# The development and evaluation of an approach to understand and influence environmental attitudes at higher education institutions in South Africa

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Thesis submitted in fulfilment of the requirements for the degree *Doctor of Philosophy in Environmental Sciences* at the North West University

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Graduation July 2019

21086443

## DECLARATION

The article model adopted by the Faculty of Natural and Agricultural Sciences in terms of the General Rules of the North-West University, has been followed as the research component of this post-graduate study.

The work presented in this thesis was conducted by the author between 2015 and 2018 and contains original data that has never been published or previously submitted for degree purposes to any university.

The author was personally involved in the conceptualisation, collection and analysis of all data as well as the writing of the thesis (e.g. all three manuscripts). Where use has been made of work by other researchers, such work is duly acknowledged in the text. The overarching format and reference style in this thesis is in accordance with the specifications provided in the Manual for Post-Graduate Students of the North-West University.

The Harvard reference style has been followed in the first and final chapter of the thesis, with Times New Roman 11 point and 2.0 spacing as prescribed by the North-West University's Guidelines for Post-Graduate Students. However, the referencing style and format of each manuscript may differ slightly and have been prepared in accordance with the unique requirements and house style of each of the respective journals the manuscripts had been submitted to.

The thesis includes three manuscripts which have been completed and submitted or intended to be submitted to the following journals:

• Manuscript 1: The South African Journal of Environmental Education

• Manuscript 2 & 3: Journal for Environmental Psychology

Both co-authors gave written permission for all three manuscripts to be submitted for degree purposes (see Appendix B).

## ACKNOWLEDGMENTS

I would like to thank all those who have contributed toward the successful completion of this work and without whom this dissertation would not have been possible.

My sincere thanks to Professor Hendri Coetzee and Professor Werner Nell, my promoters and mentors during this project. Their patience, guidance, constructive criticism, sound advice and encouragement throughout the course of the study are greatly appreciated. They challenged me to produce my best for the project and guided me to be able to complete this study successfully.

To Professor Werner Nell and Professor Suria Ellis for their assistance in the statistical analysis of the data.

To the North-West University and National Research Foundation for their financial support without which this project would not have been possible.

A special thank you to my parents, sister and friends for their support. In particular, thank you to my husband for his love and unconditional support.

To the Lord, our God and Creator, for His guidance and protection throughout this project. It is His Word that inspired me to work in Environmental Science for it is His most basic command that we shall work and protect the environment that he has entrusted to us.

**LIST OF ACRONYMS**

EAI: Environmental Attitudes Inventory Scale

EAI-24: Environmental Attitudes Inventory Scale -24 Items (Short form)

EAs: Environmental Attitudes

ERB: Environmentally Responsible Behaviour

HREC: Health Research Ethics Committee

LOC: Locus of Control

LPBS: Littering Prevention Behaviour Scale

NHREC: National Health Research Ethics Committee

NRF: National Research Foundation

NWU: North-West University

PEB: Pro-Environmental Behaviour

SPSS: Statistical Package for the Social Science

WESSA: Wildlife & Environment Society of South Africa

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## GENERAL ABSTRACT / SUMMARY

Most environmental problems are caused by the destructive behaviour of humans, which is difficult, but not impossible to change. One promising strategy to do so is to focus on people's environmental attitudes (EAs), given that attitudes are such a strong driver of behaviour. The overarching purpose of this PhD study was to develop and evaluate an approach to understand and influence EAs at higher education institutions in South Africa. Higher education institution (on a macro level), and more specifically, the attitudes of students (on a micro level), were targeted in this study. The argument for targeting this group is that students are still developing their own paradigms, are generally open to change and new experiences, are fairly representative of the broader society, and as the future leaders, are more likely to take their (hopefully positive) attitudes and pro-environmental behaviours (PEBs) towards nature into their communities and workplaces.

However, to change student's attitudes is easier said than done. Their attitudes first have to be identified, and then the development of a contextually sensitive and relevant environmental-based intervention, and finally, this intervention will have to be implemented (piloted) and evaluated (assessed) to verify that the intervention achieved the required result. These aims formed the basis for the study upon which this thesis is predicated.

EAs can be defined as the beliefs and behavioural intentions a person holds regarding environmentally related activities or issues. It is therefore rather abstract and complex. In this study it was therefore decided to concretise EAs by focusing on a very specific kind of destructive human behaviour (and the concomitant attitudes that guide it) namely littering. Littering is currently one of the biggest environmental challenges, not only in South Africa, but also in the world, because littering poses a serious threat to biodiversity and optimal functioning of ecosystem services on the one hand, and human health and well-being on the other hand.

A sequential multiple method design was used in the study, which consists of three stages (see Figure 1.2). The aim of the first stage was to explore EAs of undergraduate students at three different campuses of a South African University (n = 1283) and to examine how these EAs differ in terms of students' demographic characteristics and campus affiliations. A structured questionnaire was used to collect biographical data, and

students' EAs were assessed via the Revised New Ecological Paradigm Scale (NEP) (Dunlap *et al*., 2000) and the Environmental Attitudes Inventory (brief version) (EAI-24) (Milfont & Duckitt, 2010). Results indicated that students' EAs lean more towards *utilization*, which is an anti-environmental factor, than to the pro-environmental factor of *preservation*. Furthermore, demographic factors such as gender and ethnicity, as well as campus affiliation were significantly correlated with students' EAs, implying that students' demographic characteristics need to be empirically assessed and taken into account when tailoring environmental-based interventions aimed at instilling pro-environmental EAs. The results of the first study clearly showed that there is a definite need for an environmental-based intervention aimed at instilling pro-environmental EAs among students, and that a multi-cultural context will have to be taken in consideration.

The aim of the second stage of the study was to develop an intervention programme aimed at changing students' littering behaviour as well as their general attitudes towards nature. The programme development process consisted of three Phases: Phase 1 involved the development of a preliminary programme, drawing from existing literature on littering, programme development, and behavioural/attitudinal change; in Phase 2, the proposed intervention programme was sent to an expert panel for review; and in Phase 3, the feedback from the review panel was used to further develop and refine the programme. Prominent themes that arose from the feedback were incorporated in the finalized programme. Based on the changes that were made to the developed programme, it was concluded that the programme was ready to be implemented and evaluated.

The aim of the third stage was therefore to implement the said programme, and to evaluate the programme by measuring the students' littering behaviour with the Littering Prevention Behaviour Scale (LPBS) (Ojedokun, 2016) and their EAs with the Environmental Attitudes Inventory (EAI-24) scale (Milfont & Duckitt, 2010) before and after the intervention. The post-intervention questionnaire also included qualitative questions that were used to clarify any ambiguous findings. The results indicated that the programme was successful in changing the students' littering behaviour. However, due to a lack of psychometric reliability of the EAI-24, it is unclear whether and to what extent the students' EAs had been affected. These findings lead to the conclusion that intervention programmes that are developed by taking into account the specific

demographics of the target group and that are set out to target specific environmental behaviours are successful in changing behaviours such as littering, suggesting this approach may be useful in developing similar intervention programmes at other tertiary institutions.

**Key terms:** Environmental attitudes, littering, littering prevention behaviour intervention, pro-environmental behaviour, multi-cultural intervention program, South-Africa, university students

# CHAPTER 1: INTRODUCTION

## 1.1 Background information

Challenges in the environment are often caused by human behaviour that is to a large extent influenced by attitudes (Morren & Grinstein, 2016; Gardner & Stern, 2002; Kaiser, Wölfing & Fuhrer, 1999). Environmental attitudes (EAs) have been defined as the set of beliefs, impression, and behavioural intentions a person holds regarding environmentally related activities or issues (Schultz *et al*., 2004). EAs provide a good understanding of the set of beliefs or values that influence pro-environmental behaviour (Wiseman & Bogner, 2003). In addition, Milfont and Duckitt (2004) found that preservation and utilisation may be used to accurately measure the relationship between EAs and pro-environmental behaviour (PEB). Steg and Vleg (2009) define pro-environmental behaviour (PEB) as behaviour that harms the environment as little as possible, or even benefits the environment. Therefore, when the underlying factors that contributes to pro-environmental attitudes are known the information can be used to develop an intervention programme to change destructive environmental behaviour into PEB. An example of such a destructive behaviour is littering, which is one of the major threats to the environment and human well-being (Bator *et al*., 2011). Furthermore, it is evident that littering in South Africa is one of the greatest environmental health related-issues currently experienced by communities, especially in and around informal settlements, where awareness and service delivery are often non-existing (Armitage, Marais, & Pithey, 2001; Bator *et al*., 2011; Jancey *et al*., 2014; Lee *et al*., 2013; Pires *et al*., 2016; Sawdey *et al*., 2011; Seitz *et al*., 2012; Schultz *et al*., 2013). A number of studies have developed theoretical frameworks on how to understand, and in some cases reduce littering behaviour, however little literature is available on the effectiveness of these interventions (Steg, Bolderdijk, Keizer, & Perlaviciute, 2014; Torgler, García-Valiñas, & Macintyre, 2012). The problem is further compounded by the fact that little to no literature exists on how to address this issue in the South African context, where complex multi-cultural attitudes, norms and values can be found (Furusa, 2015). Subsequently, a need was identified by the researcher to reduce littering behaviour and to influence

South-African university students' EAs and PEBs by means of a littering behaviour prevention intervention programme.

The theoretical approach of this study is in line with the underlying assumption of the theories of reasoned action (Ajzen & Fishbein, 1980) and planned behaviour (Ajzen, 1991), that there is a relationship between behaviour and attitude. This assumption suggests that behaviour is a function of intentions and perceptions of behavioural control, and that these perceptions can either moderate the effect of intention on behaviour, or have a dominating effect on behaviour (Ajzen, 2006). A number of studies that have adopted this approach, have shown that EAs predict behavioural intentions to behave in a responsible ecological way (Kaiser, Ranney, Hartig, & Bowler, 1999; Kaiser & Scheuthle, 2003; Kaiser, Wölfing, & Fuhler, 1999; Oreg & Katz-Gerro, 2006). These theories have been used quite often to predict behaviour towards the environment originating from EAs. These rational-choice theories are the main theoretical frameworks that have been claimed to be a merging framework for different EA approaches (Kaiser, Ranney, Hartig, & Bowler, 1999). To summarize, these theories suggest that behaviour follows attitude, and that by influencing attitude with the right message delivered through the right medium, people's behaviour can be influenced. The outcome of this study would rely on self-report measures from the participants, as such, the relevance of these theories for this study is that it emphasizes the need to facilitate pro-environmental attitudes and self-reported behavioural intention from the participants not to litter.

In summary, it is recognised that there is a lack of research that evaluates the effectiveness of strategies to impact littering behaviour and PEB's in a South African setting and consequently there is a need for this gap to be addressed, which was the aim of the present study.

### 1.2 Problem statement

The North-West University (NWU) is an institution with students from a large variety of cultures and socio-economic backgrounds, which is the case for many South African universities. For instance, the NWU (2017) reported the following statistics on its website: The Vanderbijlpark campus had approximately 9725 students, of which 82% were African, 14% White, 2% Mixed race and 2% Asian.

The Potchefstroom campus had approximately 52360 students, of which 61% were African, 32% White, 6% Mixed race and 1% Asian. The Mahikeng campus consisted approximately of 12709 students of which 98% were African, 1% Mixed race, 0.3 % Asian and 0.7% were White.

An unfortunate characteristic that most SA universities share according to preliminary observations, is students' unsustainable behaviour towards the environment (Thondhlana & Hlatshwayo, 2018). To tackle the seemingly complicated task of changing students' unsustainable behaviour, it is first crucial to determine the psychological and demographic factors that are associated with students' EAs, as literature indicates that behaviour is to a large extent influenced by attitudes (Kaiser, Ranney, Hartig, & Bowler, 1999; Kaiser & Scheuthle, 2003; Kaiser, Wölfing, & Fuhler, 1999; Oreg & Katz-Gerro, 2006). However, the diversity of students with regards to factors such as language, ethnicity and socio-economic background complicates the process of understanding and changing its students' EAs towards pro-environmental behaviour. This challenge is further compounded by the fact that very little literature exists on how to facilitate and evaluate environmental behaviour change in a multi-cultural context, such as at South Africa universities (Furusa, 2015). With the growing global pressure to use natural resources in a sustainable manner, universities invest a lot of time, energy and resources on structural interventions. However, it seems as though there is not enough emphasis on producing environmentally conscious students. It is therefore necessary to do research on students' EAs to determine how to implement interventions effectively to change their EAs. In conclusion, determining the EAs of students is of interest to the higher education sector which plays an important role in both raising environmental awareness among students, and nurturing them as environmentally responsible members of the global community. The results of this study can be used to encourage student participation in on-campus sustainable activities which can be transposed into their respective workplaces after graduation.

### 1.3 Research question

The overarching research question that guided the study was: What are the EAs of students at a South African university, and what approach can be developed to positively influence pro-EAs and behaviours

among them? Three overarching aims were derived from this overall objective, which guided the individual studies as discussed under section 1.4.

## 1.4 Overarching purpose (aim) and specific objectives

The main purpose (aim) of this study was to develop and evaluate an approach to understand and influence EAs at higher education institutions in South Africa. This was done by:

- Exploring the EAs of students at the NWU (chapter 2 / article 1);
- Developing an intervention programme to influence their attitudes towards the environment (chapter 3 / article 2); and
- Implementing and evaluating the intervention programme (chapter 4 / article 3).

## 1.5 Setting of the study

The NWU is a multi-campus South African university with a footprint across two provinces as shown in Figure 1.1. The Mahikeng and Potchefstroom campuses are situated in the North West Province, while the Vanderbijlpark campus is located in Gauteng. The campuses fall in the Mahikeng, Tlokwe and Emfuleni municipal areas respectively. The Potchefstroom Campus has the largest number enrolled students of the three campuses and is situated in the historical town of Potchefstroom (North-West University, 2015). Situated on the banks of the Vaal River in a proclaimed nature reserve, the Vanderbijlpark Campus with its diverse student population also boasts a unique environmental setting, with various species of game roaming the campus grounds (North-West University, 2015). The Mahikeng Campus is located in the capital of the North West Province and has an international ambience, with students from a number of different African countries enrolled in its faculties (North-West University, 2015).

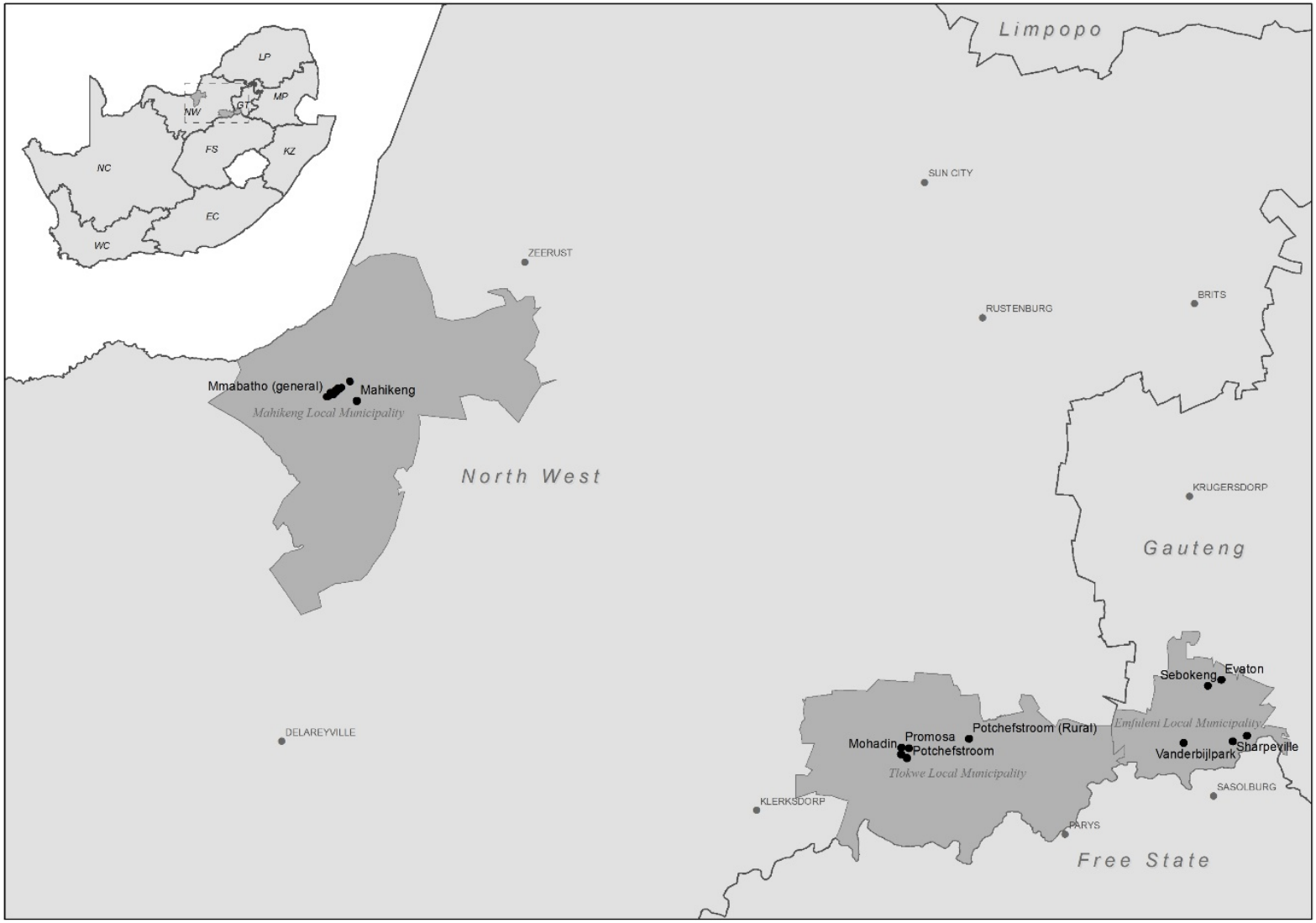


Figure 1.1: A map showing the location of the three campuses of the NWU

## 1.6 Overarching research approach and design

A sequential multiple method design (Mafuba & Gates, 2012) was used, as shown in Figure 1.2. This type of design involves the use of results obtained through one data collection method to determine the direction and implementation of subsequent stages of a research study.

