



# The Effect on Attitudes of Particular Teaching Methods Used in an Environmental Education Programme

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## *Abstract*

*Environmental education programmes should be designed to inspire learners and have enough impact to change learners' attitudes to environmental issues. These programmes can use a variety of teaching methods – some take the form of lectures, while others allow for group participation. The question arises whether the particular teaching method that is used could have an effect, or can influence, learners' attitudes. Attitudes are complex and appear to be a consequence of life experiences. Through active involvement, an attempt can be made to intensify those experiences and create a lasting impression that may alter attitudes. This investigation compared the contribution of the lecture method and collaborative learning used in an environmental education programme with the development of positive attitudes on the part of learners who participated in the programme. The findings suggest that, though both methods are effective in changing attitudes, the lecture style did allow for a greater change in attitude over the three-month period. Possible reasons for this unexpected finding are proposed.*

## *Introduction*

The goal of any environmental education programme should be to inspire and provoke thought and to spark the interest of learners in the hope of encouraging positive attitudes to the environment (Kuhar, Bettinger, Lehnhardt, Townsend & Cox, 2007:161). An attitude can be described as an enduring positive or negative feeling about some person, object or issue (Newhouse, 1990:26). The essential feature of an attitude is the readiness for response (Cushman & McPhee, 1980:2). However attitudes are complex. Cunningham, Packer, Kesek and Van Bavel (2012:486) point out that the earliest definitions of attitudes were thought to invoke readiness for behavioural action, and, as such, had physiological consequences supported by emotional states. Because activation of an attitude leads to an emotional reaction, one could understand a person's evaluative state by monitoring bodily responses. However, 'attitude' encompasses all pre-existing evaluative information a person has owing to prior learning, whether directly experienced or socially communicated. Although evaluations are constructed from multiple representations and contexts, this does not imply that attitude representations are constructed (Cunningham et al., 2012:488). This makes determining an attitude a difficult task, especially if respondents 'fake' their replies and give socially desirable responses (McLeod, 2009), which then affect validity. This needs to be kept in mind when trying to determine an attitude to something.

In an effort to do this, Newhouse (1990:28) relates attitudes to four entities: a target, an action, a temporal reference and a situational reference. Because an attitude is a positive or

negative feeling, it needs to relate to a target, and, when an attitude is the readiness for response, there will be an action that requires a reference. Attitudes generally seem to be a consequence of life experiences rather than being related to any set programme, but repeated exposure to a particular stimulus enhances an attitude to an object (Newhouse, 1990:29). Consequently, a learner's attitude to the environment will depend on experiences of a particular environmental stimulus. The media creates awareness of global issues through news broadcasts and magazine articles, but these seldom relate to local environmental issues, and, as a consequence, young people may be more concerned about issues at a global level than about those of a local nature (Yeung, 2004:101). This is a cause for concern, as it is generally at local level where individuals can make an impact. If learners can relate to, and are exposed to, local environmental issues, this could influence their attitude to those particular issues and lead to action to address these issues.

Vermunt and Vermetten (2004:361) describe how active involvement during the learning process affects emotions that may arise during the learning experience and result in a change in attitude or behaviour. A direct experience results in greater attitude-behaviour consistency than an indirect experience, thus making more information available, and, in so doing, allowing for a more positive environmental attitude. Direct experiences may cause an individual to focus on a particular behaviour and may therefore promote a positive attitude. Through the repetition of the more positive behaviour, the associated attitude may be more easily or accurately remembered. Newhouse (1990:130) describes how, at the schooling level of Grades 5 to 8, there is an increase in cognitive and factual understanding regarding attitudes to animals. Therefore, if one introduces the handling and observation of animals in an environmental education programme to illustrate the importance of conservation and biodiversity, one would expect a positive response in the learners' attitude to animals, and, therefore, a positive response to the conservation of those animals and their habitat. If this is applied in practice, learners who, for example, have the opportunity to interact with live marine animals or dried specimens may have a long-lasting memory of the experience that could affect their attitude in future situations. Keeping the preceding in mind, the question arises whether particular teaching methods could contribute to the development of a positive environmental attitude. Is one teaching method better than another for the realisation of a positive environmental attitude?

