and attitudes of teachers who are expected to carry out environmental education and other related activities in schools.

In the country's Environmental Education Strategy (SEA, 2000), environmental education is defined as a planned process enabling participants to explore the environment, investigate recognised environmental concerns and take action to address the concerns for the benefit of the environment and life. Elsewhere, environmental education is seen as education *in, about* and/or *for* the environment. *In*, implies experiences in the environment. *About*, emphasises knowledge of environmental systems and processes and *for*, has an overly critical agenda of values of education, social change and transformation through action based on exploration and involvement in resolving environmental problems (Lucas, 1980; Le Grange, 1999).

In an expanded definition Le Grange (1999) adds an important qualifier to environmental education by introducing the concept of environmental education as a process, which allows for openness and inclusivity which are omitted in the other definitions. Environmental education, as a process, leads to the consideration of qualitative dimension of environmental issues which involve things such as emotions, beliefs, aspirations, aesthetics and political issues. Collectively, these give rise to attitudes where attitude is viewed as the mental or neural state of readiness, organised through experience exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related (Manyatsi, 1991).

Attitude is very important because it prepares one for a favourable or unfavourable response. Attitudes are shaped by, among other factors, experiences which, in turn, are activated in the presence of all objects and situations (Manyatsi, 1991). Teachers, and even their students, may develop a particular attitude towards the environment which might have a bearing on the teaching/learning of environmental education in our schools (attitude shaping behaviour). However, Wain *et al.* (1998) point out that there is little predictive value for behaviour in the knowledge of environmental issues. They contend that an increase in environmental knowledge may not in itself influence behaviour. The building of knowledge, awareness and concern for the environment requires a complex mechanism to bring about consequential changes in values, attitudes and behaviours. This is the dilemma the study encountered as it attempted to ascertain attitudes based on knowledge. Nevertheless, knowledge appears to have an influence on the attitudes of teachers towards the teaching of environmental issues. The problem is to develop an appropriate measure of not only the knowledge and attitudes but also the resultant behaviour. In the methodology we were compelled to rely on an instrument that requires teachers to demonstrate their abilities to comprehend ecological facts as indicative of their level environmental knowledge, while Likert scales were used to give an indication of the teachers' attitudes towards teaching environmental issues.

## *Methodology*

### **Data collection and sampling techniques**

The study was primarily a questionnaire survey involving only qualified secondary and high school teachers, possessing either diplomas and/or degrees in their respective disciplines, as respondents. The questionnaire was complemented with key informant interviews and observation. The data collected were mainly qualitative data. It is estimated that there are around 200 secondary and high schools in Swaziland. A sample of 67 schools, approximately a third of all the schools, was selected owing to time and financial constraints. The 67 schools were selected through a systematic random sampling procedure, where, beginning with the first school, every third school was selected from an alphabetically arranged list of schools. Separate lists of schools were prepared for rural and urban schools in the country. Urban schools were classified as those located within designated boundaries of urban areas and company towns. All schools situated outside boundaries of urban places were regarded as rural.

*Questionnaire:* The questionnaire survey focussed on acquisition of data from all subject teachers in the sampled schools. The questionnaire was completed by the teachers in the presence of and assisted by a research assistant. The questionnaire was adapted from a similar study which was conducted in Botswana in the early 1990s (Marsland, 1992). The questionnaire was divided into five parts. The first part covered background information about the teachers including their gender, qualifications and major subjects studied. The second part dealt with the teachers' understanding of the concept of environmental education. The third part dealt with the teachers' knowledge of environmental issues through matching of biophysical environmental issues with their definitions. This part of the questionnaire sought to measure the cognitive domain of knowledge, i.e., environmental literacy. The fourth part dealt with the teachers' attitudes towards the teaching of environmental issues through responding to 20 Likert scale items where they had to indicate if they *strongly agree, agree, disagree or strongly disagree* with the statements. This part of the questionnaire sought to ascertain the affective aspects of attitudes which involve primarily the feelings and emotions of persons. The last part dealt with environmental practices undertaken in the various secondary and high schools. The questionnaire was piloted in ten schools to ascertain its reliability and appropriateness to yield the required data.