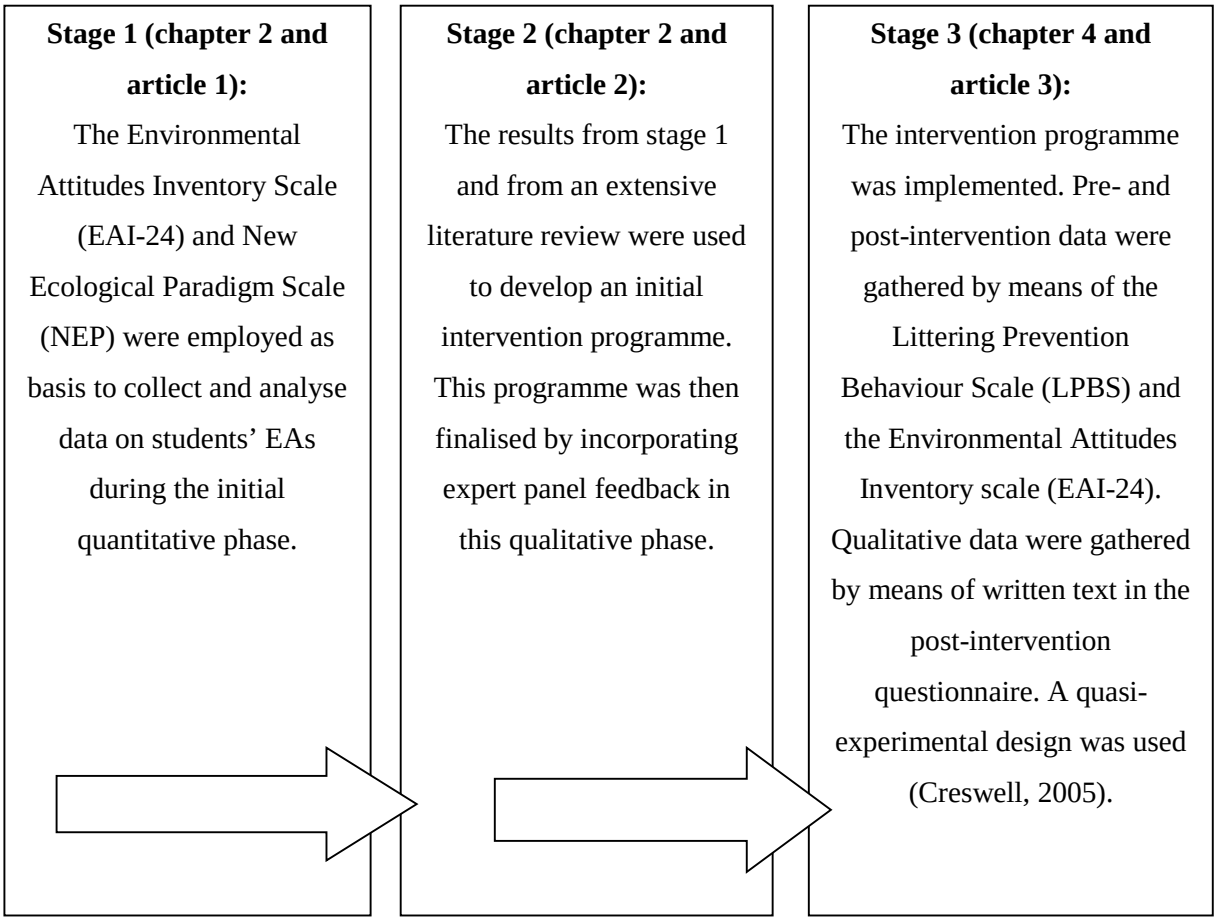


**Figure 1.2: A sequential multiple method design**

Using a web-based questionnaire, numeric quantitative data were collected in the first stage. This questionnaire was used as instrument to collect data from NWU students on all three campuses to ascertain what students' EAs are. In the second stage, an initial intervention programme was developed and in the third stage, the finalised intervention programme was implemented and evaluated. Qualitative data were gathered to analyse the student's feedback on the impact of the programme on their self-reported littering behaviour. The results were integrated during the discussion of the outcomes of the study as a whole.

## 1.7 Method

### 1.7.1 *Participants*

During the first, quantitative stage of study 1, 1283 undergraduate students from all three of the North-West University's (NWU) campuses participated. Their ages ranged from 18 to 55 years (M = 22.32, SD = 5.07). Other demographic characteristics of this sample are reflected in Table 1.1.

**Table 1.1**

**Characteristics of the participants (n = 1283)**

| | | Total (n=1283) | Potchefstroom (n=501) | Vanderbijlpark (n=168) | Mahikeng (n=470) |
|---|---|---|---|---|---|
| Item | | % | % | % | % |
| **Gender** | Male | 36.3 | 38.3 | 35.1 | 44.5 |
| | Female | 51.1 | 61.5 | 61.3 | 51.1 |
| **Ethnicity** | White Afrikaans | 30.2 | 72.3 | 9.5 | 1.1 |
| | White English | 2.5 | 4.6 | 3.6 | 0.6 |
| | African | 52.2 | 15.4 | 82.5 | 96.4 |
| | Asian/Indian | 1.2 | 2.2 | 1.2 | 0.4 |
| | Coloured | 2.6 | 4.2 | 3 | 1.5 |
| **Religion** | Christian | 87.4 | 88 | 84.5 | 87.9 |
| | Muslim | 1.2 | 1.2 | 1.2 | 1.5 |
| | Hindu | 0.2 | 0.4 | 0.6 | 0 |
| | Traditional African religion | 1.9 | 0.8 | 4.2 | 3 |
| | Spiritual but not religious | 3.4 | 3.4 | 4.8 | 3.8 |
| | Non-religious | 1.8 | 3.2 | 1.2 | 1.1 |
| **Member of environmental organisation** | Member | 6.5 | 9 | 7.1 | 5.3 |

Convenience sampling was used to select the participants because all students are equally eligible for partaking in this study as the study focusses on EAs in general. Furthermore, due to the POPI act, the researcher did not have access to data bases containing name lists of registered students which rendered

the use of random sampling very difficult, and necessitated the use of convenience sampling. However, as is evident in Table 1.1. The final sample was reasonably demographically representative of the student populations at each campus**.**

During stage 2, seven experts participated. All the participants were approached because of their extensive knowledge and or experience in the fields of environmental sciences, social sciences, psychology, or a combination of these sciences. All but one has PhD's in their respective fields, with 4 participants holding professorial positions at some of South Africa's most established universities.

During stage 3, 36 participants responded to the invitation and completed the pre-test. Over the course of the intervention, 12 participants dropped out, and therefore 24 participants completed the littering behaviour prevention programme and post-test. Ages of the participants ranged from 18 to 27 years (M = 21.46, SD = 1.91), other characteristics are set out in Table 1.2. Given the association that previous research has revealed between EAs and income bracket, connectedness to nature, and political orientation, these constructs were also included. The participant group was found to lean slightly towards the liberal end of the spectrum in terms of their political views (M = 2.37, SD = 1.25) as measured on a 5-point scale and fall into the moderate to low family income bracket (M = 43.25, SD = 27.76), as measured on a scale from 0 (Lower) to 100 (Upper). The participant group exhibited moderate to high levels of connectedness to nature (M = 64.58, SD = 26.26), as measured on a scale from 0 (Not connected) to 100 (Very connected).

Ages of the drop-out group ranged from 18 to 24 years (M = 20.92, SD = 1.73), which is not dissimilar from that of the participant group who completed the intervention. Other characteristics are set out in Table 1.2. The drop-out group was also found to lean very slightly towards political liberalism (M = 2.67, SD = 0.99), as measured on a 5-point scale, and fall into the moderate to low family income bracket (M = 50.92, SD = 24.43), as measured on a scale from 0 (Lower) to 100 (Upper). The drop-out group were found to have moderate to high levels of connectedness to nature (M = 65.50, SD = 32.47), as measured on a scale from 0 (Not connected) to 100 (Very connected).

**Table 1.2**

**Characteristics of the participants (n = 24) and drop-out group (n=12)**

| | | Participants (n=24) | Dropout group (n=12) |
|---|---|---|---|
| Item | | % | |
| Gender | Male | 16.7 | 5 |
| | Female | 83.3 | 7 |
| Ethnicity | African | 100 | 91.7 |
| | White | 0 | 8.3 |
| Religion | Christian | 87.5 | 8.3 |
| | Traditional African religion | 12.5 | 91.7 |
| Member of environmental organisation | Member | 4.2 | 8.3 |

### *1.7.2 Data gathering methods*

Stage 1 (see article 1/chapter 2): The brief form of the Environmental Attitudes Inventory (EAI-24) questionnaire (Milfont, 2007; Milfont & Duckitt, 2010) and the New Ecological Paradigm measure (NEP) Scale (Dunlap *et al*., 2000) were sent out electronically to undergraduate students registered on the NWU's Vanderbijlpark, Potchefstroom, and Mahikeng campuses.

Stage 2 (see article 2/chapter 3): This stage consisted of the development of an intervention programme by means of an extensive literature review and by taking into consideration the findings from the first stage which indicated that there were correlations found between EAs and demographic factors. Students with certain demographical characteristics showed low levels of concern for the environment and can be specifically targeted in an intervention programme. The initial intervention programme was then subjected to an expert panel for further reviews. The written feedback of the expert panel was then thematically analysed.

Stage 3: (see article 3/chapter 4): An electronic invitation to take part in the littering behaviour prevention programme (developed in stage 2) was sent out to undergraduate students registered on the NWU's Vanderbijlpark campus. The short form of the Environmental Attitudes Inventory (EAI-24) questionnaire was used for this study (Milfont, 2007) as well as the Littering Prevention Behaviour Scale (LPBS) (Ojedokun, 2016) to gather data before and after the intervention. After each session, field notes focussing on methodological and personal observations were collected in order for the researcher to gain a deeper understanding, to add context and to further explain any anomalies found in the data.

### *1.7.3 Data analysis*

Quantitative data

During stage 1 and stage 3, the inter-item reliability of the NEP, the LPBS, and the EAI-24 scales and sub-scales were assessed via Cronbach's alpha coefficients, with scales and subscales equalling or exceeding the threshold of 0.7 being regarded as exhibiting adequate inter-item reliability (Field, 2005). Once scale reliability was assessed, descriptive statistics were computed for all variables. During stage 3, paired-samples t-tests (Field, 2005) were employed to ascertain whether statistically significant differences occurred in the participants' pre-and-post-test scores on the EAI-24 and the LPBS. In all instances, the cut-off level for statistical significance was set at $p < .05$ (Field, 2005).

Qualitative data

During stage 2 the data consisted of the feedback on the programme's strengths and weaknesses from the expert panel aimed at providing indications as to how to improve the initial intervention programme. The data analysed during stage 3 consisted of the feedback of the participants in relation to the intervention programme, which served to provide additional information about the effectiveness of the programme in changing the students' littering behaviour.

During stage 2 and 3 of this study, the qualitative analysis of the data was done without any special software. All the reports were processed manually by desk research for thorough identification,

codification and categorization of data. This selected method of data analysis involved identifying, analysing and reporting themes in data (Nowell, Norris, White, & Moules, 2017). In analysing and interpreting the text, the researcher attempted to be aware the researchers own bias and of cultural biases. The researcher is an Afrikaans speaking, white female from a middle class income bracket and is a protestant Christian. The researcher also identifies strongly with environmentalism. However, the researcher attempted to empathize with the perspective of the participants and to gain a deeper understanding of the way African students think and feel about the environment. Self-reflection was aided by writing in a personal journal during the analysis process, indicating what the researcher felt to be prevalent and prominent themes emerging from the data, and doing this in conjunction with reflexive notes in relation to how the researcher's own positioning might have influenced her perspective on the data. Similar steps were followed in both stage 2 and 3 of this study, whereby the researcher read through the transcripts carefully to try and gain an overall understanding of the data. The importance of this stage was to familiarize oneself with the details, trying to get a holistic sense of the data before breaking it into parts (Agar, 1980; Schurink, Fouché & De Vos, 2011). In the data, trends or recurring patterns were identified that reflected what the participants felt most strongly about, or they placed the most emphasis on (Johnson-Hill, 1998). To create order out of the different patterns and commonalities of participant expressions, the process of initial coding was used, which is described by Babbie (2013) as the classification and categorization of singular pieces of data in an effort to establish patterns that guide and lead to theoretical comprehension of emerging themes within the collected data. The data were then further analysed and textual codes were given to specific pieces of data which corresponded with different themes. This naming of the theme is a process called "conceptualizing the data" whereby the name stands for or represents a phenomenon (Strauss & Corbin, 1990; Schurink, Fouché & De Vos, 2011). The themes were then reviewed to ensure that they form a logical pattern. Data were re-arranged or refined by splitting, combining and discarding irrelevant themes so as to remain only with themes that were consistent, meaningful and answered the research question. Finally, selective coding was done whereby all themes were scrutinized into a selected number that comprised the final presentation, reducing it to a small, manageable set of themes to write into the final narrative (Schurink, Fouché & De Vos, 2011).

## 1.8 Ethical considerations

Ethics approval was obtained for all three stages of this study, from the Health Research Ethics Committee (HREC) of the North-West University (NWU-00343-15-S1), which is registered with the National Health Research Ethics Committee (NHREC) before data collection commenced (See Appendix G).

### *1.8.1 Process of recruitment and enrolment*

*Stages 1 & 3*

The Dean of Students at each campus was contacted to obtain approval for the recruitment of NWU students as participants (permission letters can be seen in Appendix C). Participants were recruited by initially posting an invitation setting out the inclusion criteria as well as the informed consent form on eFundi (an internal electronic platform), mass mail as well as by word of mouth. The contact details of the researcher were available to participants who wished to partake in this study voluntarily. It was communicated to the students both verbally and via the consent form that:

- Participation was completely voluntary and that students who are willing to partake would be requested to provide written informed consent;
- They could withdraw from the study at any time without the necessity of providing reasons;
- They could ask for more information or explanations during any stage of the research, should anything be unclear;
- Sufficient time will be given to consult and make an informed decision before signing – a grace period of 1 week was given to make a final decision;
- There was no coercion, undue influence or inappropriate incentives to take part in the study;
- The consent form for stage 1 was in English and Setswana and for stage 3, in English.

*Stage 2*

The invitation was sent to a number of experts approached for participation in this study. All the participants for this stage were approached because of their extensive knowledge and or experience in the fields of environmental sciences, social sciences, psychology, or a combination of these sciences.

### *1.8.2 Inclusion and exclusion criteria for participants of the study*

*Stage 1*

*Inclusion criteria:*

- Registered undergraduate students of the NWU from the period 2015 to 2016 across the three campuses;
- Willingness to complete the EAI-24 and NEP questionnaires;
- Ability to communicate freely and to express themselves adequately in English.

*Exclusion criteria (Stages 1 & 3):*

- Staff, post-graduate students and third-years not registering for a post-graduate degree (these groups may have been influenced to hold a specific environmental attitude already and may not have the flexibility in their schedule to take part in the study).

*Stage 2*

*Inclusion criteria:*

- All the participants for this stage were approached because of their extensive knowledge and or experience in the fields of environmental sciences, social sciences, psychology, or a combination of these sciences.

*Stage 3*

*Inclusion criteria:*

- Registered undergraduate students of the NWU on the Vanderbijlpark campus;
- Willingness to complete the EAI-24 and LPBS questionnaires;
- Willingness to participate in the research by way of informed consent;
- Ability to communicate freely and to express themselves adequately in English; and

- Willingness to participate in environmentally friendly activities as part of the interventions.

### *1.8.3 Participants' privacy and confidentiality (Same for Stages 1, 2 & 3)*

The following measures were adopted to ensure confidentiality and privacy:

- Respect was ensured by creating a safe environment in which participants were regularly ensured that all activities and responses were voluntary and that no one would be coerced to partake in any activities or discussions that they were not comfortable with.
- Reporting of findings was anonymous. In this study identifying information of research participants were essential to the study protocol; however, anonymity of information collected from research participants were ensured by not linking individual responses with participants' identities.
- Confidentiality in stage 3, however, was only be partial due to the method of data gathering, but group rules were set out such as respecting each other's views on sensitive subject matter, to protect participants from possible judgement or embarrassment.
- Study codes on data documents (e.g., completed questionnaire) were assigned instead of recording identifying information;
- Identifiable data were encrypted;
- Face sheets containing identifiers (e.g., names and addresses) were removed from survey instruments containing data after receiving them from study participants;
- Access to identifiable information was limited;
- Data documents were stored within locked locations (password protected computers).

### *1.8.4 Process of obtaining informed consent (Same for Stages 1 & 3)*

For the participants in this study, asking questions that concern both details and social perceptions of EAs and behaviour could have impinged on their privacy and cultural sensitivity. Therefore, great care was taken by the researcher to avoid giving offence, by explaining exactly what participation in the

research entails and assuring the participants of strict confidentiality. Prior to participation in the study, each participant was given a written consent form setting out the nature of the project in which he or she has been asked to take part, so that he or she can make an informed decision (Neuman, 2000) (see Appendix A). The form, which was written in a language that is easily understandable by the participant, described the study and outlined the risks and the benefits of participation in the study. The consent form contained a section explaining that the participant may withdraw from the study at any time without providing a reason (see Appendix A). Each participant was then asked to indicate in writing his or her willingness to take part (informed consent). Before the first intervention session began, the researcher read out the procedure and purpose of the meeting to the research participants and gave them time to ask questions in order to clear up any misconceptions about the study. The researcher sought to ensure that the research participants were relaxed and ready for the intervention, and the intervention took place with a trained and experienced social scientist on standby. This encouraged the participants to share insights that were very helpful to the researcher.

### *1.8.5 Competence of researchers (Same for Stages 1, 2 & 3)*

The research was conducted by the student who was guided and supervised by two senior academic researchers who served as the promoter and co-promoter of the study – Professor Hendri Coetzee (NWU, Potchefstroom Campus) and Professor Werner Nell (NWU, Vanderbijlpark Campus).

### *1.8.6 Process of data management and storage (Same for Stages 1, 2 & 3)*

Confidentiality was ensured by way of the method used to capture data. Only the researcher had access to the data. Data were kept safe and secured under lock and key and electronic data were password protected. The risks of re-identification assessed and minimized. The researcher had no conflict of interests during the research.

### *1.8.7 Risk-benefit ratio*

*Stages 1 & 2*

The risks in this study were minimal due to the topic being more of an intellectual nature and due to the participation being completely voluntary and anonymous.

*Stage 3*

The risks were mainly due to partial loss of anonymity due to the intervention process and possibly being uncomfortable to talk and interact in a group setup, being assigned to a group where relationships with some members may be problematic or feeling that their views on the topic are different or less substantial than that of others. The indirect benefits for the participants were the opportunity to share their environmental views with other students in a group as well as to gain insight into other students' views on the topic. Students who were exposed to the interventions may experience an increase in their wellbeing as a result of exposure to the natural environment. The physical risks in this study were mitigated by ensuring the facilities adhered to the necessary health and safety standards and were appropriate and suitably resourced and by making sure there was a person with the group with medical emergency training, due to participants taking part in physical activities such as picking up and sorting litter. The study offered no direct benefits, however, it was hoped that the study would be of theoretical value and of benefit to the environment via the development and implementation of a littering intervention programme.

## 1.9 Contribution of the study

The researcher felt that this study would represent a significant contribution in the field of environmental psychology and environmental sciences, specifically as it pertains to the demographic factors that affect students EAs, and that the findings obtained from this study stimulate further research in this field. The literature review will aid in moving this field of inquiry forward by providing an integrated review of existing findings on the topic. Finally, the evaluated intervention programme could

lay the path forward for researchers to develop and further define littering intervention programmes for university students. In addition to contributing to the scientific fields of environmental sciences and environmental psychology, a further benefit of this research is its unique nature given that no such study has been conducted among the students of the NWU within this context. The NWU has only recently launched its Green Campus initiative, whereas other universities such as the University of Cape Town have been implementing similar initiatives since 2007. Not only are the PEB's that could emanate from this intervention programme, essential for preserving and conserving nature for future generations, such behaviours also have a whole array of positive impacts on the students. Given that university students will, undoubtedly, fulfil very important roles in society once they have graduated, this research aims to understand how students can be influenced and motivated effectively to become environmental ambassadors and to take the lead in environmental issues in their future workplaces and communities.

### 1.10 Chapter division of the thesis

The article method, as approved by the North-West University, was followed in the writing of this thesis. The layout of this work is outlined below.