### *Lectures versus Collaborative Learning*

The lecture method appears to be the least appropriate when learning objectives relate to developing a change in feelings, emotions or attitudes, because it provides little opportunity for learners to interact with one another or with the teacher (Westwood, 2008:19). Often, lectures outlast the attention span of learners and are frequently considered boring, as learners are expected to passively receive information delivered to them in a particular way (Eggen & Kauchak, 1996:215). Additionally, learners tend to lack the necessary confidence to ask questions when in a large group (Westwood, 2008:21). There are further limitations to this method, such as the possibility that individual learners differ with regard to prior knowledge, experience and motivation, and it is not always possible to determine whether every learner has understood the content of the lecture (Westwood, 2008:21).

Alternatively, cooperative learning allows for intense personal involvement when learners participate in tasks, also encouraging open communication (Lord, 2001:32). This method promotes face-to-face interaction and group processing, and focuses the learners' attention on the content. Learners actively process content and their learning often incorporates a varied use of materials and resources such as visual media, experiments or the use of live or real material where possible. It thus allows learners to learn from their own active processing of information using a range of authentic resources (Westwood, 2008:35). As one of the objectives of environmental education programmes should be to try to foster awareness of, and compassion for, animals and their natural environments, the interactive style of cooperative learning may be considered ideal. Yet, according to Langen and Welsh (2006:600), there is limited quantitative data to support the experiential and active learning process in terms of improving change in attitudes to the environment. Consequently, there is a need for more research on closing the gap between environmental teaching methodology and attitude change. The following questions therefore guided this investigation:

1. How do lectures and collaborative learning compare with regard to their influence on attitude change?
2. What is the influence of these two methods on attitude change before and after an environmental education programme is presented?
3. What would the long-term effect (after three months) of lectures and collaborative learning be on attitude?

### *Method*

Data was collected using a questionnaire with statements that were rated on a five-point Likert scale. The initial questionnaire was piloted with a group of 54 Grade 7 learners from a school with learners of a similar socio-economic background to those of the sample population, but who were not involved in the actual study. The pilot questionnaire initially had 30 attitude statements. This allowed for the possibility of removing unsuitable statements. A correlation was run between the response score of each learner on each item, and the scores of each across the whole scale. Increased correlation indicated a stronger relationship, so only questions with a score of 0.5 were used. The results of the correlation allowed for the removal of, or changes to, questions that might have been poorly worded or where there might have been ambiguity. The statements with the lowest correlations were removed, and two were reworded, resulting in a questionnaire with ten statements. All questions were phrased in such a way that 'strongly agree' showed a favourable response and 'strongly disagree' suggested a negative response. This scale was used to measure the learners' attitudes to environmental issues that were covered by the lesson. These included water usage, food resources and the food web, biodiversity, human impact, litter and pollution, and how people can make a difference. A second pilot test was not conducted, but the questions were reviewed by an outreach coordinator who had an understanding of the learners' language capabilities.

The sample selection focused on the target population from the eThekweni municipal area in KwaZulu-Natal, and a two-stage sampling technique was used to select schools involved in an outreach programme sponsored by Natal Portland Cement (NPC) and offered by the uShaka Sea World Education Centre. First, stratified sampling was done by dividing the area into five regions: a central area, a northern area, a southern area, an inland area and a coastal area. This was followed by simple random sampling of the strata. One school was chosen from each area, with a total of 504 Grade 7 learners, who ranged from 10 to 15 years in age, participating in this study. These learners were from similar socio-economic backgrounds.

Data was collected over five days, with each school being brought in on a different day. The selected sample of learners from each school was randomly divided into two groups, Group A and Group B. Each group completed a pre-session questionnaire, which covered specific environmental topics relating to the lesson that followed. This data was used to obtain an indication of learners' prior attitudes to environmental issues. The questionnaire was completed in the presence of a uShaka Sea World Education Centre educator. Each learner responded individually, although the questions were read aloud to guide learners and to eliminate the possible influence of poor reading abilities.

Each group then attended a lesson on how people rely on the environment to survive, on the role of the marine environment and on why sustainability is important. The topic for the lesson was linked with the Natural Science Curriculum Core Knowledge Concepts of 'Life and Living'. Group A was exposed to a teacher-centred strategy using the lecture method (Method 1). A PowerPoint® presentation was given during the lecture on resources used by humans. The presentation portrayed the idea that people need these resources in order to survive, and that the choices people make impact on these resources and on the environment. The presentation also looked at steps individuals can take to help solve related problems.