*Key informant interviews:* The key informants were mainly head teachers of the sampled schools. Head teachers are decision-makers in the schools especially where academic matters are concerned. Deputy head teachers were interviewed in the absence of head teachers. Key topics covered in the interviews included school policies on environmental education as well as the role and contribution of school administration towards undertaking of environmental activities. The key informant interviews were conducted after the questionnaire survey; therefore, issues arising from the questionnaire were incorporated into the interviews, in addition to the issues mentioned above.

*Observation:* Observation was guided by a matrix which facilitated collection of data pertaining to environmental activities undertaken in the schools. The activities observed include the number, timing and duration of clean-up slots in the school time-table; incidence of litter around school premises; maintenance of vegetation around school and other relevant activities.

### Data analysis techniques

The data were analysed following qualitative data reduction procedures, processes and categorisation as propounded by Huberman (1984) and Miles and Huberman (1994). The treatment of data involved the following procedures: selection and categorisation of data into various classes; thereafter the data were coded to allow for tallying of the responses and to establish frequencies of the responses presented. Frequency charts were produced to allow for the presentation of data as percentages using tables.

### *Summary of Research Findings and Discussion*

A discussion of the research findings is presented below. The presentation of research findings is structured according to the data sets collected, i.e., level of environmental knowledge, teachers' attitudes towards the teaching of environmental issues and environmental practices carried out in schools. Although this was not a comparative study the questionnaire yielded data that could be used for comparison purposes, particularly on knowledge and attitudes. Parameters for comparison were, mainly, subject specialisation and academic qualification. The ability to define environmental education was used to complement the knowledge test. The presentation of the findings and the discussion of the findings are presented together. The discussion may appear to lean more towards the behaviourist approach. However, this is incidental since the discussion is confined only to the findings without inclination towards any particular theoretical framework.

### Level of environmental knowledge among teachers

All 67 schools within the selected sample were surveyed and a total of 685 teachers were interviewed using the questionnaires. The level of environmental knowledge was estimated with the help of a set of concepts that were matched with their definitions. Teachers who were able to match the concepts and their definitions accurately (i.e., with a score of 50% and above) were deemed to be knowledgeable. Those failing to match the words with their definitions (i.e., scoring below 50%) demonstrated, a lack of environmental knowledge. The detailed classification of environmental knowledge is as follows:

|                 |           |
|-----------------|-----------|
| 70% and above - | Excellent |
| 60%–69% -       | Very good |
| 50%–59% -       | Good      |
| 40%–49% -       | Poor      |
| 39% and below-  | Very poor |

A majority of teachers (82.6%) demonstrated a high level of environmental knowledge by scoring 50% and above in the matching of key environmental concepts. About 415 teachers (60.6%) scored 70% and above while 39.4% scored below 70% which demonstrates a very high level of environmental knowledge among the teachers. There were 17.4% of teachers who scored below 50% in the matching of key concepts with their explanations (Table 1).

**Table 1.** Teachers' level of environmental knowledge

| Score Range % | No. of Teachers | % of Total Sample |
|---------------|-----------------|-------------------|
| 39 and below  | 70              | 10.2              |
| 40 – 49       | 49              | 7.2               |
| 50 – 59       | 60              | 8.7               |
| 60 – 69       | 91              | 13.3              |
| 70 and above  | 415             | 60.6              |
| Total         | 685             | 100.0             |

The level of environmental knowledge was more or less comparable between degree holders and non-degree holders. However, the proportion of degree holders having excellent scores in the knowledge was higher at 22% compared to 17.0% for non-degree holders.

Notably, the level of environmental knowledge differed according to gender and subject specialisation. Overall, male teachers exhibited a higher level of knowledge compared to their female counterparts. On the other hand, teachers of science-based subjects attained higher scores in the knowledge test than teachers of non-science subjects. Science-based subjects included mathematics, physics, chemistry, biology, geography, agriculture, home economics and human and social biology. Non-science-based disciplines included history, English literature, English language, SiSwati, French, religious studies, technical subjects, bookkeeping, commerce and others.

The data indicate that the level of environmental knowledge is quite high among secondary and high school teachers in Swaziland. This is indicative of a potential for environmental education in the schools if environmental education were to be formalised. However, the fact that there is still about 17.4% of the teachers having a poor to very poor level of environmental knowledge indicates that not all teachers are well equipped to deliver environmental education lessons and activities in a meaningful way, as well as identify and teach environmentally related topics in their subject syllabi.