Chapter 1: Introduction

Chapter 2: Article 1 – Environmental Attitudes among Undergraduate Students in South Africa

Chapter 3: Article 2 – The development of an intervention programme to promote pro-environmental attitudes to reduce littering behaviour at South African universities

Chapter 4: Article 3 – The evaluation of an intervention programme to promote pro-environmental attitudes to reduce littering behaviour at South African universities

Chapter 5: Conclusion, limitations and recommendations

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**CHAPTER 2**

**ARTICLE 1**

# ENVIRONMENTAL ATTITUDES AMONG UNDERGRADUATE STUDENTS AT A SOUTH AFRICAN UNIVERSITY


## *ABSTRACT*

Understanding environmental attitudes (EAs) has been viewed as an important prerequisite to changing environmental behaviour and is a particularly salient topic in the context of higher educational institutions, which play an important role in shaping students' worldviews. As such, the main aim of the study was to explore EAs of undergraduate students at three different campuses of a South African University (n = 1283) and to examine how these EAs differ in terms of students' demographic characteristics and campus affiliations. A structured questionnaire was used to collect biographical data, and students' EAs were assessed via the Revised New Ecological Paradigm Scale (NEP) and the Environmental Attitudes Inventory (Short form) (EAI-24). Results indicated that students' EAs lean more towards *utilization,* which is an anti-environmental factor, than to the pro-environmental factor of *preservation*. Furthermore, demographic factors such as gender and ethnicity, as well as campus affiliation were significantly correlated with students' EAs, implying that students' demographic characteristics need to be empirically assessed and taken into account when tailoring environmental-based interventions aimed at instilling pro-environmental EAs. However, the results also raise concerns about the cross-cultural validity of current EA-related measuring instruments and suggest that a need exists to develop culturally sensitive EA measures in a South African context.



**Key terms**: Environmental attitudes, environmental concern, environmental education, undergraduate students; South Africa

## *2.1 INTRODUCTION*

Environmental attitudes (EAs) are fundamentally important, widely discussed, frequently measured, and poorly understood (Heberlein, 1991). This is even more so at institutions of higher learning, where the success of environmental protection and sustainability programmes often depend on the EAs of its students (Zilahy & Huisingh, 2009). Investigating students' EAs is important because students are highly susceptible to new attitudes and worldviews and will carry these new EAs with them into their prospective communities and workplaces (Lozano, Lukman, Lozano, Huisingh & Lambrechts, 2013). Universities have recognised this, and many now try to use this opportunity to instil positive attitudes towards the natural environment as attributes among their students (Waas, Verbruggen & Wright, 2010). It has therefore become necessary to understand EAs at higher education institutions, mainly because universities are in a good position to facilitate change in their students' attitudes towards the natural environment through education, innovation and research (Zilahy & Huisingh, 2009).

### 2.1.1 Definition of environmental attitudes

Traditionally, EAs has been viewed as a uni-dimensional construct ranging from being *unconcerned* to *concerned* about the environment (Dunlap, Van Liere, Mertig, & Jones, 2000; Milfont, 2007). As is also the case in this study, the term "environmental concern" is often used in empirical literature as a synonym for "environmental attitudes" and can refer to either the environment in general or to some particular aspects of environment (Dunlap & Jones, 2002). Furthermore, EAs have been defined as the set of beliefs, impressions, and behavioural intentions a person holds regarding environmentally related activities or issues (Schultz, Shriver, Tabanico & Khazian, 2004), and thus provide a good understanding of the set of beliefs or values that influence pro-environmental behaviour (Wiseman & Bogner, 2003).

### 2.1.2 EAs in international and South African studies

Many studies have been conducted to establish predictive factors of students' EAs to be able to increase their level of environmental concern (Franzen & Vogl, 2013; Teksoz, Sahin, & Tekkaya-Oztekin, 2012; Quimby, Seyala & Wolfson, 2007). These studies all confirmed the important role played by socio-demographic characteristics in predicting students' EAs (Franzen & Vogl, 2013; Milfont, 2007; Teksoz, Sahin, & Tekkaya-Oztekin, 2012; Quimby, Seyala & Wolfson, 2007).

*Age:* Most international studies in the last 30 years have shown a consistent relationship between environmental concern and age, especially among more-educated students (Klineberg, McKeever & Rothenbach, 1998; Aminrad, Zakaria, & Hadi, 2011). By contrast, South African research tends to indicate either a positive correlation (*e.g.* Milfont, 2007; Reynolds, 1992) or the absence of any such correlation (Craffert & Willers, 1994). It would therefore seem as though there is no clear or consistent relationship between age and EAs among South African students. This points to the possible influence of complex factors specific to the South African context that need to be further explored.

*Gender:* Several studies investigating gender differences in EAs among students have found that females are more sensitive towards environmental issues than males and are also more inclined to be in favour of conservation and environmentally favourable behaviour (Duman-Yuksel & Ozkazanc 2015; Fernández-Manzanal, Rodríguez-Barreiro, & Carrasquer, 2007; Zelezny *et al*., 2000). However, in contrast to international findings, gender differences with regards to environmental issues in South Africa are not as clear-cut. Although some studies such as those by Rousseau and Venter (2001) and Milfont (2007) found gender and age to play a significant role in determining EAs in South Africa, other studies found no such association (Reynolds, 1992; Craffert & Willers, 1994; Willers, 1996; Struwig, 2010). In contrast with international findings, gender differences in EAs were found to be complex and influenced by ethnicity in a South African study by Adejoke, Mji and Mukhola (2014). As such, additional research is called for to clarify this association.

*Ethnicity:* A large number of studies, conducted in diverse settings, concluded that environmental beliefs and behaviours vary significantly across different ethnic groups (Schultz, 2002; Milfont &

Fischer, 2015), suggesting that ethnic differences in EAs constitute a global phenomenon and should be considered an important predictive variable. Similar findings were made in a South African context, where ethnicity was found to be a major predictor of EAs. More specifically, African participants were found to be the least concerned with the environment, followed by coloured, Indian and white participants (Craffert & Willers, 1994; Struwig, 2010).

*Religion and religiosity:* Religious individuals have been found to be less environmentally concerned than less religious people, with this trend being even more pronounced for persons from a Judeo-Christian tradition who espouse literal beliefs in the Bible (Milfont 2007; Schultz, Zelezny & Dalrymple, 2000). This can likely be explained by the Christian religious belief in human dominance over nature, emphasizing anthropocentric views of the environment (White, 1967). In addition, Schultz *et al*. (2000), who investigated EAs among university students from 14 countries found that, across countries, participants who expressed more literal beliefs in the Bible scored significantly lower on the NEP, lower on ecocentric environmental concern, and higher on anthropocentric environmental concern. This indicates that religion, and specifically traditional Christian beliefs, are significant indicators of anti-EAs or lower environmental concern as expressed by beliefs of human dominance over nature. However, very little research has been conducted on this topic in South Africa. In one of the few studies that have been done, no significant associations were found between religiosity and EAs (Struwig, 2010).

*Education:* Findings pertaining to the relationship between EAs and education have been somewhat inconsistent. Whereas some studies report strong positive correlations between pro-EAs and level of education (Jones & Dunlap, 1992), other studies found education to be weakly related to values typically associated with pro-EAs, such as benevolence and universalism (Schwartz, 2005). Yet other studies have shown that pro-EAs are higher among educated people than less educated people, (Fransson & Gärling, 1999; Theodori & Luloff, 2002). In contrast to international findings, South African research has consistently indicated a positive relationship between education and pro-EAs (Reynolds, 1992; Craffert & Willers, 1994; Willers, 1996). However, the assumption that more educated South Africans would have more pro-EAs was challenged by Todes, Oelofse, Houghton, and Sowman, (2003) who found that educated people avoided responsibility for the environment

because of the belief that human ingenuity and new technology would be able to fix current and future environmental challenges. As such, it would seem that while education could play a significant role in raising awareness about environmental challenges, it is important to distinguish between "education" and "environmental knowledge" - being highly educated need not necessarily imply a high level of environmental knowledge (Carlson, 2006).

*Income:* Fransson and Garling (1999) discuss a “social-class” hypothesis, stating that pro-environmental EAs are positively related to both education and income. This hypothesis is based on Maslow’s (1954) hierarchy of needs theory, implying in this context, that as the basic needs of middle- and upper-class members of a society have been satisfied, they are able to consider higher-order needs such as conservation of natural resources for future use. In accordance with aforementioned research, Craffert and Willers (1994) found that monthly income correlated positively with the tendency to regard environmental destruction as a priority in a South African context. This leads to the conclusion that as people acquire more financial stability, they are more inclined towards being aware of environmental issues as well as being more inclined towards pro-environmental behaviour. A possible reason for this could be that people from higher income-bracket families have more resources to spend on education and in turn become more inclined to be aware of environmental issues (Meyer, 2015).

*Political orientation:* Several studies indicated that pro-environmental EAs are positively related to liberal political ideology (Fransson & Gärling, 1999; Theodori & Luloff, 2002 Milfont; 2007). The relationship between EAs and this demographic variable has however not yet been significantly investigated in a South African context.

In light of the relatively limited and sometimes contradictory research findings on the topic, a need exists for additional investigation in relation to the extent to which demographic variables such as age, gender, ethnicity, religion, education, and income influence South Africans’ EAs, particularly in the higher education sector. Such investigation would enable researchers and university management to be able to more efficiently predict potential causes and correlates of unsustainable environmentally-oriented behaviour and predict enablers of pro-environmental behaviour. Knowledge gained from studies such as this one can be used to design evidence-based and behaviour-specific

intervention strategies and education programmes tailored to target specific groups (Mtutu & Thondhlana, 2016).

### 2.1.3 Purpose of this study

The purpose of this study was to determine the EAs among a diverse sample of South African students by using the three (geographically and culturally diverse) campuses (situated in Potchefstroom, Mahikeng and Vanderbijlpark) of South Africa's North-West University (NWU) as a case study. Although the NWU has joined the global higher education movement on making pro-EAs part of its students' attributes through the Green Campus initiative, the current EAs of student's at most South African universities, including the NWU, is unknown. Consequently, time, energy and resources devoted to the implementation of interventions will be wasted or sub-optimally expended if the necessary research is not conducted to specifically determine problematic attitudes and behaviours that would need to be targeted by such interventions.

In light of the above, the following research questions were formulated to guide the study:

1. What are NWU undergraduate students' attitudes towards the environment?
2. How, if at all, do their EAs differ according to demographic factors such as age, gender, involvement in an environmental organisation, ethnicity, religious affiliation, religiosity, political orientation, and family income bracket?

## *2.2 MATERIALS AND METHODS*

### 2.2.1 Participants

A cross-sectional survey study was conducted in 2016 with a sample of 1283 undergraduate students drawn from all three of the North-West University's (NWU) campuses. Ages of the participants ranged from 18 to 55 years (M = 22.32, *SD* = 5.07). Given the association that previous research has revealed between EAs and religiosity and political orientation, these were also assessed. The participant group was found to have moderate to high levels of religiosity (M = 3.7, *SD* = 1.17, as measured on a 5-point scale), and to be slightly more politically liberal than conservative (M = 3.7,

*SD* = 1.47, (1= extremely liberal and 5 = extremely conservative). Other characteristics of the participant group are set out in Table 2.1.

**Table 2.1.**

**Characteristics of the participants (n = 1283)**

| | | Total | Potchefstroom | Vanderbijlpark | Mahikeng |
|---|---|---|---|---|---|
| | | (n=1283) | (n=501) | (n=168) | (n=470) |
| Item | | % | % | % | % |
| **Gender** | Male | 36.3 | 38.3 | 35.1 | 44.5 |
| | Female | 51.1 | 61.5 | 61.3 | 51.1 |
| **Ethnicity** | White Afrikaans | 30.2 | 72.3 | 9.5 | 1.1 |
| | White English | 2.5 | 4.6 | 3.6 | 0.6 |
| | African | 52.2 | 15.4 | 82.5 | 96.4 |
| | Asian/Indian | 1.2 | 2.2 | 1.2 | 0.4 |
| | Coloured | 2.6 | 4.2 | 3 | 1.5 |
| **Religion** | Christian | 87.4 | 88 | 84.5 | 87.9 |
| | Muslim | 1.2 | 1.2 | 1.2 | 1.5 |
| | Hindu | 0.2 | 0.4 | 0.6 | 0 |
| | Traditional African religion | 1.9 | 0.8 | 4.2 | 3 |
| | Spiritual but not religious | 3.4 | 3.4 | 4.8 | 3.8 |
| | Non-religious | 1.8 | 3.2 | 1.2 | 1.1 |
| **Member of environmental organisation** | Member | 6.5 | 9 | 7.1 | 5.3 |

### 2.2.2 Procedure and ethical considerations

Permission to conduct the research was obtained from the NWU ethics committee. An invitation to take part in the study was sent to students by means of a variety of communication platforms. All participants who agreed to take part in the study were asked to sign a written consent form which explained to potential participants that their participation would be, entirely voluntary,

confidential and could be terminated at any time without penalty. The online questionnaire was translated into Setswana using a bilingual committee approach as proposed by Van de Vijver and Leung (1997). Responses were captured electronically by direct loading into a website database as a password restricted file, and subsequently extracted into SPSS for analysis.

### 2.2.3 Instruments

Data were collected by means of a web-based questionnaire which consisted of three sections. Section A included a series of single-item measures aimed at assessing demographic information. Section B consisted of the revised New Ecological Paradigm (NEP) Scale (Dunlap *et al*., 2000), which is the most widely used measure of EAs (Dunlap & Jones, 2003). The scale contains 15 balanced items, assessed on a 5-point Likert scale, that are designed to tap each of the five hypothesized aspects of an ecological worldview: the reality of limits to growth, anti-anthropocentrism, rejection of exemptionalism, the fragility of nature's balance, and the possibility of an ecocrisis. An example item includes: '*We are approaching the limit of the number of people the earth can support*'. In the present study, a Cronbach's alpha coefficient of 0.64 was obtained for this scale, which suggests that there might be some concerns in relation to inter-item reliability. A possible reason for this could be the complexity of language used in the NEP, and the fact that some of the concepts do not necessarily translate well in other languages. As a result of this, the findings emanating from this scale should be interpreted with caution. Section C consisted of the short form of the Environmental Attitudes Inventory (EAI-24), a culture-general and fully-balanced assessment-tool developed to measure the multidimensional and hierarchical structure of EAs (Milfont, Duckitt & Wagner, 2010b). This inventory captures both the vertical and horizontal structure of EAs by measuring twelve specific facets, or first-order factors that define the two-dimensional higher order structure of EAs (i.e., Preservation and Utilization). The scale consists of 24 items, with two positively worded and two negatively worded items for each of the 12 subscales, with all item's beings assessed on a 5-point Likert scale. An example item includes: '*I think spending time in nature is boring*'. In the present study, Cronbach alpha coefficients for the subscales of the EAI-24 varied

widely (see Table 2.2), with some scales showing acceptable reliability (subscales 3, 5, 9 and 12), others marginal reliability (scales 1, 10, and 11), and yet others very poor reliability (scales 2, 4, and 8). Results from the latter scales should therefore be viewed in an extremely tentative light, and future research is needed to verify the findings reported here. Possible reasons for these findings are discussed later in the article.

### 2.2.4 Data analysis

The inter-item reliability of the NEP and EAI-24 scales and sub-scales were assessed via Cronbach's alpha coefficients, with scales and subscales equalling or exceeding the threshold of 0.7 being regarded as exhibiting adequate inter-item reliability (Field, 2013). Once scale reliability was assessed, descriptive statistics were computed for all variables. Bivariate Pearson's correlations and independent t-tests (Field, 2013) were employed to examine relationships between variables among various demographic subgroups based on participants' age, gender, religiosity, ethnicity, political orientation and family income bracket. Correlations are used to indicate direction and strength of relationships between variables while t-tests are used to find if there are significant differences in means. To assess differences in EAs between multiple groups (*e.g.* based on religious affiliation) Analysis of Variance tests (ANOVA) were carried out. In all instances, the cut-off level for statistical significance was set at $p < .05$ (Field, 2013).

## *2.3 RESULTS*

### 2.3.1 EAs of students as measured by the EAI-24 and NEP scales

Analysis of the 12 subscales of the EAI-24 (as shown in Table 2.2) reveal that participants' levels of *enjoyment of nature* (M = 2.94, *SD* = 1.61), *environmental movement activism* (M = 3.64, *SD* = 1.99) and *personal conservation behaviour* (M = 3.65, *SD* = 1.68) were relatively low. These subscales are associated with the pro-environmental higher order factor *preservation* of the EAI-24 scale, and as such, imply that students' EAs lean more towards apathetic or anti-EAs. Furthermore, participants also did not regard the environment as being fragile or under any imminent threat as reflected on their

relatively low scores on *environmental threat* (M = 3.31, *SD* = 1.69) and *ecocentric concern* (M = 3.95, *SD* = 1.99). By contrast, scores on sub-scales measuring conservation motivated by *anthropocentric concern* (M = 7.80, *SD* = 2.16) and *human utilization of nature* (M = 7.88, *SD* = 1.91) were high. These subscales are associated with the anti-environmental higher order factor *utilization*. As such, participants' concern for nature was not only based on the extent to which it was viewed as serving human needs, but consumption of natural resources for human benefit was also strongly endorsed. However, in contrast to the overall picture painted by the results derived from the EAI scores, the student group's mean score on the NEP, which measures ecological worldviews, was moderately high (M = 3.54, *SD* = 0.48) indicating that the participants' attitudes were mildly pro-environmental.

### 2.3.2 EAI-24 subscale correlations

The 12 subscales of the EAI-24 were correlated with each other and the results are shown in Table 2.2. In agreement with research done by Milfont et al. (2010b) subscales that were associated with the pro-environmental, higher order factor, *preservation*, had moderately strong correlations with each other namely; *enjoyment of nature, environmental movement activism, personal conservation behaviour, environmental threat and ecocentric concern*. However, as expected, these subscales showed a moderately strong negative correlation with the anti-environmental factor, human utilization of nature which is associated with the anti-environmental higher order factor *utilization*.

**Table 2.2**

**Descriptive statistics, reliabilities, and inter-scale correlations for the NEP and the 12 scales of the EAI-24**

| Item | N | Mean | SD | α | NEP | EAI1 | EAI 2 | EAI 3 | EAI 4 | EAI 5 | EAI 6 | EAI 7 | EAI 8 | EAI 9 | EAI 10 | EAI 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NEP | 959 | 3.54 | 0.48 | 0.64 | | | | | | | | | | | | |
| EAI1:Enjoyment of nature | 959 | 2.94 | 1.61 | 0.67 | -0.19** | | | | | | | | | | | |
| EAI 2: Support for interventionist policies | 899 | 4.12 | 1.85 | 0.33 | -0.15** | 0.24** | | | | | | | | | | |
| EAI 3: Environmental movement activism | 898 | 3.65 | 1.99 | 0.80 | -0.08* | 0.47** | 0.22** | | | | | | | | | |
| EAI 4: Conservation motivated by anthropocentric concern | 899 | 7.79 | 2.12 | 0.52 | 0.29** | -0.09** | -0.04 | 0.01 | | | | | | | | |
| EAI 5: Confidence in science and technology | 899 | 5.59 | 2.26 | 0.82 | 0.19** | 0.08* | 0.03 | 0.08* | 0.08* | | | | | | | |
| EAI 6: Environmental threat | 899 | 3.31 | 1.69 | 0.62 | -0.39** | 0.29** | 0.22** | 0.25** | -0.24** | -0.04 | | | | | | |
| EAI 7: Altering nature | 898 | 6.12 | 2.32 | 0.60 | 0.14** | -0.19** | -0.07* | -0.16** | 0.07 | 0.05 | -0.10** | | | | | |
| EAI 8: Personal conservation behaviour | 896 | 3.65 | 1.65 | 0.54 | -0.17** | 0.44** | 0.21** | 0.41** | -0.16** | 0.07* | 0.30** | -0.14** | | | | |
| EAI 9 Human dominance over nature | 896 | 6.37 | 2.73 | 0.87 | 0.34** | -0.03 | -0.00 | -0.06 | 0.10** | 0.11** | -0.10** | 0.08* | -0.07* | | | |
| EAI 10: Human utilization of nature | 897 | 7.88 | 1.91 | 0.68 | 0.26** | -024** | -0.12** | -0.27** | 0.18** | 0.04 | -0.25** | 0.20** | -0.33** | 0.16** | | |
| EAI 11: Ecocentric concern | 896 | 3.95 | 1.99 | 0.67 | -0.23** | 0.22** | 0.10** | 0.26** | -0.16** | -0.01 | 0.22** | -0.14** | 0.33** | -0.15** | -0.24** | |
| EAI 12: Support for population growth policies | 898 | 6.05 | 2.74 | 0.79 | -0.19** | 0.06 | 0.10** | 0.06 | -0.11** | 0.03 | 0.14** | -0.14** | 0.07* | -0.08* | -0.11** | 0.09** |

Note: Mean score for the NEP ranges from 1 to 5; mean scores for all subscales of the EAI range from 2 to 10.