Group B was exposed to a learner-centred strategy resulting in cooperative learning (Method 2). This group was subdivided into six groups of approximately ten learners per group. The learner-centred lesson was based on the same topic as that of the lecture, but the presentation of material was different. This lesson used picture cards to determine what resources are essential for people to survive. A game was played to illustrate the impact of humans on the environment, and another game highlighted positive environmental choices.

After the learners had completed their respective lessons and had been taken on a guided tour through the aquarium, they were given a post-test questionnaire containing the same questions. Three months after their visit to the uShaka Sea World Education Centre, the learners were visited at their schools and given a second post-test questionnaire. The design of the three questionnaires was intended to provide an indication of both the short- and longer-term effects of the lesson in terms of attitude change.

### *Data Analysis*

The ten statements rated on the five-point Likert scale covered the full scope of the lesson. Learners would obtain a single attitude score on the basis of the ratings they selected, with a minimum score of 10 and a maximum score of 50; 10 is viewed as being more environmentally

positive and 50 as being more environmentally negative. Microsoft Excel and Statistica were used to perform parametric statistical analysis on the data collected. The pre-test and post-test questions were entered on an Excel worksheet, were then transformed into a Statistica worksheet, and the variables were named.

The pre-test and post-test design has the potential to control threats to internal validity and increases statistical power precisely because of the inclusion of pre-test data. However, it is acknowledged that the issue of how data from pre-test and post-test groups should or should not be analysed has been questioned and discussed over a lengthy period (Dugard & Todman, 1995:181). During this research, analysis included the measurement of the raw data to determine the average, distribution and spread of the data sets. A normality test was done to determine if the frequency distribution of values from the different ranges of the variables was symmetrical, therefore indicating a normal distribution of data. A Levene's test was then done to determine the absolute deviations of values from the respective group means, therefore indicating that the variances in the different groups were equal. If this is the case in both instances, the assumption can be made that the data is normally distributed and parametric tests can be applied.

A t-test was performed to compare the differences in the means (Tuckman, 1999:300) between the pre- and post-test scores of learners, as well as the pre-test and delayed post-test scores of the learners for both groups. The tests were done collectively for all data and then individually for each participating school.

## Results

Preliminary inspection of the data using a normality test showed that the sample test scores followed a normal distribution, and the Levene's test indicated that the variances in the groups were equal (Table 1).

**Table 1.** The p-values and skewness scores for the pre-test, post-test and delayed post-test scores for normal distribution

Data group	p-value	Skewness
Pre-score	0.31321	-0.039399
Post-score	0.04174	0.175996
Delayed score	0.00000	0.867102

This implies that the learners in the two groups may be considered as being equal to one another before any tests were conducted, therefore eliminating any prior biases.

When looking at the two methods (Method 1 – Group A and Method 2 – Group B) individually, the results shown in Tables 1 and 2 were obtained.

When comparing the two methods, the data shows that there is a significant difference for the delayed post-tests, as reflected in Figure 1.

**Table 2.** Learners' attitude scores from the sample t-test for pre-test, post-test and delayed post-test scores for Group A (Method 1)

	Pre-test	Post-test		Pre-test	Delayed-test	
Group A	Mean	Mean	p	Mean	Mean	p
Total	23.78	21.43	0.00000**	23.78	22.29	0.00815*
School 1	24.50	24.94	0.622	24.50	23.25	0.365
School 2	23.58	21.50	0.062	23.58	22.04	0.204
School 3	26.33	22.85	0.000204**	26.33	21.23	0.000009**
School 4	16.62	15.51	0.2135	16.62	20.06	0.024705*
School 5	27.83	23.41	0.000001**	27.83	24.90	0.001437*