Notably, the data do not show significant differences in the level of knowledge between degree and non-degree holders among the teachers. In the same vein, however, the slight variance noted in the level of environmental knowledge between degree and non-degree holders may indicate some link between environmental education knowledge and the attainment of a higher qualification.

In comparing the level of environmental knowledge according to subject specialisation, the results indicate that science teachers are more knowledgeable than non-science teachers. The fact that science teachers scored higher in the knowledge test than non-science teachers is not surprising at all since environmental education involves a number of scientific concepts and methods of learning and enquiry. Moreover, teachers of subjects such as chemistry, biology, geography and agriculture were more exposed to environmental issues and concepts in their tertiary education than teachers of other subjects. Non-science teachers were, at best, exposed to environmental issues and concepts in a superficial and incidental manner. The treatment of environmental issues within non-science disciplines may not receive adequate attention from the teachers. Non-science teachers may ignore or simply fail to identify environmental themes and topics within their disciplines.

A gender analysis of the scores attained by teachers portrays male teachers as more knowledgeable than female teachers. There were more male teachers attaining scores in the higher categories than females and yet they were educated and trained in similar schools and tertiary institutions. This disparity may be attributed to factors other than education. Culture may be assumed to contribute to this disparity in the sense that males from childhood spend more time outdoors while looking after cattle. This assumption is immediately challenged by the fact that females also interact with the environment to a large extent especially in the utilisation of basic environmental resources such as water, wood and wild foodstuffs.

#### Definition of environmental education

The ability to define environmental education was used to complement the matching of key concepts in the estimation of level of environmental knowledge of secondary and high school teachers. A large percentage of teachers (54.0%) failed to define environmental education while 43.0% had an idea and only 3.0% defined environmental education correctly (Table 2).

**Table 2.** Ability of teachers to define environmental education

| Ability to define EE  | Number of Teachers | % of Total |
|-----------------------|--------------------|------------|
| Not able to define EE | 370                | 54         |
| Have an idea of EE    | 295                | 43         |
| Able to define EE     | 20                 | 3          |
| Totals                | 685                | 100        |

It could be observed that the high level of environmental knowledge demonstrated by the teachers raises some questions and doubts, particularly on its relevance pertaining to environmental education. This observation stems from the fact that the same teachers who have demonstrated a high level of environmental knowledge failed to define environmental education which indicates a sharp difference between mere knowledge of environmental issues and understandings of environmental education. It appears that teachers know a lot about the environment but less about environmental education – implying a need to enhance the knowledge base among teachers on aspects of environmental education.

#### Teachers' attitudes towards the teaching of environmental issues

A Likert scale was used to estimate the teachers' attitudes towards the teaching of environmental issues. A list of statements referring to attitudes towards the environment was provided in the questionnaire requiring responses from the teachers either in agreement or disagreement with the statements. The responses were graded from 1 to 4 either on agreement or disagreement where a total score of all the responses was used to estimate the attitude of the teachers.

A scoring system was adopted where all scores ranging from 49 points and below was classified as indicating a negative attitude towards the teaching of environmental issues and scores ranging from 50 points and above was classified as indicating a positive attitude towards the teaching of environmental issues.

The highest number of teachers, 442 teachers (64.5%), attained average scores of 50 points and above in the attitude scale, exhibiting a positive attitude towards the teaching of environmental issues. Of these, 145 teachers (21.3%) attained scores ranging from 60 points and above demonstrating a strongly positive attitude towards the teaching of environmental issues. Approximately 243 teachers (35.5%) attained scores below 50 points thus exhibiting a negative attitude towards the teaching of environmental issues. Only 80 teachers exhibited a strongly negative attitude towards the teaching of environmental issues by attaining scores below 40 points in the attitude scale (Table 3).