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed)

### 2.3.3 Correlations between NEP and EAI-24 subscales

An unexpected finding was that the participant group's mean NEP score correlated positively with the EAI-24 subscales associated with *anti*-EAs*: anthropocentric concern*, ($r$ = 0.285, N = 898, $p$< 0.005, two tailed; $R^2$ = 8.1%), *dominance over nature*, ($r$ = 0.335, N = 895, $p$<0.005, two tailed; $R^2$ = 11.2%) and *utilization of nature*, *(*$r$ = 0.256, N = 896, $p$< 0.005, two tailed; $R^2$ = 6.5%). This indicates that although students have moderately pro-EAs according to the NEP scale, these attitudes positively correlate with anti-EAs as measured by the subscales of the EAI-24 and adds to tendency of students to have EAs leaning more towards the second order anti-environmental factor of the EAI-24, *utilization*. Another contra-intuitive finding was that the less students were concerned with *environmental threat* the more pro-environmental they scored on the NEP scale. Rather than reflecting a substantive association between variables, given the low inter-item reliability that has been found on some of the subscales used, it seems probable that factors such as a socially desirable response bias (Félonneau & Becker, 2008), lack of cross-cultural validity of some of the items in these measures, and complexity of language of certain questions might have affected student's responses. Thus, even though these scales are among the most widely used instruments to assess EAs, as will be elaborated on in a later section, the present results suggest that these findings should be treated with substantial caution and that a need exists to examine the psychometric properties of these scales in a South African context.

### 2.3.4 Relationships between demographic variables, the NEP scale, and EAI-24 subscales

To investigate the socio-demographic correlates of students' EAs, their scores on the EAI and NEP were correlated with their age, religiosity, political orientation, economic status, and membership of an environmental organisation. Results indicated that none of these demographic factors exhibited statistically significant correlations with the NEP.

### 2.3.5 Students' EAs according to Campus affiliation

In order to investigate how EAs differed on the different campuses, undergraduate students' mean scores on the NEP and EAI-24 were compared based on their campus affiliation. Statistically significant mean differences were found between the NWU, Mahikeng campus, Vanderbijlpark Campus and the Potchefstroom campus on the EAI-24 subscales, environmental movement activism (F 2,893 = 33.81, p< 0.0005, partial η2 = .07) and conservation motivated by anthropocentric concern (F 2,894 = 41.51, p< 0.0005, partial η2 = .09). For both subscales Potchefstroom scored the highest (M = 4.16, SD = 2.07) (M = 8.47, SD = 1.80), the Vaal Triangle second highest (M = 3.66, SD = 2.18) (M = 7.32, SD = 2.25) and Mahikeng Campus the lowest (M = 3.01, SD = 161) (M = 7.18, SD = 2.28) respectively. As such, significant inter-campus differences existed in terms of students' willingness to actively support or get involved in structured environmental movement activism, and in the extent to which their support for conservation policies and protection of the environment are motivated by a selfish concern for human welfare vs. selfless concern for nature and the environment (anthropocentric concern).

### 2.3.6 Demographic variables and the EAI-24 subscales

Independent t-tests were conducted to determine whether significant group mean differences on the EAI scores occurred. A statistically significant, but relatively small (mean difference = -0.55, 95% CI: -0.91 to -0.18; *d* = 0.20), mean difference was found between males and females (*t* = -2.949, df = 876, *p*< 0.005, two tailed), with females (M= 6.61, *SD* = 2.67) scoring higher than males (M = 6.06, *SD* = 2.75) on *human dominance over nature*. The human dominance over nature subscale taps into the belief that nature exists primarily for human use, which is traditionally associated with male attributes versus beliefs that humans and nature has the same rights (Milfont *et al*., 2010a).

Females also scored significantly lower (M= 3.74, *SD* = 1.91) on *ecocentric concern* (a nostalgic concern and sense of emotional loss over environmental damage and loss) than males (M = 4.20, *SD* = 2.05), (*t* = 3.371, df = 876, *p*< 0.005, two tailed). The magnitude of the differences in the means (mean difference = 0.45, 95% CI: 0.19 to 0.72) was small (*d* = 0.22).

Statistically significant differences in scores of some of the EAI subscales were found between African and White Afrikaans speaking students. African students (M = 3.11, *SD* = 1.73); (M = 7.24, *SD* = 2.28) scored statistically significantly lower on *environmental movement activism* (*t* = -9.418, *df* = 606.794, *p*< 0.005, two tailed, equality of variance not assumed) and *conservation motivated by anthropocentric concern* (*t* = -9.643, *df* = 807.663, *p*< 0.005, two tailed, equality of variance not assumed) than white Afrikaans speaking students (M = 4.41, *SD* = 2.05; M = 8.58, *SD* = 1.70), respectively. The magnitude of the differences in the means for both subscales were moderately large (mean difference = 0.45, 95% CI: -1.57 to -1.03, *d* = -0.67; mean difference = -1.34, 95% CI: -1.61 to -1.07, *d* = 0.67, respectively). African students, however seem to enjoy spending time in nature more than white Afrikaans speaking students as they scored statistically significantly higher on *enjoyment of nature* (M= 3.04, *SD* = 1.70) (*t* = 2.298, df = 768.833, *p*> 0.005, two tailed, equality of variance not assumed) than white Afrikaans speaking students (M = 2.78, *SD* = 1.73). The magnitude of the differences in the means (mean difference = 0.25, 95% CI: 0.04 to 0.47) was small (*d* = 0.16).

The seemingly logical assumption that members of environmental organisations would hold pro-EAs such as activism is contradicted by the findings of this study, as these participants scored lower on *environmental movement activism* (M = 3.06, *SD* = 2.61) than non-members (M = 3.71, *SD* = 2.02). An independent *t*-test showed that the difference was statistically significant (*t* = -3.102, df = 85.137, *p*< 0.005, two tailed, equality of variance not assumed). However, the magnitude of the differences in the means (mean difference = 0.65, 95% CI: -1.06 to -0.23) was moderate (*d* = 0.36). Furthermore, members of environmental organizations scored higher on *human dominance over nature* (M = 7.06, *SD* = 2.70), which is associated with anti-EAs on the EAI-24, than non-members, (M = 6.31, *SD* = 2.72). Though statistically significant (*t* =2.17, df =887, *p*< 0.005, two tailed, equality of variance not assumed), the magnitude of the difference (mean difference = 0.75, 95% CI: 0.07 to 1.43) was small to moderate (*d* = 0.28).

Self-reported religiosity and religious affiliation had virtually no bearing on any aspect of EAs measured by the EAI-24 or the NEP. The only exceptions to this were that Christians scored higher on *environmental threat* (M= 3.36, *SD* = 1.69) which is the belief that the environment is fragile and easily damaged by human activity (Milfont *et al*. 2010a) than those who regarded themselves as

spiritual, but not religious (M = 2.71, *SD* = 1.70). An independent *t*-test showed that the difference was statistically significant (*t* = 2.20, df = 813, *p*< 0.05, two tailed), but small in magnitude (mean difference = 0.65, 95% CI: 0. to -0.18; *d* = 0.20). It should be noted that this finding could be due to the very small sample size of those regarding themselves as 'spiritual but not religious', and should therefore be viewed with substantial caution.

### *2.4 DISCUSSION*

Results of the analysis of the 12 subscales of the EAI-24 scale revealed that participants' levels of *enjoyment of nature*, *environmental movement activism* and *personal conservation behaviour*, which are associated with the second-order factor, *preservation*, were relatively low. By contrast, *conservation motivated by anthropocentric concern* and *human utilization of nature*, associated with the second-order factor, *utilization* was high (Milfont *et al*., 2010b). Furthermore, participants also did not regard the environment as being under threat from humans as reflected on their relatively low scores on environmental fragility and ecocentric concern subscales. These findings are consistent with previous literature indicating low levels of awareness and concern for environmental problems among university students (Kahraman, Yalçın, Özkan, & Ağgül, 2008; Liu & Lin, 2014). This suggests that initiatives aimed at instilling pro-environmental EAs among university students such as those involved in the present study would be well-warranted.

Students' mean scores on the NEP scale indicated moderate pro-EAs. However, when the NEP scale was correlated with subscales of the EAI-24 scale it correlated positively with subscales associated with anti-EAs, *anthropocentric concern*, *human dominance over nature*, and *human utilization of nature*. These results contradict the findings of the Milfont *et al*. (2010a) cross-cultural study. A possible reason for this it that the NEP scale uses out-dated wording of items, and also that it has been criticised (LaLonde & Jackson, 2002) as being unable to adequately capture people's increasingly thorough understanding of complex environmental issues.

With regard to demographic variables, neither the students' political orientation nor the income bracket in which students' families fell had any statistically significant correlation with their EAs on

either the EAI-24 or the NEP-scale. Whilst similar findings have been reported by others in relation to gender (Willers, 1996; Struwig, 2010), this finding is inconsistent with the negative correlation between EAs and conservatism values reported by others (*e.g.* Fransson & Gärling, 1999; Theodori & Luloff, 2002), suggesting a need for additional research to be conducted on the association between these variables.

The only statistically significant difference between religious affiliation and students' EAs was that Christians had a stronger belief that the environment is fragile and threatened by human activity than students who indicated themselves to be spiritual but not religious. This contradicts previous literature that indicates that those who have higher beliefs in the Bible tend to hold anti-EAs (Milfont 2007; Schultz, *et al*., 2000), but supports White's (1967) claim that Christian views on human-nature relations supports a belief that humans should dominate over nature evident by the high scores of these participants on the *human dominance over nature* subscale. Contradictory to White's (1967) approach to this subscale, Roper (2007) argued that although humans had dominion over the earth and all living creatures, humans are supposed to cultivate and care for the earth as stewards of nature. In addition, other researchers also indicated that instead of dominion, the Bible refers to the God-given power to rule the earth, as stewardship and emphasizes the responsibility to take care of nature (Kempton, Boster, & Hartley, 1995; Roper, 2007; Barbour; 1980; Ponting (1991). Moreover, this perspective could explain why Christians had a stronger belief that the environment is fragile and threatened by human activity than of those regarding themselves as 'spiritual but not religious', however due to the small sample size of the last-mentioned religious orientation, this finding would need to be subjected to verification in future studies.

Females scored higher on the *human dominance over nature* subscale, and lower on the *ecocentric concern* subscale, than males. This finding is in contradiction with previous research showing females to have stronger positive EAs than males (Zelezny *et al*., 2000; Fernández-Manzanal *et al*., 2007). It is however consistent with research conducted in South Africa where Adejoke *et al*. (2014) found males to be more aware of environmental issues than females. These findings suggest a complex association between gender and EAs that might be mediated or moderated by other variables such as ethnicity, which was indeed reported to be the case by Grieve and Van on (1985) who found

that the most pro-environmental EAs were espoused by English-speaking women, followed by English-speaking men, Afrikaans-speaking men, and Afrikaans-speaking women.

In direct contrast to most other studies on the topic (Milfont *et al*., 2010a; Fielding, McDonald & Louis, 2008), in the present study members of environmental organizations scored lower on '*environmental movement activism'* and higher on *'human dominance over nature'* than non-members. Contra-intuitively, this indicates that students who were part of an environmental organisation were less likely to be activists. A possible explanation for this phenomenon is that students who are part of environmental organisations can be scrutinized by other students/people because activists are often the bearers of an inconvenient truth (Klas, Zinkiewicz, Zhou, & Clarke, 2018). This could result in them becoming overwhelmed with people's resistance and subsequently become less inclined towards activist behaviour. A more plausible explanation could be that students join environmental organisations for reasons other than environmental activism, such as obtaining extra credits, making friends, enhancing personal prestige, or for the possibility of getting free snacks, etc." Thus, this association should be further explored to be able to understand why students feel this way and how this effect can be reversed so that environmental groups on campus can increase both pro-EAs and activism.

White Afrikaans speaking students appeared to be more inclined to *environmental movement activism* and *conservation motivated by anthropocentric concern* (for the benefit of humans) than African students, which concur with the results from the Struwig (2010) report. However African students indicated that they enjoyed nature more than white students. As enjoyment of nature is positively correlated with activism (Matsuba & Pratt, 2013), this finding suggests that there might be value in strategies aimed at increasing enjoyment of nature amongst white students in order to increase their willingness to protect it. In the case of African students, it should be investigated why their enjoyment of nature does not translate into environmental activism or ecocentric concern. Overall, these findings, which suggest that ethnicity is a significant predictor of environmental disposition, have also been found in both local (Craffert & Willers 1994; Struwig, 2010) as well as international studies (Johnson, Bowker, & Cordell, 2004; Milfont & Fischer, 2015; Schultz, 2002; Leung & Rice, 2002).

The results from this study make clear that the demographic and cultural diversity that characterises many student populations do indeed seem to differentially affect student's EAs. As such, when pursuing an agenda of environmental awareness and/or activism, the findings of the study underscore the importance of empirically assessing students' EAs as a prelude to developing evidence-based and demographic-specific intervention strategies and education programmes. Finally, these programmes could be implemented as part of the higher education sector's global movement towards sustainability in the form of Green Campus initiatives. These initiatives aim to promote climate change interventions at college and university campuses by creating environmental management systems, public participation and social responsibility; and promoting sustainability in teaching and research (Alshuwaikhat & Abubakar, 2008; Tiyarattanachai & Hollmann, 2016). This is particularly so in a culturally diverse country such as South Africa (Mtutu & Thondhlana, 2016).

### *2.5 LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH*

In the present study, reliabilities of certain subscales of the EAI-24 were found to be problematic (especially scales 2, 4, and 8). As such, results from these scales should be viewed in an extremely tentative light, and future research is needed to verify the findings reported here. However, the authors believe that this also represents an inherently significant finding of the study, as it points to a deeper set of concerns pertaining to the cross-cultural relevance and validity of many of the items in these scales as measures of EAs in contexts such as South Africa. Items such as '*I really like going on trips into the countryside, for example to the bushveld or nature reserves*', '*One of the most important reasons to keep dams and rivers clean is so that people have a place to enjoy water sports*', and '*I'd prefer a garden that is wild and natural to a well-groomed and ordered one*' probably would not make much sense to students who come from very impoverished communities (which is the case with a significant portion of the student sample) where the notions of going on trips, enjoying water sports, or owning a garden would be completely foreign. Other items such as '*Families should be encouraged to limit themselves to two children or less*' would be incongruent with prevailing traditional notions in some African cultures of the *utilitarian values of children* (Sam, Peltzer &

Mayer, 2005; Spjeldnaes, Sam, Moland, & Peltzer, 2007). It could be argued that scales such as these are biased towards respondents with a middle to upper class orientation, and that they consequently fail to adequately capture the lived experience of South African students whose contexts often differ substantially from this. This points to a need to develop culturally and contextually sensitive measures of EAs to reliably assess this construct in a South African context. Questions should be developed which reflect contextually realistic and accessible EA related factors. A need also exists to have questionnaires translated into various South African languages to improve the participants' understanding of the questions. In addition to this, questions should address environmental challenges faced across all the income groups, for instance, in rural settlements the proper disposal of waste is a big issue and can be a possible variable contributing to people's EAs.

Whilst the study only focused on students from one university, by sampling three different campuses with substantially differing demographic and geographic characteristics, this limitation has been mitigated to some extent. However, future research should investigate EAs of students at other South African tertiary educational institutions, given the important role that such institutions can play in fostering and promoting pro-EAs and behaviours.

### *2.6 CONCLUSION*

The results of this study, which surveyed the EAs of 1283 students of the three campuses of the NWU using a cross-sectional survey design, indicate that students' EAs lean more towards *utilization*, which is an anti-environmental factor, than to the pro-environmental factor of *preservation* in the two-dimensional higher-order structure of EAs of the EAI-24. To the extent that the findings might be representative of other student populations, the findings indicate that interventions (such as Green Campus initiatives) might be needed to temper EAs related to the utilization of nature for anthropogenic purposes. In addition to this, the results indicated that EAs related to preservation of ecological resources such as enjoyment of nature, activism and personal conservation behaviour should be promoted. Furthermore, the findings revealed that demographic factors such as gender and ethnicity are significantly correlated with students' EAs. This demonstrates that students'

demographic characteristics need to be empirically assessed and considered when tailoring environmental-based interventions aimed at instilling pro-environmental EAs. In addition to arguing both theoretically and on the basis of the empirical findings emanating from the study that there is a pertinent need to measure South African students' EAs and assess demographic differences in such EAs, the main contribution of the study is that it provides important baseline data on the environmental attitudes of three geographically disparate groups of students, and also outlines how these EAs differ according to student demographics. These findings are of practical significance in that they may be used to inform the development of contextually relevant interventions aimed at promoting pro-environmental EAs. Given that the findings indicate which EAs are most problematic, and which demographic student subgroups are most likely to espouse such EAs, targeted and relevant interventions can be developed that would efficiently focus on promoting relevant EAs among specific student subgroups. Furthermore, by reporting the less than adequate psychometric properties of some of the scales that were used to assess EAs, the findings of the study also highlight that this scale, though widely accepted and used in international contexts, may not be contextually and culturally valid instruments to use in a South African context. This points to the need to develop culturally appropriate instruments to measure EAs in a manner that will evince cross-cultural equivalence.

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**CHAPTER 3**

**ARTICLE 2**

# THE DEVELOPMENT OF AN INTERVENTION PROGRAMME TO PROMOTE PRO-ENVIRONMENTAL ATTITUDES TO REDUCE LITTERING BEHAVIOUR AT A SOUTH AFRICAN UNIVERSITY


## *ABSTRACT*

Many environmental challenges such as littering, are rooted in human behaviour, and can therefore be modified by encouraging pro-environmental behaviour (PEB). The aim of this study was to develop a littering intervention programme that would address the gap between theoretical approaches and what is effective in practice. The programme development process consisted of three phases: phase 1 involved the development of a preliminary programme, drawing from existing literature on littering, programme development, and behavioural/attitudinal change; in phase 2, the proposed intervention programme was sent to an expert panel for review; and in phase 3, the feedback from the review panel was used to further develop and refine the programme. Prominent themes that arose from the feedback were incorporated in the finalized programme, which is now ready to be implemented and evaluated.



**Key terms**: Pro-environmental behaviour, littering, littering behaviour prevention, intervention programme, environmental attitudes


## *3.1 INTRODUCTION*

Many environmental challenges such as littering, are rooted in human behaviour, and can therefore be modified by encouraging PEB (Gardner & Stern, 2002). Furthermore, without long-term attitudinal and behavioural change, intervention campaigns will only give a temporary solution and will not provide a long-term strategy to address root-causes of the littering problem. Literature on littering has shown that contextual factors (e.g. the presence of existing litter, availability of dustbins,

etc.) only predicted approximately 15% of littering behaviour, whereas personal predictors (i.e. gender and age) predicted nearly 85% of littering behaviour (Schultz, Bator, Large, Bruni, & Tabanico, 2013). In addition, the latter study by Schultz et al. (2013) shows that littering behaviour stems largely from an individual's attitude and values towards the environment. The underlying assumption of the theories of reasoned action (Ajzen & Fishbein, 1980) and planned behaviour (Ajzen, 1991) is the relationship between behaviour and attitude. This assumption suggests that behaviour follows attitude, and that by influencing attitude with the right message delivered through the right medium, people's behaviour can be influenced. Some of the important contributions to behaviour change intervention design were made by Albarraci´n et al., (2005) and Durantini, Albarraci´n, Mitchell, Earl and Gillette, (2006). They found that audience characteristics are crucial to effectiveness as well as mode of delivery, type of materials and reliability of implementation in relation to manual specifications. Finally, the extent to which interventions are tailored to individuals or groups are also potentially important determinants of effectiveness (Davidson et al., 2003).