Mean: Possible attitude score range from 10–50

\*p<0.05 \*\*p<0.001

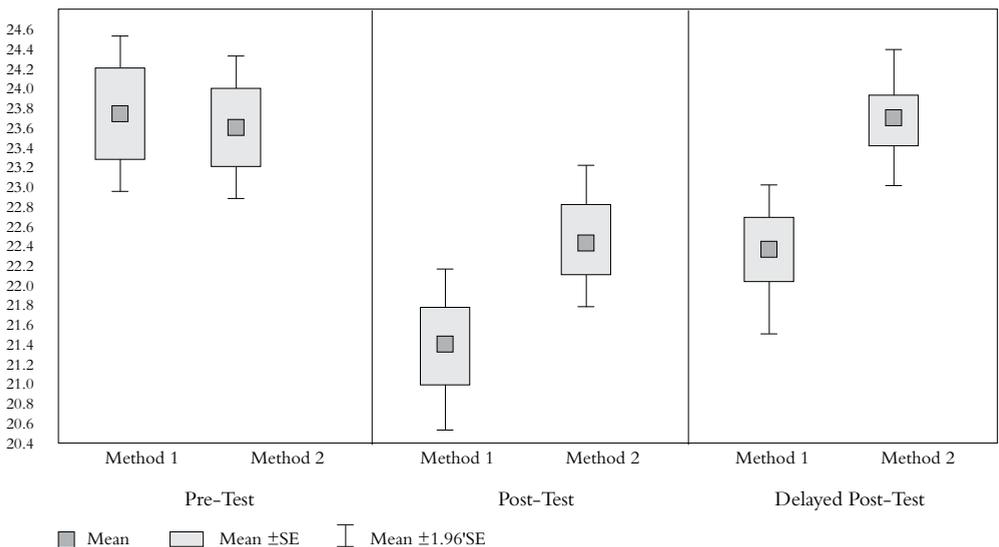
**Table 3.** Learners' attitude scores from the sample t-test for pre-test, post-test and delayed post-test scores for Group B (Method 2)

	Pre-test	Post-test		Pre-test	Delayed-test	
Group B	Mean	Mean	p	Mean	Mean	p
Total	23.71	22.51	0.00729*	23.71	23.77	0.884
School 1	25.57	25.30	0.717	25.57	25.47	0.893
School 2	24.43	22.38	0.0206*	24.43	22.64	0.0597
School 3	25.31	24.20	0.374	25.31	24.00	0.192
School 4	17.40	15.44	0.0525	17.40	22.15	0.000155**
School 5	25.31	24.75	0.5699	25.31	24.65	0.518

Mean: Possible attitude score range from 10–50

\*p<0.05 \*\*p<0.001

**Figure 1.** Box-and-whisker plots comparing attitude scores for Method 1 (lecture) with Method 2 for pre-test, post-test and delayed post-tests



## *Discussion of Results*

The results for Method 1, the lecture method, as reflected in Table 2, show that there is a significant difference ( $p = 0.00000$ ) between the pre-test and post-test score for the total Group A. This suggests that the average mean of the attitude score decreased significantly, showing that there was a positive change in attitude between the pre- and post-test for Group A. The inference made is that the lecture method (used with Group A) had a positive influence on the learners and that their attitudes were more environmentally positive after the lesson. A similar trend was noticed with Schools 3 and 5, while Schools 1 and 2 showed no significant difference between pre- and post-testing. School 1 is very much a rural school that may not be significantly affected by environmental impacts. These learners' attitudes to the environment may already be positive, as they have limited resources and are possibly more conscious of those resources that they do have. School 2 is a peri-urban school and learners in this school may also be more conscious of their environmental resources. Both of these schools have fewer learners compared with Schools 3, 4 and 5. School 4 showed no significant difference for the pre- and post-test, which may suggest a lack of empathy for the environment, as these learners live in the heart of the city.

When comparing the means of the pre-test and delayed-test scores for Method 1 (Table 2), there was an overall significant difference ( $p = 0.00815$ ) between the pre-test and delayed post-test scores, suggesting that there was still a significant change in attitude three months after the learners attended the environmental education programme, as there was a drop in the mean attitude score. As the attitude score was measured on a Likert scale, with 1 measuring a positive and 5 a negative environmental attitude, a low score or a decrease in the mean attitude score could imply that a more positive attitude score was obtained. When considering individual schools, Schools 3 and 5 showed a significant difference for the pre-test and delayed post-test scores, while Schools 1 and 2 showed no significant differences between the pre-test and delayed post-test scores. This may again be due to the fact that these two schools may not be heavily impacted upon by environmental issues such as litter and water pollution, and many of these learners live in communities that grow their own food. It is possible that these learners are more conscious of where their food comes from, resulting in a stronger environmental awareness. As an increase in the mean attitude value from the pre-test to the delayed post-test shows a significant decrease in positive environmental attitude, the attitude of the learners from School 4 was actually poorer three months after the use of Method 1.