**Table 3.** Teachers' attitudes towards environmental teaching issues

| Range of Scores | No. of Teachers | % of Total Sample |
|-----------------|-----------------|-------------------|
| 39 and below    | 80              | 11.6              |
| 40 – 49         | 163             | 23.8              |
| 50 – 59         | 297             | 43.4              |
| 60 and above    | 145             | 21.2              |
| Totals          | 685             | 100.0             |

The findings indicated differences in attitudes according to gender, subject specialisation and academic qualifications. Male teachers were found to have a more positive attitude towards the environment compared to female teachers. A larger proportion (37% of total sample) of male teachers was in the upper categories of the attitude scale compared to female teachers (28% of total sample). Moreover, teachers of science-based subjects also demonstrated a more positive attitude towards the teaching environmental issues compared to teachers of non-science subjects. A larger proportion (40.0% of total sample) of teachers of science-based subjects was placed at the upper categories of the attitude scale compared to teachers of non-science subjects (26.4% of total sample). Teachers who are non-degree holders fared poorly in the attitude scale compared to teachers holding degrees.

On the overall teachers demonstrated a strongly positive attitude towards the teaching of environmental issues. This augers well with environmental education particularly since the positive attitudes are complemented by high levels of environmental knowledge among the teachers. More than 60% of the teachers exhibited a positive attitude towards the teaching of environmental issues compared to 35.5% whose attitudes were found to be negative. Reasons for the positive attitudes may be attributed to national environmental campaigns which tended to concentrate more on schools than other sectors of the Swazi society.

Differences, however, were noted when comparing degree and non-degree holders among teachers. Non-degree holders exhibited less positive attitudes than degree holders. While non-degree holders were fewer than degree holders, there were more of them in lower score categories (denoting negative to strongly negative attitudes) than degree holders. The more positive attitudes demonstrated by degree holders may be due to their interaction with environmental issues in degree-offering institutions.

The comparison of attitudes according to subject specialisation is also portraying differences in attitudes towards the teaching of environmental issues between teachers of science-based

disciplines and non-science disciplines. It may be observed again that teachers of science-based disciplines interact more with environmental issues in their academic life than teachers of non-science disciplines. Therefore, the interactions with environmental issues throughout their academic lives have shaped their attitudes and led them to appreciate the environment as a significant entity supporting human life.

Once again male teachers have demonstrated a more positive attitude towards the teaching of environmental issues than female teacher, as was the case with environmental knowledge. While there were more male teachers in the sampled schools, there were more female teachers exhibiting a strongly negative attitude than male teachers. Explanations for this state of affairs may be a subject of further investigations although some people may still be persuaded to follow the cultural explanation presented above. An observation made during the survey indicates that the teaching of science-based disciplines was dominated by male teachers. It has already been noted that teachers of science-based disciplines demonstrated a more positive attitude towards the teaching of environmental issues compared to teachers of non-science subjects. If teachers of science-based disciplines are predominantly males, therefore, male teachers will have a more positive attitude than female teachers who dominate the non-science disciplines.

#### **Environmental practices and activities in secondary and high schools**

A large proportion of data on environmental practices and activities was acquired through observation, while the last section of the questionnaire also solicited data on environmental practices in the sampled schools. Quite a number of environmentally related activities and practices were identified in the schools. However, the most popular practices identified included clean-up campaigns and picking up of litter, tree planting, joining of environmental clubs and land reclamation.

*Clean-up campaigns:* Results from observation indicate that 64 schools (95.5%) had scheduled cleaning of their premises at varying intervals. There were 27 schools that had scheduled cleaning of their premises every day of the week while nine schools had cleaning of their premises twice a week. About 18 (26.9%) had scheduled cleaning only once a week and 10 schools clean their school premises occasionally. Only three schools (4.5%) had not scheduled the cleaning of their premises at all.

*Incidents of litter:* A total 20 schools (29.9%) did not have litter while 26 schools (38.8%) had low incidence of litter. However, 16 schools had a high incidence of litter. Overall, schools demonstrated a moderate to no incidence of litter.

*Maintenance of indigenous trees within school premises:* A majority of schools, 42 schools or 62.7% exhibited a good record of maintenance of natural vegetation within their premises. This was demonstrated by a deliberate effort of nurturing of indigenous trees within the school, while a few attempted to grow them in the school yards and gardens. Only 10 schools were found not maintaining indigenous vegetation within their premises.

*Planting of trees:* About 40 schools (59.7%) were found to have planted trees of varying types. The dominant tree species planted was the eucalyptus. The remaining 27 schools had a poor tree-planting record since there were no trees found within their premises.