However, there seems to be a lack of research aiming at replicating behaviour change interventions published in scientific journals according to Abraham and Michie (2008). They found that only two thirds of the techniques identified in intervention manuals were also replicated by other researchers in journal articles in a reliable manner. Abraham and Michie (2008) also identified that pressure on journal space may limit intervention descriptions in published articles. This may threaten replication reliability because detailed manuals are not always accessible and are not presented in standardized formats, which complicates the process of practically applying these interventions. Moreover, specification of content has been proven to be vital, and at present, a lack of detailed intervention instructions often leads to a hindrance in preparation of evidence-based guidelines for intervention designers. This may increase the risk that of ineffective or unproven interventions to be adopted (Nicassio, Meyerowitz, & Kerms, 2004).

In addition to above mentioned factors, other gaps in littering intervention research on a more local front, is that littering has focused mainly on waste management and marine littering, which leaves the subject of urban littering under-researched (Furusa, 2015).

Furthermore, discarded cigarette butts constitute one of the greatest litter problems, as trillions of butts are littered every year (Schultz et al. 2013; Register, 2005). This phenomenon of not properly discarding of cigarette butts has been observed to be prevalent among university students (Jancey et al. 2014; Sawdey et al. 2016; Schultz et al. 2013). In addition, researchers have found that people most likely to have fewer or less stringent personal norms against littering are young people under the age of 30 (Bator, Bryan & Schultz, 2011). Consequently, to be able to address this problem, it is important to first ascertain why university students' litter. Schmuck and Vlek (2003) have acknowledged that people's attitudes play a central role in the building of an environmentally responsible society, and as such are essential to consider during any process of intelligent policy making aimed at reducing environmental problems.

In conclusion, to modify the seemingly growing tendency to litter among university students, the psychological pretext should be addressed in order to design effective behaviour change interventions. As such, attempting to prevent littering by changing students' attitudes towards littering by developing a practice and theory based intervention programme that can be replicated by other researchers in the future, is a potentially effective strategy to improve environmental quality at South African universities.

### *3.1.1 Literature review*

It has become evident that the South African context is very different from the typical Western higher learning context such as those found in Europe or the United States, and as such, should be considered when developing environmental intervention programmes. For example, the percentage of students in different ethnic and language groups enrolled at the North West University (NWU), South Africa in 2017 were 67% African students, 4.5% students of mixed race, 4.5% Indian/Asian and 27.5% White students (North-West University, Student Headcount Enrolments & Graduates, 2018). Furthermore, these ethnic groups can be further classified into the 11 official languages spoken in South Africa, resulting in diverse groups of students who likely espouse many different views, attitudes and behaviours towards the environment. Moreover, recent "fees must fall" protests by

students aimed at attaining free tertiary education, on numerous university campuses in South Africa, has often turned violent and disrupted classes in some instances (Oxlund, 2016). During these demonstrations if was made clear that students from a middle -class socio-economic background or the “the missing middle class” felt that they were left out of most bursary programmes from the government and insisted on being included in tertiary education funding programmes. During these demonstrations racial tension often came to the foreground (Oxlund, 2016). It seems both reasonable and prudent to suggest that in such socio-politically volatile circumstances, any intervention must be handled with utmost cultural and contextual sensitivity.

Moreover, research on environmental behaviour of students has predominantly taken place in Western cultures, and subsequently existing models and scales have been based on Western contexts and worldviews to a certain degree (Milfont & Page, 2013; Eom, Kim, Sherman & Ishii, 2016). This Western cultural context could be described as Western civilization or European civilization. This term broadly refers to a heritage of social norms, ethical values, traditional customs, belief systems, and political systems etc. that have some origin or association with Europe (Definitons.net, 2019). Far less emphasis has been placed on other perspectives such as those of the Eastern, North American Indian and African cultures (Carlson & Van Staden, 2006). However, this provides an opportunity for further research to develop intervention programmes that are effective for application in multi-cultural contexts such as South Africa. In the context of this study, it was observed that many South African students live in highly polluted informal rural areas where littering is part of daily life (Struwig, 2010), and as such, implementing an intervention aimed at reducing littering could have a significant and substantive positive impact on the environment and on the well-being of a given community.

*Previous studies on environmental attitudes and behaviour in South Africa*

In light of the relatively limited research on environmental attitudes (EAs) in South Africa (Furusa, 2015), as well as the demonstrated importance of demographic factors as predictors of littering (Schultz et al., 2013) a need was identified to investigate the extent to which demographic variables such as gender, ethnicity and campus affiliation influence the EAs of university students. A

study was therefore conducted by Evert, Coetzee & Nell (Submitted) to determine the EAs among a diverse sample of South African students by using the three (geographically and culturally diverse) campuses (situated in Potchefstroom, Mahikeng and Vanderbijlpark) of South Africa's North-West University (NWU) as a case study (see chapter 2). Results from this study indicated that students' EAs lean more towards utilisation, which is an anti-environmental factor, than to the pro-environmental factor of preservation (Milfont & Duckitt, 2004). *Preservation* and *Utilization* refers to distinct dimensions used to measure ecological values as developed by Wiseman and Bogner (2003). Preservation measures support for the conservation and protection of the environment, and Utilization support for the utilization of natural resources (Milfont & Duckitt, 2004)

Furthermore, demographic factors such as gender and ethnicity, as well as campus affiliation were found to be significantly correlated with students' EAs, implying that students' demographic characteristics need to be empirically assessed and considered when tailoring environmental-based interventions aimed at instilling pro-EAs (Evert et al., Submitted; Franzen & Vogl, 2013; Milfont, 2007).

The aim of this study was therefore to draw on existing literature as well as on a previous study of South African university students' EAs (Evert et al., Submitted) to develop an intervention programme to reduce littering that would be applicable at South African universities. As such, it is also necessary to consider findings and insights derived from existing literature in relation to littering behaviour interventions.

*Littering behaviour interventions*

Previous research on littering interventions focuses mainly on two types of interventions, namely attitudinal and structural. Attitudinal interventions focus on addressing intrinsic and extrinsic motivation behind littering and include factors such as values, norms, rewards and psychological barriers that may influence an individual's behaviour. Walmsley and Lewis (2014) theorize that the construction of attitudes involves cognitive, emotional, and conative elements. The cognitive facet reflects one's beliefs and thoughts about an attitude object; the emotional component reflects a

person's assessment and feelings expressed verbally or through reactions towards the object for which attitude has been formed, and the conative facet reflect one's behavioural intentions (Ajzen & Fishbein, 2005). According to this point of view, the concept of littering attitude is a psychological tendency to evaluate or react with a certain degree of positive, negative or apathetic disposition towards littering. Thus, by influencing individual attitudes, their littering behaviour might change. Moreover, it is important for researchers to determine which type of intervention they are going to use in order to provide a detailed methodology for the chosen intervention. This could provide a solid foundation for other researchers to effectively repeat the same type of intervention. This study focuses on bridging the gap between attitudinal interventions and measurement of the effectiveness of these interventions on behaviour change.

Structural interventions, also referred to as environmental interventions as was the case in the research done by Geller, Witmer and Tuso (1977), focus on manipulating the physical environment to influence certain behaviours. This can be done, for instance, by adding more bins and ashtrays to reduce littering behaviour in a certain area (Liu & Sibley, 2004). Furthermore, Leijdekkers, Marpaung, Meesters, Naser, Penninx, Van Rookhuijzen and Willems (2015) suggested an integrated approach of an attitudinal intervention targeting youngsters' beliefs about the effects of littering to make use of their social surroundings and to offer rewards for proper waste disposal behaviour. They combined this strategy with a structural intervention that facilitates proper waste disposal behaviour by providing information on the bio-degradability of litter on posters, notice boards etc. Even though there are merits for structural littering interventions, the effects of these interventions on students littering behaviour are most likely short-lived as students leave universities (and thus the context of their structural interventions) after a few years. A more long-term solution to address littering amongst university students is therefore to change their behaviour by fundamentally changing their attitudes towards littering. This prompted the main aim of the present study, which was to draw on existing literature on littering and littering interventions, as well as on a previous study of South African university students' EAs (Evert et al., Submitted) to develop an intervention programme to reduce littering that would be applicable at South African universities.

**Phase 1: Development of preliminary intervention programme**

## *3.2 METHODS*

### *3.2.1 Approach*

This paper describes a comprehensive developmental approach to preventing littering and facilitating attitudinal/behavioural change. Furthermore, it is based on a systematic literature review used to develop a preliminary intervention programme which was then subjected to an expert panel for further refinement. Finally, this study aimed to produce a littering intervention programme ready to be implemented and evaluated at a South African university.

### *3.2.2 Design process*

The design process consisted of three phases as shown in Figure 3.1, the first being a literature review during which key concepts and strategies were identified that were relevant to the development of an intervention programme in South Africa. The second phase entailed the design and development a preliminary programme, and in the third phase, the feedback of an expert panel was sought and subsequently thematically analysed and then incorporated in order to refine/finalise the programme, following a similar approach to that adopted by Orsi, Geneletti and Newton (2011).


**Figure 3.1: Overall intervention programme development process**

The motivation for this approach was that an expert panel review is the predominant method used for research evaluations and is normally seen as an 'unavoidable' method which cannot be replaced by quantitative methods alone (Davis, 1992; Langfeldt, 2001; 2002). Furthermore, the expert panel

approach was selected as a method to ensure the scientific quality of the intervention programme. To assess the quality of scientific research, the expert panel was comprised of experts in the field of environmental interventions. Expert evaluations of research programmes such as in the case of this study constitute a form of modified peer review. In addition to scientific merit, the expert panel can give critique and input that has an influence on the impact of the research or potential for utilisation of the results (Davis, 1992; Langfeldt, 2001; 2002).

A systematic review of literature was done to identify key concepts and strategies that are relevant to designing, applying and evaluating an intervention programme for undergraduate university students in South Africa. In Table 3.1, important key concepts identified in previous research on the topic of behaviour change through interventions, are listed.

**Table 3.1**

**A systematic literature review, relevant to designing, applying and evaluating an intervention programme for undergraduate students at the North-West University in South Africa.**

| **Key concepts** | **Sources** |
|---|---|
| Identification of the anti-environmental behaviour to change | (Steg & Vlek, 2009); (Geller, 2002); (Stern, 2000); (McKenzie-Mohr, 2008; 2011); (Dietz et al., 2009); |
| Systematic programme design to address the problem behaviour by implementing the following strategies. | (Geller et al., 1982); (Brehm, 1972); (Skinner, 1971); (Partain, 1998); (Winett, 1978); (Durdan, Reeder & Hecht, 1985). |
| • The self-determination theory | (Deci & Ryan, 1985; 1991; 2011). |
| *Intrinsic motivation* | (Sheldon & Kasser, 1998); (Sheldon & Houser-Marko, 2001); (Van der Werff, Steg & Keizer, 2013). |
| *Extrinsic motivation (rewards): operant conditioning;* | (Skinner, 1985; 1971), (Geller, 2002); (Gärling & Schuitema, 2007); (Brehm, 1972); (Geller et al., 1982); (Dwyer et al., 1993). |

| | |
|---|---|
| *Amotivation: Dealing with psychological barriers;* | (Gifford, 2011); (Gifford & Nilsson, 2014). |
| • Awareness campaigns, education and communication; | (Messick & Brewer, 1983); (Abrahamse & Matthies, 2012); (Dwyer, Leeming, Cobern, Porter & Jackson, 1993); (Singh & Rahman, 2012). |
| • Reflection and integration of what was learned to facilitate commitment to change behaviour. | (Brown, Hernandez, Saint-Jean, Evans, Tafari, Brewster, Celestin, Gomez-Estefan, Regelado, Akal, Nierenberg, Kauschinger, Schwartz & Page, 2008); (Waterman, Tillen, Dickson & de Koning, 2001*);* (Kemmis & McTaggart, 1988); (Bray, Lee, Smith, & Yorks, 2000); (Dewey, 1933; 2007). |
| | (Abrahamse et al., 2005); (Bamberg, 2002); (Cialdini, 2001); (Geller, 2001); (Burn & Oskamp, 1986); (Geller & Lehman, 1991); (Pardini & Katzev, 1983-1984); (DeLeon & Fuqua, 1995) |

In the following section, each of these aspects is discussed in more detail.

*Identifying the anti-environmental behaviour to change*

Steg and Vlek (2009) suggested a systematic approach to designing an intervention programme where an important first step is to identify the behaviour that needs to change. Further considerations should include targeting behaviours that will significantly affect environmental quality (Geller, 2002; Stern, 2000). In addition, McKenzie-Mohr (2008; 2011) points out that an intervention activity should be a non-divisible end-state action that is simple to apply. The specificity of the action makes it easier to apply and monitor and should ideally be aimed at effecting changes across several environmental behaviours (Young, Davis, McNeill, Malhotra, Russell, Unsworth & Clegg, 2015). Dietz et al. (2009) suggest that the behaviour targeted by the intervention should have a high potential

to be changed (behavioural plasticity) to increase the probability of a successful intervention. Littering was selected as the anti-environmental behaviour to target in this intervention programme as it adheres to the above-mentioned criteria as well as being observed as a prevalent anti-environmental behaviour among university students (Schultz et al., 2013).

*A systematic intervention programme design to address the problem*

The second step is examining which factors play a causal role in relation in relation to the anti-environmental behaviours (such as environmental attitudes, values, motivations and psychological and structural barriers) and to incorporate strategies that will target these factors in the design of the programme.

*Behaviour modification by means of self-determination*

The development of this intervention programme is grounded in part in the self-determination theory. The self-determination theory provides a comprehensive theoretical explanation of the social and intrapersonal processes by which important behaviours are incorporated into the self (Deci & Ryan, 2011). An example of self-determined behaviour is people doing things out of their own choice even though it may not be enjoyable to them such as picking up litter or sorting recyclables. According to self-determination theory (Deci & Ryan, 1985; 1992), the three ways in which self-determination can be the underlying motivation of an individual's behaviour are via its articulation with needs for competence, autonomy and relatedness.

*Intrinsic motivation*

An intrinsically motivated person acts out of personal choice and interest (Green-Demers et al., 1997). Furthermore, internalised motivation is said to occur when people act either because the behaviour is enjoyable and challenging (intrinsic motivation) or because they identify with the values underlying the behaviour (identified motivation) (Ryan & Deci, 2000b). Reichel and Geller (1981) suggested that if we respect and value environmentally responsible behaviour, then "such norms may

even be internalized by individuals so that conserving behaviours become intrinsically reinforced" (p. 88). Furthermore, research suggests that people's intrinsic motives to conserve can be nurtured and developed by either seriously challenging people's initial values or by suggesting that their way of life is threatened (Steg et al. 2016; Bardi & Goodwin, 2011; Lindenberg, 2009; Abrahamse & Steg, 2013; Abrahamse et al., 2005; Lokhorst et al., 2013). As such, this study aims to shift ERB from initially being extrinsically motivated and maintained, towards being more long-term intrinsically motivated, similarly to a report from Vining and Ebreo (1990).

*Extrinsic motivation*

Behavioural analysis by means of operant conditioning, originating from the work conducted by B. F. Skinner (1958; 1971) is not only one of the most widely used, but is also often viewed as the most effective approach for promoting PEB (Geller et al., 1982; Geller 2002). Briefly, operant conditioning focusses on increasing the frequency of behaviours that are reinforced (encouraged) and decreasing the frequency of behaviours that are not reinforced. In the case of this study, behaviours such as picking up litter and recycling are encouraged and behaviour such as littering is discouraged among university students. Similar behavioural approaches have also been used in office, work-site, and other institutional settings (Austin, Hatfield, Grindle & Bailey, 1993; Ludwig, Gray & Rowell, 1998).

Encouraging littering prevention can be done before the behaviour takes place (antecedent strategy e.g. prompts) or after the behaviour has occurred (consequence strategy e.g. rewarding or punishing behaviour). Behaviour modification using a behavioural analysis strategy such as prompts have been used effectively across several environmental areas, including energy conservation (Oceja & Berenguer, 2009), litter prevention (de Kort, McCalley, & Midden, 2008), and recycling (Austin et al., 1993).

Whereas prompting is an antecedent strategy to changing behaviour, contingencies occur after the behaviour. This strategy is considered to be an extrinsic stimulus that occurs in response to a behaviour. These are the events that motivate or discourage behaviour. The efficacy of behaviour analysis (and especially contingency strategies) at promoting PEBs has been well documented (Dwyer et al., 1993; Geller, 1987; 2002; Lehman & Geller, 2004).

The research shows that offering a reward following a desired behaviour generally increases its frequency, and providing a punishment following a behaviour generally decreases its frequency.

Many prior studies of PEBs have taken the extrinsic approach to behaviour modification (Dwyer, Leeming, Cobern, Porter & Jackson, 1993; Hornik, Cherian, Madansky & Narayana, 1995; Huffman, Grossnickle, Cope, & Huffman, 1995).

However, extrinsic behaviour modification approaches often require high frequency investments and can consequently become costly to use as long-term solutions to maintaining PEB. Several studies have indicated that these approaches by themselves do not lead to permanent changes in behaviour; when the external reinforcement that lead to increases in the behaviour are withdrawn, the behaviour's frequency will reduce over time (Osbaldiston & Sheldon, 2003).

As such it could be concluded that when seeking to motivating people to engage in PEB such as recycling, only relying on extrinsic behaviour modification is not a viable permanent solution to littering problems.

*Amotivation: Dealing with psychological barriers.*

Amotivation results from not valuing an activity or from a state of lacking any motivation to act (Ryan & Deci, 2000a), and can therefore be addressed as a psychological barrier. Many structural and psychological barriers stand in the way of behavioural changes that would help limit environmental degradation caused by humans. According to Gifford (2011) psychological barriers are very important to address because amongst others, it is associated with issues such as unawareness or denial of the problem, uncertainty of the facts or what to do, or the belief that their actions will make no difference or are unimportant compared to those of others, as in the locus of control (LOC) theory (Gifford, 2011; Gifford & Nilsson, 2014). The psychological construct of LOC predicts that an individual's behaviour is guided by his or her perception that a certain behaviour will lead to an expected result. LOC is based on internal versus external control, referring to the degree to which an individual believes that a desired outcome can be achieved through his or her own behaviour or personal characteristics (Rotter 1990; Gifford & Nilsson 2014). Similar findings by Forte (2004) suggests that

people with an internal LOC decide for themselves what is appropriate behaviour, while people with an external LOC have external reference points to decide what is appropriate or not. As such, it would be beneficial to this study to enhance students' internal locus of control with regards to PEB as motivation is enhanced when people have an internal perceived locus of causality for their behaviour (Osbaldiston & Sheldon, 2003).

Moreover, researchers have also linked locus of control to responsible environmental behaviour (REB) (Granzin & Olsen, 1991; Hwang et al., 2000). REB is described as a behaviour that results from environmental empathy that includes activities which have been recommended to resolve problems such as littering, in the natural environment (Van Liere & Dunlap, 1981). Studies have also linked personality variables such as locus of control, self-efficacy and self-concept to littering (Ojedokun, 2011; Ojedokun & Balogun, 2011). Ojedokun, (2011) suggested in this research on attitude towards littering among residents of Ibadan metropolis, Nigeria, that increasing peoples' sense of empowerment can be a solution to the littering problem. Furthermore, he suggested that this can be done by developing a sense of personal obligation, personal investment, and personal responsibility for litter prevention among individuals with low altruism and internal locus of control. This can be done through modelling, training, and practicing the behaviour, possibly in a classroom context with the support of peers and supervisors. He goes on to suggest that a cognitive solution would be convincing people not to litter, that littering is a sign of chaos and incivility, and creating awareness on the relationship of attitude related to littering, environmental quality and their own quality of life. Both empowerment and cognitive solutions could be implemented via identification and recruiting of potential social influencers that may be in position to assist in spreading attitudinal change and behaviour modification information to the target audience. This strategy could be especially effective among university students who have been proven to be influenced to large extent by popular people on social media (Alsaif, 2016).