Method 2 also showed an overall positive attitude change between the pre- and post-test, suggesting that this method may also be effective in changing attitude in the short term. However, there was no significant difference in attitude change between the pre-test and delayed post-test, suggesting that Method 2 had little effect on attitude change after three months and is therefore less effective for long-term attitude change. Table 3 shows that, when comparing the means of the pre- and post-test scores for Method 2, it was found that, overall, the total group showed a significant difference ( $p = 0.00729$ ) between the two scores, with a lower than average mean. This suggests a positive change in environmental attitudes. One may therefore deduce that, over a short-term period, participating in an interactive lesson can

increase learners' environmental awareness enough to change their environmental attitudes in a more positive way. This trend was apparent in School 2, but there was no significant difference between scores for Schools 1, 3, 4 and 5.

When looking at the long-term effects of Method 2, it appears as though this method has little impact on the long-term effects of learners' attitudes to environmental issues. In Table 3, the means for the pre-test and delayed post-test scores showed no significant difference ( $p = 0.884$ ) for the total group, and similarly for Schools 1, 2, 3 and 5 individually. School 4 did, however, show a significant difference between the pre-test and delayed post-test scores with  $p = 0.000155$ , but the average mean for School 4 was higher in the delayed-test score compared with the pre-test score, which implies that environmental attitudes had become weaker compared with the pre-test evaluation. The implication is that, before the learners participated in the cooperative lesson, they had a more positive attitude to the environment compared with the situation after they had participated in the lesson.

The results are illustrated in Figure 1 by means of box-and-whisker plots for Method 1 and Method 2 for the pre-test, post-test and delayed post-test scores. The pre-test values show no significant differences, which is to be expected, as this indicates that all learners were of the same attitude base when they started the programme. The post-test scores showed no significant difference ( $p = 0.051$ ) for the total group, which may indicate that neither method was more effective than the other in creating attitude change in the short-term period. It could be that it does not matter which method is used, as it appears as though neither is more effective in order to change attitudes in the short term. However, the results indicate that Method 1 does promote a positive change in environmental attitudes in the long term (after a three-month period), as the delayed-test scores showed a significant difference between the two methods for the total group, favouring Method 1 over Method 2 in creating more positive environmental attitudes. Figure 1 reiterates that, for the total group of learners, there is a positive change in environmental attitudes when using Method 1 from the time of taking the pre-test to completing the post-test and the delayed post-test. Method 2, by comparison, only shows a positive change in environmental attitudes from the time of taking the pre-test to completing the post-test. There is no significant difference in attitude change when comparing the pre-test and delayed post-test results for Method 2, suggesting poor long-term effects on attitude change of learners. Consequently, it can be deduced that either method could be used to influence environmental attitudes in the short-term period, but, to create a long-lasting effect on attitudes to the environment, Method 1 may be the more successful for these particular learners.

### *Conclusions and Recommendations*

The results of this study suggest that lectures could be more effective in the long term when considering the development of positive environmental attitudes. This finding is unexpected, but raises the importance of the attitudes and emotions of the learners, as well as their background and life context that have to be considered for the programme to be a success. Learning is a process of relating new information to previously learnt information (Ormrod, 1990:151), and learners understand better when concepts relate to other concepts that they

know (Taylor, 2002:154). It is therefore important that the learners are familiar with the materials used in the programme, as learners need to find personal relevance to what they learn to be able to connect with the concepts presented to them. Athman and Monroe (2001:39) describe how content is more effective if conveyed when embedded in a local context, giving learners a chance to explore what is around them. The most powerful experiences in our lives are not those designed to educate, but rather life experiences (Newhouse, 1990:27), and attitude is linked to 'situational reference from life experience' (Newhouse, 1990:28). If this is true, then it is very important to consider the learners in their daily life context. The resources that are used should be related to the setting and understanding of learners.

It is also necessary to focus on the ability to reflect on an experience that may influence the bridging between the experience and the theoretical concept being taught (Gibbs, 1988:9). In this particular study, a lack of understanding of certain marine concepts may inhibit reflection and therefore be lost or forgotten. It is therefore recommended that the visiting school be provided with some base or background information that the teacher can cover with the learners before their visit so as to enhance their experience.

It is also recommended that, prior to the learners participating in the environmental education programme, further information be obtained about the teaching methods used predominantly at a particular school to ensure that the most effective teaching method is selected for that particular group. This could enhance their experience and therefore make it more effective in creating a positive change in attitudes to the environment in the long term.

### *Notes on the Contributors*

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