Several environmental activities and practices carried out in the schools have been

identified. However, there was no attempt in the study to correlate school environmental activities and practices with teachers' level of environmental knowledge and attitudes towards the environment. The activities and practices were only studied and presented according to their popularity. The most popular activity mentioned and observed in most of the sampled schools is the cleaning of school premises, involving mainly collection of litter and other refuse materials. This activity, however, did not carry much environmental significance to teachers and students. Interviews with school heads revealed that this activity was a routine intended mainly to enhance the cleanliness of the school but not to carry out any environmental agenda. The environmental agenda was, however, demonstrated in the planting of vegetation in school premises, since this was encouraged and supported by environmental clubs which were found to exist in most schools, courtesy of *Yonge Naawe*, a local environmental NGO. Moreover, some schools were found to participate and take leadership in public clean-up campaigns, conservation of soil and reclamation of eroded areas. All the identified environmental activities and practices were found to be encouraged by teachers and supported by school heads through provision of ideas, time and finance.

### *Conclusion and Emerging Issues and Ideas Relevant to Environmental Education*

The overwhelming quantity and diversity of the data can be further analysed in future. From this analysis of the data, a number of emerging issues could be raised, some of which are not related to environmental education *per se*. However, four emerging issues will be raised addressing attempts to facilitate environmental education in local schools. In presenting these issues there will be deliberate effort to avoid getting entangled in the philosophical debates of formalisation of environmental education within the school system in Swaziland.

The national environmental awareness campaigns appear to have borne positive results among teachers in the sampled schools. In the main, the level of environmental knowledge was found to be high while teachers' attitudes towards the teaching of environmental issues were found to be positive. But their failure to define environmental education highlights a gap between knowledge, attitudes and environmental education. What emerges is the absence of a translation of environmental knowledge and attitudes into an ethos and practice of environmental education. The knowledge and attitudes, as observed among teachers, is a product of environmental campaigns which were focussed on environmental issues and concerns, not particularly on environmental education. The failure to define environmental education may indicate the need for a shift towards campaigns focussing more on environmental education and training, where teachers would be assisted to identify and teach topics related to the environment within their disciplines. It has been mentioned elsewhere that all disciplines have substantial environmental topics and implications but some teachers ignore, or fail to identify, them for teaching purposes.

Apparently, teachers of non-science disciplines have been found to be less knowledgeable than teachers of science-based disciplines. Moreover, these teachers exhibited less positive attitudes towards the environment compared to teachers of science-based disciplines. What emerges is the need for possible interventions focussing on enhancing the knowledge base

and attitudes of teachers of non-science disciplines. Deliberate efforts need to be mounted to improve the knowledge and attitudes of non-science teachers. Otherwise, the environmental education agenda in non-science disciplines will continue to suffer.

The lower level of environmental knowledge and less positive attitudes of non-degree holders among teachers may be a result of deficiencies of environmental content in the academic programmes of institutions offering non-degree teaching qualifications. What emerges is a need to involve non-degree holders in environmental workshops, seminars and courses. Moreover, institutions offering non-degree qualifications have to improve their environmental content and orientation in their academic programmes.

The disparity in knowledge and attitudes between the gender groups and level of experience need urgent attention. Gender-biased mechanisms of enhancing knowledge and attitudes among female teachers seem untenable in the era of gender sensitivity and equality. However, a gender approach in the transfer of environmental knowledge could be designed to involve all teachers in equitable basis. A proper gender mix in staffing may be a starting point to facilitate environmental education in schools.

A majority of the environmental activities and practices identified were mainly reactive to environmental problems. Quite a few were proactive, such as the formation of environmental clubs; yet environmental activities are expected to be more proactive, that is, attending to environmental matters before they become a source of concern. Prevention is always better than cure. Notably, few activities in the schools involved education of communities and peers. What emerges is a need for a shift from the common reactive measures of attending to environmental problems to more proactive ones. This may include training students and staff on environmental education approaches and conservation activities to be applied within the schools and neighbouring communities. The low registration of environmental projects in the national Science Fairs is a source of concern since there are numerous environmental issues and problems to design projects on. This may indicate a situation where teachers may not be well equipped to advise on such projects in preference of scientific models and others which dominate the entries into the Science Fairs.

### *Notes on the Contributors*

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