As such this study aims to incorporate some of the suggestions made by Ojedokun, (2011) in changing students littering behaviour, in part because it has been proven to be successful in an African context, and partly because addressing psychological barriers seems to be vital in changing students' littering behaviour as highlighted in the littering literature reviewed above.

*Creating awareness, education and communication*

The first challenge to address when attempting to create behavioural change is the issue of ignorance. Many students are not aware of the current eco-crisis and therefore do not care about their environmental behaviour (Evert et al., Submitted). This can be rectified through informational strategies (Abrahamse et al., 2005; Abrahamse & Matthies, 2012). Informational strategies target motivational factors, which could influence people's choices. However, it does not actually change the external context in which choices are made (Abrahamse et al., 2005; Abrahamse & Matthies, 2012).

For the purpose of this study, information about the harmful effects of littering and advantages of recycling, for instance, can be communicated in three ways. Firstly, informational strategies could be aimed at increasing students' awareness of environmental problems and of the environmental impacts of their behaviour, and/or to increase their knowledge of behavioural alternatives such as recycling. Students could be made aware of the advantages of recycling e.g. the monetary reward for recycling cans (extrinsic motivation) etc. or how recycling can reduce their carbon footprint or help to reduce waste ending up in the ocean (intrinsic motivation). Secondly, persuasion strategies could be employed, for example, to influence students' attitudes, strengthen their altruistic and ecological values, and/or strengthen their commitment to act pro-environmentally. Furthermore, promising results have been found with individualized social marketing approaches, in which information is tailored to the needs, wants and perceived barriers of individual segments of the population (Steg & Reser, 2011). In the context of the development of an intervention programme, informational strategies will be incorporated to target university students coming from disadvantaged backgrounds (e.g., Abrahamse et al., 2007). Thirdly, social support and role models can be incorporated to strengthen social norms, and to inform individuals about the perceptions, efficacy, and behaviour of others such as student leaders, lecturers and other role models on campus. Modelling and providing information about the behaviour of others appeared to be successful in supporting PEB in motivating residents to conserve energy without financial incentives in a study done by McMakin et al. (2002). Research done by Stern (2000) found modelling a major causal variable in influencing

environmental behaviour. However, it should be noted that modelling can be counterproductive when people take the behaviour of others acting in anti-environmental ways as an example to model their own behaviour after. This negative effect of modelling can be avoided by adding injunctive norm information, which conveys social approval (Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). Informational strategies in themselves are especially effective when the PEB is not very costly, and when individuals do not face severe external constraints on behaviour (e.g. easy access to recycle or refuge bins and not having to walk far to reach a trashcan or bin). Furthermore, they are an essential element in the implementation of structural strategies that prompt individuals to change their behaviour (e.g. providing more bins on campus).

The communication/persuasion model is widely used in communications and media studies. This model postulates that communication can change attitudes and behaviours that are linked in the same causal chain (McGuire, 1964). In this model, inputs include the source, the message itself, the channel, the recommended change or behaviour, and the destination. Outputs of the model are changes in specific cognition and observed behaviours (Graeff et al., 1993). The greatest challenges to the model are ensuring the causal chain is maintained and the message is continued. In environmental education, the communications/persuasion model is frequently used (Heimlich & Ardoin, 2008; Singh & Rahman, 2012).

Informational strategies are an important antecedent step to changing behaviour. However, on their own, information campaigns hardly ever result in behaviour changes (Abrahamse et al., 2005). It is therefore necessary to not only provide awareness by means of information but also to provide formal and informal environmental education. The difference between an awareness campaign and environmental education is that education not only provides information about the problem, but also provides educational experiences and tools to attempt to solve the problem (Kollmuss & Agyeman, 2002). As such, it would be of paramount importance to incorporate these elements into the intervention programme.

Notwithstanding, in the literature reviewed it became evident that raising awareness alone is not effective in encouraging PEB. However, increasing awareness together with environmental education (both formal and informal) may be a more successful strategy. The importance of education is

emphasized in a number of studies that found individuals with more education in general are more concerned about the environment (Chanda, 1999; Gifford & Nilsson 2014; Klineberg, McKeever, & Rothenbach, 1998). People are unlikely to deliberately act in in pro-environmental ways if they are not aware of environmental problems or that their actions may have a positive or negative effect on the environment, according to Hines, Hungerford, and Tomera's (1986-87) classic meta-analysis of 315 studies. In a British study by Lyons and Breakwell (1994), the best discriminator between environmentally concerned and indifferent teens was the amount of environmental knowledge together with scientific knowledge about specific issues they claimed to have. Although knowledge must be regarded as a necessary but not a sufficient condition for constructive decision-making, emphasis must be placed on having the correct knowledge, as it has been shown to predict behaviour (Levine & Strube, 2012).

Specifically, prompts (printed, verbal, or auditory) work best when the target behaviour is relatively easy to perform, clearly defined, and when the message is displayed near the place where the target behaviour can be performed. For instance, "Recycle your bottles" posted near a trashcan in a food court is an example of a prompt. In addition, the message should convey the sentiment that littering is and unacceptable behaviour, but it should still be stated politely to avoid eliciting reactance or counter control. Prompts have been used effectively for the intervention applicable to this study namely, litter prevention (Durdan, Reeder, & Hecht, 1985; de Kort, McCalley, & Midden, 2008). As such, these elements in the form of verbal prompts, videos, and printed material have been incorporated into the programme proposed in this article.

In conclusion, this section emphasizes the importance of including effective communication and awareness strategies when developing a littering prevention intervention programme. This study aims to incorporate these strategies, especially to emphasize the possibly unknown and far reaching consequences of littering.

*Reflective learning as approach to facilitate commitment to change behaviour*

Reflective learning is a powerful method of experiential learning as first proposed by John Dewey who wrote *Experience and Education in 1933.* It entails a form of education where the student needs to reflect on what he/she has learnt in order to activate further dimensions of thought (George Mason University Center for Teaching Excellence, 2011; Haynes; 2007). Reflection is important as it helps to put different tasks and distinct roles into perspective, to simplify seemingly complicated matters, and bring to light the central issues of what was learnt during an educational intervention. Furthermore, it assists to unpack problems and generate solutions, to analyse strategies and ideas, to form linkages between issues that would otherwise be embedded and unapparent. Moreover, reflection clarifies what it means to be a pro-environmental student (Ferreira, Keliher, & Blomfield, 2013; Riordan, & Klein, 2010). Reflection can be done individually (intrapersonal) and will contribute to the success of the intervention programme as the reflection may result in the participants' "enlightenment, empowerment and emancipation" (Kember et al., 2000). Interpersonal reflection entails constant feedback from the participants and study-supervisors, through constructive criticism, critical reflection, dynamic discussions, integration and suggestions and ideas for the future (Day, 2000). This strategy can be effective in facilitating commitment to change behaviour. Commitment strategies appeared to be successful in encouraging PEB (Matthies, Klöckner, & Preißner, 2006). Applied to the aim of this study, this would mean that after reflecting upon what participants experienced during the intervention programme, they were instructed to not only indicate which specific behaviour they intend to change but also how they plan to do so.

### *3.2.3 Programme development*

*Intervention programme development method*

De Young (2000) concluded in his research on expanding and evaluating motives for environmentally responsible behaviour that there is no single motive (e.g. intrinsic, extrinsic) that is optimal for promoting PEB. Therefore, it can be concluded that to promote widespread PEB it will

more likely require an approach where a combination of motives is used rather than just a single motive approach. Subsequently, the motives and strategies noted above were synthesised and sequenced into an intervention programme aimed at targeting littering among South African university students. The methodology for the development of the intervention programme is similar to the four steps set out by (Geller, 2002; Gardner & Stern, 2002; Steg & Vlek, 2009) which are (1) identification of the behaviour to be changed, (2) examination of the main factors underlying this behaviour, (3) application of interventions to change the relevant behaviours and their determinants, and (4) evaluation of intervention effects on the behaviour itself and its main determinants e.g. environmental quality, and human quality of life.

**Table 3.2: Outline of preliminary intervention programme**

| **Session 1**: **Creating awareness** | **Goal/s** | **Brief description of sessions** |
|---|---|---|
| **Icebreaker:**<br>**Favourite animal**<br>10 min | To help the researcher and participants to get to know each other and to create a relaxed and 'fun' atmosphere conducive to learning. | As participants arrive, and before their names are written on a name card, the researcher will ask them to identify their favourite animal and three adjectives to describe the animal. Each participant will then be requested to write these three adjectives, along with their names, on a name tag (but to omit the name of the animal). The participants will then be asked to mingle and guess which animal each participant chose. |
| **Activities**<br>(Urgency and Association)<br><br>35 min | To create basic awareness that the littering problem exists;<br><br>To indicate the scale, urgency and relevance of the problem; | The participants will be made aware of the impact that the anti-environmental behaviour, littering, has on the environment by means of a PowerPoint presentation that will include research findings, photos and video clips describing the problem.<br><br>The participants will be physically exposed to different natural environments to show them the contrast between a highly polluted and degraded environment vs. a well-preserved environment. |

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| | To break the problem down into smaller components (e.g. causes and consequences) and thereby deepen understanding of cause and effect;<br>Homework activity instructions. | The physical exposure of the polluted and well-preserved environments will be followed by a discussion of the problem. Participants will be instructed to discuss the probable causes and consequences of littering. Relevant input will be provided by the programme facilitated as required.<br><br>At the end of this session participants will be asked to perform a pro-environmental activity (in their own time) with regards to littering each week, for the upcoming 4 weeks and to document these activities by means of photos or videos. |
| **Session 2**: **Education and communication** | **Goal/s** | **Brief description of sessions** |
| **Icebreaker: Draw your name...**<br>10 min | To build trust. | Participants will be asked to draw a picture that could be associated with their name or would visually demonstrate it. |
| **Activities**<br>(Modelling and Demonstrations)<br><br>35 min | To provide information, training, etc. on how to:<br>• Avoid littering<br>• Overcome obstacles that cause littering e.g. no nearby bins<br>• Motivate others not to litter<br>• Clean-up<br>• Recycle | Participants will take part in a practical exercise in the form of a clean-up session. During this session, participants will be briefed on the technical and safety precautions of a clean-up activity (wearing gloves, having a black refuge bag etc.).<br>Following the exercise participants will be asked to reflect on their cleaning up experiences and on related matters (e.g. they will be asked about how they think the litter in the area could have been prevented in the first place). To reinforce the new behaviours, participants will also be asked how it |

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| | To reflect on this exercise in order to reinforce and deepen learning gains.<br>Operant conditioning: to facilitate the provision of intrinsic and extrinsic rewards and feedback.<br>To foster the establishment of a new pro-environmental identity via discussion and acknowledgement in front of an audience. | made them feel to have cleaned the area and to see the difference between how it looked before vs. after.<br>Participants will be asked to share what pro-environmental activities pertaining to littering, they have done for the homework activity. They will also be asked to discuss their experiences and feelings in relation to these activities in a group context. Following this, all participants in the homework activity will receive a certificate. The best activity (as voted for by the whole group) will receive a designated award (for example, two tickets to visit a nearby zoo). |
| **Session 3**: **Dealing with barriers** | **Goal/s** | **Brief description of sessions** |
| **Icebreaker: The wonders of nature**<br>15 min | To build further trust;<br>To encourage the participants to feel more connected to the environment. | The participants assemble at the outdoor area on the riverbanks with open grass fields and wooded edges. Participants are asked to stay within outlined boundaries, set by the researcher. The researcher gives out a piece of paper with the instructions listed below, a notepad and pen and participants are given 10 minutes to find whatever is needed. Participants can make notes, drawings or take photographs of what they are instructed to find. Everyone gathers after 10 minutes to discuss their findings.<br>INSTRUCTIONS:<br>1. Find an area that makes you feel good/happy<br>2. Find an area that makes you feel bad/sad<br>3. Give possible reasons for why the selected areas make you feel a certain way. |

| | | |
|---|---|---|
| **Activities**<br><br>35 min | To identify and deal with physical and psychological barriers that might prevent non-littering behaviour | The participants will be asked to engage in an informal discussion on their own experiences with littering and recycling and the barriers in their own lives that may cause or encourage littering and not being able to dispose of litter or recycle in the correct and responsible way. Participants will be asked to come up with solutions that are applicable in their lives and communities. |
| | To deal with psycho-social barriers (an opinion leader will serve the purpose to remove the misconception that it is socially acceptable to litter) | A prominent leader figure on campus or an opinion leader will talk to the participants about the importance of recycling and that littering is an unacceptable behaviour. The leader figure will participate in a clean-up activity to clean-up a polluted area. |
| | To remove the psychological barrier of the limiting belief that one person's actions does not make a difference (supporting the development of an internal locus of control which is the extent to which people believe they can influence events and their outcomes). | Participants will watch a series of thought-provoking videos showing the impact of how one person's litter can impact the environment as well as of how one person's anti-littering behaviour can have a substantive positive impact on the behaviour of others. |
| | Operant conditioning: to facilitate the provision of intrinsic and extrinsic rewards and feedback.<br>To foster the establishment of a new pro-environmental identity via discussion and acknowledgement in front of an audience. | Participants will be asked to share what pro-environmental activities pertaining to littering, they have done for the homework activity. They will also be asked to discuss their experiences and feelings in relation to these activities in a group context. Following this, all participants in the homework activity will receive a certificate. The best activity (as voted for by the whole group) will receive a designated award (for example, two tickets to visit a nearby zoo). |

| **Session 4: Reflection, integration and commitment** | **Goal/s** | **Brief description of sessions** |
|---|---|---|
| **Icebreaker: The wonders of nature (continued)...**<br>15 min | To build further trust;<br>To encourage the participants to feel more connected to the environment. | The participants assemble at the outdoor area on the riverbanks with open grass fields and wooded edges. Participants are asked to stay within outlined boundaries, set by the researcher. The researcher gives out a piece of paper with the instructions listed below, and participants are given 10 minutes to find whatever is needed. Participants can make notes, drawings or take photographs of what they are instructed to find. Everyone gathers after 10 min to discuss their findings.<br>INSTRUCTIONS: Find a quiet area and reflect on your own about the benefits you receive daily from nature. Write down at least three things you are grateful for that you get from nature. |
| **Activities**<br>45 min | To create a powerful and lasting impression of the negative impact of littering;<br>To reward participants;<br>To encourage self-reflection;<br>To encourage commitment to change. | Picnic in pristine area.<br>A video clip will be shown of all the activities in the previous sessions and of the difference between the polluted area, before and after it was cleaned-up by the participants.<br>Participants will be asked to reflect on all the sessions and write down if and how they intend to change their littering behaviour, also the highlights and low points of their experiences during the sessions. |

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|---|---|---|
| | Operant conditioning: to facilitate the provision of intrinsic and extrinsic rewards and feedback.<br>To foster the establishment of a new pro-environmental identity via discussion and acknowledgement in front of an audience.<br>To encourage participants to take on an identity of being environmentally conscious by recognizing and rewarding this identity in front of an audience. | Participants will be asked to share what pro-environmental activities pertaining to littering, they have done for the homework activity. They will also be asked to discuss their experiences and feelings in relation to these activities in a group context. Following this, all participants in the homework activity will receive a certificate. The best activity (as voted for by the whole group) will receive a designated award (for example, two tickets to visit a nearby zoo).<br>An award ceremony will be held where participants will receive (in front of others) a certificate with title 'Environmental Champion'. This event will be attended by various stakeholders that will include representatives of the environmental conservation industry, tertiary education sector and local government. |

*Description of preliminary Structure of programme sessions*

Each of the 4 sessions described above in Table 3.2 is approximately 60-90 minutes long in order to ensure that participants have optimal concentration and to avoid fatigue. Participants will be briefed before each session to explain what will happen in that session and also to ensure that they are comfortable with what will be expected of them. The icebreaker at the beginning of each session will be applied to bring about a cohesive and cooperative atmosphere and to ensure that participants are relaxed and in a receptive state.

*Session 1*

The main focus of session 1 is to create awareness and to provide information about littering. The participants will be taken to a pristine and well-maintained area as well as a polluted area on or near the university campus. At the polluted venue participants will be instructed to discuss the probable causes and consequences of the littering. At the end of the session the participants will be asked to complete and document themselves performing a pro-environmental activity pertaining to littering in the upcoming week (the same instructions will be given after session two and three).

*Session 2*

The aim of session 2 is to educate participants on littering and recycling and to provide them with training on how to recycle and also to enhance awareness by making them act as ‘cleaners’ – literally putting them in their shoes by cleaning up a patch of polluted environment. The participants will take part in a practical exercise in the form of a clean-up session. The clean-up session will be done at the same polluted area that they will be exposed to in the previous session. During the session participants will be briefed on the technical and safety precautions of a clean-up activity (wearing gloves, having a black refuge bag etc.) as well as instructions on how to recycle. The litter will be categorized and placed into different containers for plastic, glass, paper and aluminium cans. The participants will then return to the pristine and clean area where they will present the pro-

environmental activities they have done throughout the week; after which they will be rewarded for their actions – the same procedure will be followed for session three. These rewards will consist of receiving of a certificate as well as various designated awards (for example, two tickets to visit a nearby zoo) in front of the whole group, in order to publicly reinforce the acknowledgement and reward.

*Session 3*

The main focus of session 3 is to deal with physical and psycho-social barriers that will prevent participants from changing especially with regards to perceived costs of the action. The third session will take place at the polluted area where a prominent leader figure on campus or an opinion leader, will join them in the clean-up activity and talk to them about the importance of littering prevention and recycling. The goal of having an opinion leader clean-up with them is to remove the psychological barrier pertaining to the misconception that picking up litter will lead to embarrassment or unpopularity as well addressing the misconception that littering is job-creation. Participants will then walk back to the pristine area where they will engage in an informal discussion on their own experiences with littering and the barriers in their own lives that may lead to littering and not recycling and have the participants come up with solutions that is applicable in their lives and communities.

*Session 4*

The aim of this session is to encourage commitment and to reflect on the previous sessions and to integrate and consolidate all the sessions into a powerful summary of the importance of PEB. The final session will take place at the pristine area where participants will be asked to reflect together on their work, inquiring deeply into assumptions and root causes for littering. Participants will be asked to write down the highlights and lowlights of the sessions as well as how to if they are going to change their behaviour and how they plan to do so. Finally, an award ceremony will take place where participants will receive a certificate along with a title of an environmental champion in front of the whole group to establish an identity as an environmental activist/champion etc. The participants who

won the pro-environmental activity challenge will also receive a certificate and prize where after everyone will enjoy a picnic together. During the picnic a slideshow will be presented with photographs and videos taken from session 1-3 to encourage reflection and integration of what they have learned about the impact of littering.

**Phase 2: Review by expert panel**

## *3.3 DATA COLLECTION*

### *3.3.1 Approach*

The intervention programme proposed above was subsequently evaluated and further refined with the input of an expert/advisory panel. This approach was selected because it is an effective technique which is relevant to this study (Linstone & Turoff, 1975). Qualitative methods of data collection and analysis were used. The following questions were sent to the panel for input: (1) What are the strengths of the programme? (2) What are the weaknesses of the programme? and (3) How do you think the programme could be improved, etc.?

### *3.3.2 Sampling*

The selection of the panel of experts was done by means of expert sampling (Trotter, 2012). Seven experts were chosen that are experts in the field of environmental psychology and in the development of littering prevention intervention programmes.

### *3.3.3 Participant (expert panel) profile*

All the participants have extensive knowledge and or experience in the fields of environmental sciences, social sciences, psychology, or a combination of these sciences. All but one has PhD's in their respective fields, with 4 participants holding professorial positions. The first participant has a DPhil in Psychology and is a Professor at the University of Pretoria with the following research interests: research methodology, teaching research methods and environmental psychology. The second participant has a PhD in Animal, Plant and Environmental Sciences and is a

researcher at the University of Witwatersrand and a project manager for WESSA (Wildlife & Environment Society of South Africa) with the following research interests: insect biology (distribution, life cycle and fecundity), host plants (for food, oviposition and shelter), together with an analysis of its socio-economic and conservation status. The third participant has a PhD in Psychology and is a lecturer at the Adekunle Ajasin University, Nigeria with the following research interests: Social Psychology and the promotion of responsible environmental behaviour. The fourth participant has a PhD in Psychology and is a Professor at the North-West University with the following research interests: clinical psychology, specifically self-regulatory and adaptive behavioural systems. The fifth participant has a PhD in Psychology and is a Professor at the North-West University with the following research interests: relations, families or communities and identity formation from a Gestalt theoretical perspective. The sixth participant has a PhD in Social Work and is a Professor at the North-West University with the following research interests*:* Psychosocial health of individuals, groups and communities. The seventh expert is a lecturer at the Tshwane University of Technology in the faculty of Science and the Ndumo community project coordinator from the Department of Nature Conservation.

### *3.3.4 Data analysis*

The data processing was done without any special software. All the reports were processed manually by desk research for thorough identification, codification and categorization of data. This selected method of data analysis involved identifying, analysing and reporting themes in data (Nowell, Norris, White, & Moules, 2017). According to (Boyatzis 1998; Braun & Clarke, 2006) this method of qualitative data analysis reduces broad information into patterns and themes by means of a strategy of coding, in order to interpret data and to answer the research questions, which is be described individually under the results section. It is described how the themes link up with findings in the literature study and it is evaluated whether and how the data answered the questions sent to the expert panel. The researcher attempted to be sensitive to what the participants contributed towards the programme in terms of strengths, weaknesses and suggestions. In analysing and interpreting the text,

the researcher attempted to be aware the researcher's own bias and of cultural biases. Self-reflection was aided by writing in a personal journal during the analysis process, indicating what the researcher felt to be prevalent and prominent themes emerging from the data.

The researcher read through the transcripts carefully to try and gain an overall understanding of the expert panel feedback. The importance of this stage is to familiarize oneself with the details, trying to get a holistic sense of the data before breaking it into parts (Agar, 1980; Schurink, Fouché & De Vos, 2011). In the data, trends or recurring patterns were identified that reflected what the participants felt most strongly about, or they placed the most emphasis on (Johnson-Hill, 1998). To create order out of the different patterns and commonalities of participant expressions, the process of initial coding was applied. Babbie (2013) describes this process as the classification and categorization of singular pieces of data in an effort to establish patterns that guide and lead to theoretical comprehension of social life within the collected data. This was followed by further analysis whereby textual codes were given to specific pieces of data which corresponded with different themes. In this study, the researcher used a table format to organize the data. The table consisted of the anonymised participant codes (no. 1-7) and their corresponding responses in clustered patterns or themes. The themes were named depending on its focus or subject matter. This naming process is called "conceptualizing the data" whereby the name stands for or represents a phenomenon (Schurink, Fouché & De Vos, 2011). As the researcher reads through the data similar phenomena can be given the same name. The name given to each theme or category is the one that seems most logically related to the data it represents and relevant to the questions sent to the participants. The themes were then reviewed to ensure that they form a logical pattern. Data were re-arranged or refined by splitting, combining and discarding irrelevant themes so as to remain only with themes that were consistent, meaningful and answered the research question. Finally, selective coding was done whereby all themes were scrutinized into a selected number that comprised the final presentation, reducing it to a small, manageable set of themes to write into the final narrative (Schurink, Fouché & De Vos, 2011).

**Table 3.3**

**Report results of experts**

| Categories | Themes | Verbatim quotes |
|---|---|---|
| Insufficiencies and suggestions for improvements | Activities: insufficiently described/ explained<br><br>Number of times emerged in data: 4 | Expert 1:<br>"This is not clear…", *"The participants will be physically exposed to different natural environments to show them the contrast between a highly polluted and degraded environment vs. a well-preserved environment".*<br>"Not clear what activity this is?" *"Participants will be asked to share what pro-environmental activities pertaining to littering, they have done for the homework activity."*<br>Expert 2:<br>"??" *"Relevant input will be provided by the programme facilitated as required."*<br>Expert 6:<br>"Define*:" "The researcher gives out a piece of paper with the instructions listed below, a notepad and pen and participants are given 10 minutes to find* ***whatever*** *is needed. Participants can make notes, drawings of take photographs of what they are instructed to find. Everyone gathers after 10 minutes to discuss their findings*." |

| | |
|---|---|
| Activities: | Expert 5: |
| Gamification | "…It needs some 'fun' activities …. We must be careful not to treat them as adults even though they are. In every adult there is a child waiting to play and learn. We have forgotten about play. People learn whilst having fun… get fun back into this programme. Think dramas, hands-on activities, trashion shows, toi (with litter banners), etc…" |
| Number of times emerged in data: 8 | "Maybe use drama instead of a power point presentation – should work better than a formal power point presentation as litter is a sensitive issue) followed by a small group discussion (groups of 5) …with set questions to brainstorm."<br>"Then expose the participants to various scenes (polluted areas) and green zones (non-polluted areas) … if any exist. It may look clean, but quality of air and water. Hold discussions at each site … drawings of what they see/feel. These drawings are crucial for evaluative purposes. With a short written (descriptive of what the see/feel) at the back of each drawing. Remember, they may be adults but, in each person, there is a child with great responses. The person must feel free to express feelings."<br>"Problem solving technique must lead to action groups (all depends on outcomes from discussions)" *"The participants will be made aware of the impact that the anti-environmental behaviour, littering, has on the environment by means of a PowerPoint presentation that will include research findings, photos and video clips describing the problem."*<br>"I have tried this, and this ice breaker failed on me. Remember icebreakers must link into the theme … play the plastic game. Its team work or a treasure hunt through campus looking for clues." "*Participants will be asked to draw a picture that could be associated with their name or would visually demonstrate it."*<br>"Excellent – but then what? How about a trashion show where the participants make items of clothing and present their designs. Also think of banners …. Need to make the message clear (not just a matter of clean up) … get the message out. Get them to write articles in the local paper – what they think about litter and what can be done. Remember start locally then get it national." *"Participants will take* |

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| | *part in a practical exercise in the form of a clean-up session. During this session participants will be briefed on the technical and safety precautions of a clean-up activity (wearing gloves, having a black refuge bag etc.).”*<br>Expert 6:<br>“I am looking forward to your results on this. I tried making Eco-bricks and building a bench with learners. It was a very fun activity, but I am not sure if it made a difference to littering.”<br>“I wonder if it would be helpful to get people to guess how long their litter takes to breakdown e.g. cigarette butt, chip packet etc. In this was we start to get people thinking about circular rather than linear economies. Changing not only littering behaviour but also the packaging we produce in the first place. E.g. sucker sticks. Why are plastic? They used to be paper a few years ago and at least could decompose. These are being thrown all over SA by kids and are cheap.” |
| Participants: recruitment process unclear<br><br>Number of times emerged in data: 6 | Expert 1:<br>“Who will the exact participants be? Undergraduate students? Staff? Both? That will determine the relevance of the exercises”<br>“This takes me back to my question in the beginning -who will participants be. If undergraduate students, the activities may be more effective”<br>Expert 2:<br>“I have a little bit of a concern about the age group the programme will focus on. The programme contents maybe more suitable on the level of high school learners, than that of university students.”<br>Expert 5:<br>“Also, what is the size group? First years/ Second years and time factors for the students. Can it not be interlinked into the syllabus …? Also, what are the participants studying? |

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| | Expert 7:<br>"It's not clear how participants will be chosen – it may be important to distinguish between their environmental attitudes."<br>"This sounds a bit judgemental. How are you going to select the participants? What about those who already do not litter?" |
| Increase intrinsic motivation: Not enough emphasis on factors such as cultural and/or religious morals and values that contribute towards intrinsic motivation | Expert 3:<br>"I totally agree with this goal, but I'm not convinced that the activities as described here will really improve/enhance intrinsic motivation? Also, what is the idea regarding 'extrinsic' rewards/motivation? Would real change not be brought about by being intrinsically motivated? Is the problem with sustainability of a positive environmental attitude (if present) not the fact that people are usually only extrinsically motivated?"<br>"The focus is also perhaps too strong on providing external rewards, and not enough on the development of intrinsic motivation."<br>Expert 4:<br>"I expected you to ask the participants about their cultural belief about litter and littering, and how they deal with this problem in their own culture."<br>"I think this aspect should also focus on practical personal efforts/actions that participants can take to prevent littering their environment. For example, keeping their litter until they get to litter bin, providing litter bins etc."<br>"I think this should focus more on taken personal responsibility for preventing littering instead of externalising the responsibility to others. This should also focus on building personal capacity to tackle littering, e.g. empowerment."<br>Expert 5:<br>"… People from many different cultures have different views/opinions about litter as well as who is responsible. You will see so many different opinions here." |

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| Number of times emerged in data: 6 | |
| Littering: Focus on littering vs. recycling | Exert 4:<br>"I expected a definition of litter and littering at this point. I also expected examples of litter and littering behaviour. It is also important to define recycle and explain the difference or similarity between littering and recycling."<br>"Note: Recycling was not discussed in Session 2; Recycling and littering prevention activities are different things. Also, some litter are not recyclable. You need to deal with this issue." |
| Number of times emerged in data: 3 | Expert 7:<br>"So there are 2 aims for the project? Perhaps a bit ambitious. Recycling on its own is a huge area to cover. On reading further it seems that the 2 aims are comingled and are not addressed as separate initiatives. The programme makes the assumption that by addressing littering people will start recycling – this is a big assumption and your examiners will ask what evidence you can provide for it. This document describes the programme, so it will be interesting to see how the participants' attitudes and behaviours are measured pre and post the intervention." |
| The location of the intervention. | Expert 2:<br>"Further the programme contents focus a lot on the benefits of nature and how a good feeling about nature may impact on a pro-environmental attitude – this can be a strength, but also a constraint since it seems like a more general area (grass field / close to a river / woods). If the programme wants to address littering on CAMPUS (of any university), I would suggest a more campus focused programme…" |

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| Number of times emerged in data:5 | "If these environments are not on campus, I think it may result in findings that are 'generic' and not specifically focusing on littering at universities."<br>Expert 3:<br>"Also, I wonder, to what extent is littering a problem on university campuses, in relation to general urban spaces?"<br>"where exactly? In SA? On campuses (refer to title of the study)?"<br>Expert 5:<br>"Will this be done on campus?" |

Themes identified from the expert panel feedback:

***Theme description***

*Theme 1: Activities are insufficiently described / explained*

Some of the experts were unclear about the logistics of the activities based on existing descriptions and explanations in the programme, for instance, the one of the experts made the following comment: "*Not clear what activity this is?*"

*Theme 2: Activities not 'fun' enough, include gamification*

A few of the experts mentioned that the activities were not fun enough and that the participants might find them uninteresting. The following were suggestions for games and activities from the expert panel:

- Ask participants to make drawings of what they see/feel, with a short-written piece (descriptive of what the see/feel) at the back of each drawing. These drawings can also be used for evaluative purposes.
- End each informative session with a small group discussion that should lead to an action plan.
- Have a litter treasure hunt - guess how long each piece of litter takes to degrade, the team with the highest score wins a prize.
- Play a game in each session, for instance throwing litter into a bin shaped as a basket, the person with the highest number wins a prize. Include an educational game on packaging e.g. biodegradable packaging or no packaging vs. non-biodegradable packaging or which every-day packaged items are more environmentally friendly.

*Theme 3: Increase intrinsic motivation*

The experts mentioned that more emphasis should be placed on increasing intrinsic motivation by linking up pro-environmental values such as not littering with similar established cultural morals and norms. As one example they suggested establishing a link between the value of not littering and Christian notions of man and woman's stewardship over (and consequent obligation towards) nature.

*Theme 4: Choosing participants*

The experts were unsure about who the target audience is for the programme and if the programme is specifically tailored to be effective for changing a specific groups' behaviour.

This feedback is consistent with findings from the literature review indicating the extent to which interventions are tailored to individuals or groups according to audience characteristics are crucial to effectiveness (Durantini, Albarracı´n, Mitchell, Earl, & Gillette, 2006; Davidson et al., 2003). This feedback was incorporated into the programme by taking into consideration the demographic factors of the participants taking part in this behavioural intervention. This was done by taking factors such as language, religion, culture, gender, age and political orientation into consideration when choosing relatable activities, videos, photos and presentations.

*Theme 5: Littering vs. recycling.*

Some of the experts considered recycling and littering as separate behaviours to address. For instance, one of the participants made the following remark "*Recycling was not discussed in Session 2; Recycling and littering prevention activities are different things. Also, some litter are not recyclable. You need to deal with this issue.*" Recommendations from some of the experts with regards to littering vs. recycling seem to agree that an effective intervention programme should focus changing one behaviour such as littering prevention or recycling but not both. Consequently, the feedback was incorporated into the programme by focusing primarily on littering behaviour, however, recycling is considered to be closely associated with PEB which is aligned with the aim of this study. Therefore, elements of recycling will still be included in the programme with emphasis on reducing littering behaviour.

Based on the feedback received from the expert panel, the initial program was subsequently modified and is presented in Table 3.4. A comprehensive discussion of the most prominent themes can be found under the discussion section.

**Table 3.4**

**Phase 3: Finalised Modified Littering Intervention programme**

| **Modified Littering Intervention Programme** | | |
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| **Session 1:** | **Goal/s: Creating awareness** | **Brief description of sessions** |
| **Icebreaker: Choose your litter**<br>**15 min** | To help the researchers and participants to get to know each other and to create a relaxed and 'fun' atmosphere conducive to learning. | Placed on the ground will be many different examples of 5 types of litter: tin cans, paper, plastic, cigarette butts and glass. Each participant will be asked to pick up one piece of litter. Then participants will be asked to a group in which they think their litter could be categorized. In their groups they will have to choose a group name pertaining to the prevention of the type of litter they are grouped in e.g. *The tin Terminators* and give each person in the group nick names also relating to litter prevention e.g. Recycler Reggie |
| **Activities (Urgency and Association)**<br>**35 min** | To create basic awareness that the littering problem exists; and to provide information<br>To indicate the scale, urgency and relevance of the problem; | The participants will be made aware of the impact that the anti-environmental behaviour, littering, has on the environment by means of a PowerPoint presentation that will include research findings, photos and gripping video describing the problem.<br>The participants will be shown videos of different natural environments to show them the contrast between a highly polluted and degraded environment vs. a well-preserved environment. |

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| **20 min** | To break the problem down into smaller components (e.g. causes and consequences) and thereby deepen understanding of cause and effect; | After watching the videos of polluted and clean environments, participants will be asked to make drawings of what they see/feel, with a short, written description (descriptive of what the see/feel) at the back of each drawing. |
| **10 min** | Homework activity instructions. | At the end of this session participants will be asked to perform a pro-environmental activity (in their own time) with regards to littering each week, for the upcoming 4 weeks and to document these activities by means of photos or videos. |
| **Session 2:** | **Goal/s: Education and communication** | **Brief description of sessions** |
| **Icebreaker: Litter basketball…**<br>**15 min** | To help the researchers and participants create a relaxed and 'fun' atmosphere conducive to learning. | Participants will again break into the groups they formed in the previous session. The groups will then compete against each other by throwing litter in the form of trampled up newspapers (balls) from a certain distance through a hoop on top of a bin. The group with the highest number of newspaper balls thrown into the bin wins a prize. |
| **Activities: (Modelling and Demonstrations)**<br>**35 min** | To provide information, training, etc. on how to: Administer a clean-up activity/campaign | Participants will take part in a practical exercise in the form of a clean-up session. During this session, participants will be briefed on the technical and safety precautions of a clean-up activity (wearing gloves, having a black refuse bag etc.). |
| **Informational session**<br>**30 min** | To provide information, training, etc. on how to: Recycle | An informational session will be presented on how to recycle, where nearby recycling stations are, how the process of recycling works and possible entrepreneurial opportunities in recycling in South Africa |

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| **Operant conditioning**<br>**10 min** | Operant conditioning: to facilitate the provision of intrinsic and extrinsic rewards and feedback.<br>To foster the establishment of a new pro-environmental identity via discussion and acknowledgement in front of an audience. | Participants will be asked to share what pro-environmental activities pertaining to littering they have done for the homework activity. They will also be asked to discuss their experiences and feelings in relation to these activities in a group context. Following this, all participants in the homework activity will receive a certificate. The best activity (as voted for by the whole group) will receive a designated award (for example, two tickets to visit a nearby zoo). |
| **Session 3:** | **Goal/s: Dealing with barriers** | **Brief description of sessions** |
| **Icebreaker: Litter treasure hunt…**<br>**15 min** | To create a relaxed and 'fun' atmosphere conducive to learning. | Participants will break into their groups and embark on a litter scavenger hunt. This will entail that groups should pick up litter according to a list provided to them by the researcher, the team with the highest score wins a prize. |
| **Activities: Group discussions**<br>**35 min** | To identify and deal with physical and psychological barriers that might prevent non-littering behaviour; | The participants will be asked to engage in an informal discussion in their groups on their own experiences with littering and recycling and the barriers in their own lives that may cause or encourage littering and not being able to dispose of litter or recycle in the correct and responsible way. Participants will be asked to come up with an action plan to address littering and to find solutions that are applicable in their lives and communities. |
| **Dealing with psycho-social barriers** | To deal with psycho-social barriers preventing non-littering behaviour (an | A PowerPoint presentation and video clip will be played with information about how prominent leader figures and role models support anti-littering campaigns. The informational session will address common |

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| **30 min** | opinion leader will serve the purpose to remove the misconception that it is socially acceptable to litter). | misconceptions or 'myths' about littering for instance that littering creates jobs instead of causing economic degradation and health problems. |
| | To remove the psychological barrier of the limiting belief that one person's actions does not make a difference (supporting the development of an internal locus of control which is the extent to which people believe they can influence events and their outcomes). | Participants will watch a series of thought-provoking videos showing the impact of how one person's litter can impact the environment as well as of how one person's anti-littering behaviour can have a substantive positive impact on the behaviour of others. |
| **Operant conditioning**<br>**10 min** | Operant conditioning: to facilitate the provision of intrinsic and extrinsic rewards and feedback.<br>To foster the establishment of a new pro-environmental identity via discussion and acknowledgement in front of an audience. | Participants will be asked to share what pro-environmental activities pertaining to littering they have done for the homework activity. They will also be asked to discuss their experiences and feelings in relation to these activities in a group context. Following this, all participants in the homework activity will receive a certificate. The best activity (as voted for by the whole group) will receive a designated award (for example, two tickets to visit a nearby zoo). |

| Session 4: | Goal/s: Reflection, integration, intrinsic motivation and commitment | Brief description of sessions |
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| **Icebreaker: The Litter quiz... 15 min** | To create a relaxed and 'fun' atmosphere conducive to learning. | Participants break into their groups and take part in an on-line litter quiz that will be on interesting facts about reducing litter that they have learned about throughout the previous sessions e.g. guess which every-day items are more environmentally friendly in terms of packaging e.g. biodegradable packaging, consequences of litter etc. |
| **Activities: Focus group session 40 min** | To increase intrinsic motivation to engage in anti-littering behaviour. To learn about other cultures / religions values about the environment and specifically about littering. | Participants will be asked to sit in a group and discuss how looking after the environment/not littering, links up with each group members' values in their different cultures and religions and how the programme have influenced how the think about the environment. |
| **Operant conditioning 30 min** | To increase intrinsic motivation by encouraging participants to take on an identity of being environmentally conscious by recognizing and rewarding this identity in front of an audience. | An award ceremony will be held where participants will receive (in front of others) a certificate with title 'Environmental Champion'. This event will be attended by various stakeholders that will include representatives of the environmental conservation industry, tertiary education sector and local government. This ceremony will be followed by a Picnic and debriefing. |

### *3.5 DISCUSSION*

The main findings of this study can be broken down into the three sections in which the study was conducted. Phase1 entailed the development of a preliminary littering intervention programme on the basis of a literature review of existing littering programmes as well as an empirical study conducted by Evert et al. (Submitted) on EAs among undergraduate students in South Africa. This phase is an important first step and forms the foundation of any littering intervention programme (Steg & Vlek, 2009; Heimlich & Ardoin, 2008). In the development of this intervention programme, existing programmes were evaluated that were aimed at participant groups with demographic factors similar to those that are prevalent at South African universities, because these factors have been proven to influence EAs and subsequent littering behaviour (Schultz, Bator, Large, Bruni, & Tabanico, 2013; Franzen & Vogl, 2013; Milfont, 2007). During this phase the researcher identified a lack of research pertaining to the development on an intervention programme aimed at targeting littering behaviour in a South African context. Further emphasizing the need for environmental interventions in South Africa, is the lack of research in low- and middle-income countries of Asia, Africa, and Latin America, where many hot spots of threatened biodiversity are located (Clayton, 2012). Another gap identified in the environmental behaviour change literature is the lack of input from industry professionals with practical experience of effective littering intervention methods. Furthermore, Marouli (2002) noted in her research that multicultural environmental education programmes are often not inclusive of culturally marginalized groups. It is therefore, critical to invest more research on environmental interventions to target cultures such as the African culture in South Africa. This second phase of this study aimed to bridge this gap by subjecting the preliminary intervention programme based on a literature study to an expert panel for further input and refinement.

The experts were chosen not only because of their academic achievements in this field, but because of their practical experience in conducing littering behaviour interventions programmes. Similar approaches were followed by Leijdekkers, et al. (2015) who used a review of previous literature on PEB and frameworks and conducted a meta-analysis to design an intervention

programme. This expert panel approach has proven to provide the researchers with valuable feedback on how to improve the preliminary programme.

Phase 3 of this study involved the refinement of the programme via incorporating useful feedback from the expert panel, which was analysed by means of thematic analysis. Prominent themes that arose from the feedback were that activities are insufficiently described / explained. This theme is supported by research from Davidson et al. (2003) that suggests that it is crucial to add clear and detailed descriptions of intervention programmes to ensure that mode of delivery, type of materials, and implementation reflects the programme specifications. Consequently, the feedback was incorporated by taking careful consideration to include clear instructions and descriptions of the activities in the written programme as well as with briefing sessions during the intervention. Another prominent theme identified by the researcher is that the activities are not 'fun' enough and that more games should be include. Furthermore, the expert panel indicated that even though students are technically young adults, the power of learning through games in their life-phase should not be underestimated. In a longitudinal study based on the flow theory, team competition as an element of gamification was found to be rather effective at enhancing student engagement, even despite low levels of competence (Sepehr & Head, 2013). Moreover, student engagement in an intervention is a vital factor of the intervention programme's success (Christenson, Reschly & Wylie, 2012). Additionally, Watson, Hancock and Mandryk (2013) showed that non-intrinsically motivating self-study activities can be turned into engaging experiences by introducing gamification. They found that the system successfully addressed the three player needs described in the self-determination theory, competence, autonomy and relatedness to influence intrinsic motivation (Deci & Ryan, 1985; 1992), which links up with the findings from the literature review in *phase 1* of this study.

The importance of increasing intrinsic motivation was emphasized by the expert panel, for instance, one expert suggested establishing a link between the value of not littering and Christian notions of man and woman's stewardship over (and consequent obligation towards) nature. This feedback is consistent with the findings from the literature study that found intrinsic motivation to be an important diver of PEB (Ryan & Deci, 2000b; Van der Werff, Steg, & Keizer, 2013). This feedback was incorporated into the programme by adding a focus-group session with a few driving questions

centred on the participants' religious and cultural beliefs about the environment and specifically about littering. A series of follow-up questions aimed at instigating reflective awareness of the link between their beliefs and behaviour.

The contribution of this study is evident in the number of themes identified by the expert panel which was missing in the preliminary programme. This indicates the importance of including input from an expert panel to ensure that the programme is not only based on solid literature, but also on knowledge of what is effective in practice.

### *3.6 LIMITATIONS AND CONSIDERATIONS FOR FUTURE RESEARCH*

A number of limitations were encountered during the research. For instance, waiting for feedback from the experts proved to be time-consuming as they are industry professionals with their own time constraints. Another limitation was that a number of the concerns of the experts about the programme were already addressed in the literature study and therefore unnecessary. This is due to the experts only receiving the littering programme and not the literature review that led to the development of the programme. This rationale behind only sending the programme was to make the review of the programme and as time efficient and convenient as possible for the expert panel. A recommendation that came forward from this research is to send experts the document with the proposed programme along with a separate document containing the background information such as the literature review that led to the development of the programme. This will enable reviewers to have access to more information about the programme if they required it. Although there is ample research about the theories of behaviour change and intervention design, little research exists that addresses the implementation of interventions and whether these interventions were successful. As such, although the objective of producing a littering intervention programme was achieved, the programme needs to be tested in the field to evaluate its effectiveness.

## *3.7 CONCLUSION*

Human behaviour causing environmental degradation is a global, growing concern. To tackle this challenge, anti-environmental human behaviour should be modified (Gardner & Stern, 2002). However, there seems to be a lack of research that addresses the development of intervention programmes in a South-African context. Furthermore, littering, as identified by previous research and by observation is found to be a prevalent anti-environmental behaviour among university students (Furusa, 2015, Jancey et al. 2014; Sawdey *et al.* 2016; Schultz et al. 2013). The aim of this study was to develop a littering prevention behavioural intervention targeted at South African university students. The development of the programme was done by developing an initial programme by reviewing existing literature and subjecting this programme to an expert panel for review. The expert panels' feedback was used to refine and finalise the programme. The most prevalent themes that arose from the expert panel review was that activities are insufficiently described, the programme should focus on a specific behaviour such as littering behaviour, intrinsic motivation should be increased, and care should be taken when recruiting participants and finally the most prominent theme seemed to be that activities are not 'fun' enough. Moreover, these suggestions were used to modify the programme.

In addition to drawing attention to the lack of existing research on environmental behaviour and intervention research in South Africa, and providing an extensive literature review which summarises the guidelines for developing an environmental intervention programme in a South African context that could be useful for future research, the main contribution of this study was the development of a new littering intervention programme that has been tailored for the South African context.

## *3.8 ACKNOWLEDGEMENTS*

The researcher wishes to express her gratitude to the NRF for its financial contribution towards the completion of this research.

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# CHAPTER 4

## ARTICLE 3

## THE EVALUATION OF AN INTERVENTION PROGRAMME TO PROMOTE PRO-ENVIRONMENTAL ATTITUDES AIMED AT REDUCING LITTERING BEHAVIOUR AT A SOUTH AFRICAN UNIVERSITY


### *ABSTRACT*

Many environmental challenges, such as littering, are rooted in human behaviour. However little literature exists on successful intervention programmes aimed at changing environmental behaviour. Therefore, the twofold aim of this study was firstly to determine whether a specific behaviour such as littering could be influenced with a littering intervention programme, and secondly, to determine whether a littering intervention programme would have an influence on students' general environmental attitudes (EAs). The contribution of this study is to address the gap between theory and practice by evaluating a littering behaviour intervention programme aimed at influencing South-African university students' EAs to reduce their littering behaviour. This was done by measuring the students' littering behaviour with the Littering Prevention Behaviour Scale (LPBS) (Ojedokun, 2016) and their EAs with the Environmental Attitudes Inventory (EAI-24) scale (Milfont & Duckitt, 2010) before and after the intervention. In relation to the first aim, the results indicated that the programme was successful in changing the students littering behaviour. However, due to the lack of psychometric reliability that was found in the EAI-24, no reliable conclusions could be drawn in relation to the second aim in terms of how students' EAs were affected. This finding suggests that a need exists to find or create more psychometrically robust, reliable and valid approaches to measure EAs in an African context. In conclusion, the proposed littering behaviour prevention programme proved to be successful in influencing students littering behaviour in a relatively short time, which has significant implications for other universities also looking to successfully influence their students' littering behaviour.

**Key terms:** Environmental attitudes, littering, littering prevention behaviour scale, pro-environmental behaviour, interventions

## *4.1 INTRODUCTION*

Littering is one of the major threats to the environment and human well-being around the world and is especially prevalent in developing countries in Africa such as Nigeria and South-Africa (Nkwachukwu, Chima, Ikenna & Albert, 2013; Bator et al., 2011). Furthermore, it is evident that littering in South Africa is one of the greatest environmental health related- issues currently experienced by communities, especially in and around informal settlements, where awareness and service delivery are often non-existing (Armitage, Marais, & Pithey, 2001). The problem is further compounded by the fact that little to no literature exists on how to address this issue in the South African context, where complex multi-cultural beliefs, attitudes, norms and values can be found (Furusa, 2015). This macro trend can be observed on a micro level, especially among university students who stem from the affected areas, and who can potentially take new knowledge, pro-environmental attitudes and behaviour back to their original communities to positively impact these areas.

To be able to instil pro-environmental attitudes and behaviours among university students in the long term, altruistic, biospheric and egoistic values should be taken into account (De Groot & Steg, 2009). Altruistic attitudes and behaviours refer to concern for others, biospheric to concern for the environment and egoistic to concern for personal resources (Bouman, Steg & Kiers, 2018). The distinction between these three value orientations has been found to valid and useful for examining environmentally relevant behaviour by De Groot and Steg (2007). As such a study from Reddy (2016) on the environmental behaviour of young adults in South Africa, found that egoistic values were the most common of all the values, followed by altruistic values, with biospheric values possessing the least importance to the respondents. This finding is concerning as it suggests that young people of South Africa are more concerned about their own needs than that of the environment. In addition, a study by Evert, Coetzee and Nell (Submitted) shows that EAs among South African university

students lean more towards *utilization.* This is an anti-environmental factor, which support the idea of utilizing natural resources for human gain (Milfont & Duckitt, 2004). Their research also indicated that students scored low on questions that support conservation and protection of the environment which is associated with the pro-environmental factor of *preservation* on the Environmental Attitudes Inventory scale, developed by Milfont and Duckitt (2010). *Preservation* and *Utilization* refers to distinct dimensions used to measure ecological values as developed by Wiseman and Bogner (2003). Effective interventions are needed to change this egoistic and utilization orientation towards the environment into pro-environmental attitudes to influence littering behaviour.

Whilst a number of researchers have developed theoretical frameworks on how to understand, and in some cases reduce littering behaviour, little literature is available on the effectiveness of these interventions (Steg & Vlek, 2009; Steg, Bolderdijk, Keizer, & Perlaviciute, 2014; Kollmuss, & Agyeman, 2002). Therefore, this study aims to address the gap between theory and practice by evaluating the impact of a littering behaviour intervention programme, specifically developed to reduce South-African university students' littering behaviour in an attempt to have a positive impact on their attitudes towards the environment. The results from this study could add to the growing body of research related to Green Campus initiatives aimed at developing and implementing effective interventions designed to increase pro-environmental behaviour.

### *4.2 BACKGROUND*

Ojedokun, (2015) explains littering as the human act of dropping waste on bare ground in public places as opposed to disposing of it properly. This waste typically includes cigarette butts, plastic bags, cans, and an assortment of other items (Schultz et al., 2013). Littering behaviour stems largely from an individual's attitude and values towards the environment, according to Schultz et al. (2013). Milfont (2007) conceptualized environmental attitudes (EAs) as a psychological tendency expressed by evaluating the natural environment with some degree of favour or disfavour. Moreover, littering prevention behaviour can be classified under the umbrella term of pro-environmental behaviour (Bator et al., 2011). PEB's are individual actions that consciously seek to minimize harm to

the environment or helping behaviours directed toward the environment (Griskevicius et al., 2010; Inoue & Alfaro-Barrantes, 2015; Unsworth et al., 2013). The theories of reasoned action (Ajzen & Fishbein, 1980) and planned behaviour (Ajzen, 1991) share the underlying assumptions that behaviour follows attitude, and that by influencing attitude with the right message delivered through the right medium, people's PEB, including littering prevention behaviour, can be influenced.

### *4.2.1 Littering in South Africa*

Littering has been identified as a significant environmental issue in South Africa (Bator & Schultz, 2011; Jancey et al. 2014; Lee et al. 2013; Pires et al. 2016; Sawdey et al. 2011; Seitz et al. 2012; Schultz et al. 2013). To be able to address this issue of littering in a developing country such as South Africa, it is necessary to understand who are responsible for littering and why they litter. To answer the first question, Beck (2007) found that littering is prevalent among young people (ages 18-29). This is concerning as young people are the policy makers and leaders of the future. University students, whose average age falls in the aforementioned age bracket, have been found to be a demographic group guilty of littering (Ajaegbo, Dashit & Akume, 2012). This makes them potentially good targets for a littering behaviour intervention programme (Levine & Strube, 2012). The second question of why South Africans litter, could be explained in terms of the locus of control theory, which is described by Ajzen (2002) as perceived control over enactment of a behaviour, having a considerable effect on a persons' intentions and actions. Moreover, Pavalache-Ilie and Unianu (2012) indicated a significant relationship between students' perceived locus of control and their ecocentric concern, which is a term closely related to biospheric concern, referring to concern for the impact of humans on the environment. In the same study support for interventionist conservation policies was associated with perceived locus of control, this refers to support for policies regulating industry and the use of raw materials and the support for using alternative eco-friendly energy sources and practices (Milfont & Duckitt, 2010; Pavalache-Ilie & Unianu, 2012). As such, many South African students come from highly polluted neighbourhoods which might lead to the perception that their circumstances are out of their control and subsequently they might feel that their own littering

behaviour will not make a substantial difference. Furthermore, research suggests that an area that was already clean and tidy, was unlikely to be littered and the inverse of this was also found to be true; already highly littered areas were more likely to be further polluted (Lewis, Turton & Sweetman, 2009). Therefore, it is important to cultivate internality, which suggests that students should be made aware of their own power to make a difference and of the long-term and direct consequences of their behaviour on the environment. This can be done with environmental interventions aimed at raising awareness and encouraging students to accept responsibility to behave in an environmentally responsible manner rather than relying on others to solve environmental issues (Pavalache-Ilie & Unianu, 2012).

### *4.2.2 Existing research on littering intervention programmes*

While a broad range of social and behavioural science theories are available, the actual application of these theories in an intervention programme remains a real challenge for environmental managers at schools, universities and businesses (Glanz & Bishop, 2010; Michie & Abraham, 2004). The need for the development of a littering intervention programme in an African, and more specifically a South-African context, is vital. The reason for this is because research on environmental interventions have mostly been conducted in high-income countries even though most population growth is occurring in low- and middle-income countries of Asia, Africa, and Latin America, where many hot spots of threatened biodiversity are located (Clayton, 2012). Furthermore, Marouli (2002) noted in her research that multicultural environmental education programs often really only target culturally marginalized groups, excluding the dominant one(s). It is therefore, critical to invest more research on inclusive environmental interventions to target a variety of cultures.

This approach entailed the development of a preliminary programme by reviewing existing literature and identifying reoccurring and prominent themes of intervention programmes aimed at reducing littering behaviour in a multi-cultural South African context, specifically among university students. The programme was then subjected to an expert panel review. The expert panel consisted of environmental psychology and education experts both in the academic and environmental

management sectors. The feedback of the expert panel was thematically analysed and subsequently used to make improvements to the intervention programme. The final programme is reproduced in Table 4.1. In summary, it is recognised there is a lack of research that evaluates the effectiveness of strategies to impact littering behaviour and PEB's in a South African setting (Steg & Vlek, 2009). In response to this, an intervention programme was developed to address littering behaviour among South-African university students, and in the present study, this programme was subsequently implemented and empirically assessed to determine its effectiveness.

### *4.2.3 General description of the Littering Behaviour Prevention Programme*

The programme consisted of 4 sessions that were conducted over 4 weeks. The duration of each session was 2 hours. This duration was selected in order to have an optimal impact without being to time constraining or fatiguing for the participants. Each of the four sessions began with an icebreaker to help the researchers and participants to get to know each other and to create a relaxed and 'fun' atmosphere conducive to learning. The icebreaker consisted of a game-based activity or challenge in a group to make new friends, enhancing their enjoyment of the programme, likely resulting in committing to the programme. This was followed by an informational session targeting the main goal of each session identified during the literature review namely; creating awareness, providing education and communication about environmental issues; dealing with barriers, and finally, providing opportunity for reflection, integration, intrinsic motivation and commitment to change behaviour. Each of these goals was identified as being important to address in the context of a littering intervention programme in existing literature. Each session concluded with an opportunity to share a pro-environmental activity done in the participants own time throughout the week. This activity typically took the form of a competition to enable operant conditioning in the form of rewards and to provide the opportunity for the participants to identify as environmental champions, increasing the chances of changing their littering behaviour and potentially their overall EAs to influence their PEB. However, the effectiveness of this programme has not yet been evaluated empirically and as

such it is unclear whether or not it will be effective at reducing the incidence of littering among South African university students.

### *4.2.4 Aim of the study*

The aim of the study was to evaluate the proposed littering intervention programme by means of a quasi-experimental pre-test/post-test design.

## *4.3 METHODOLOGY*

### *4.3.1 Research Design*

The research design is a quasi-experimental pre-test/post-test which requires a pre-test and post-test for an intervention group (Creswell, 2005) as illustrated below in Figure 4.1.

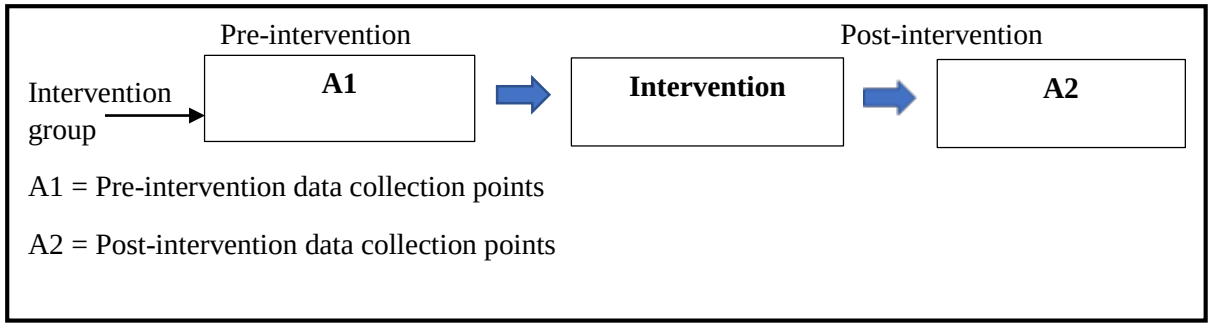


**Figure 4.1: Visual diagram of a quasi-experimental pre-test/post-test design**

In a pre-test-post-test design, the dependent variable is measured once before the treatment is implemented and once after it is implemented. If the latter mean score is better than the pre-test score, and if this difference is found to be statistically significant, then one might conclude that the treatment might be responsible for the improvement (Cook & Campbell, 1979; Creswell, 2005).

**Table 4.1**

**Littering Intervention Programme (Evert et al., Submitted)**

| **Session 1:** | **Goal/s: Creating awareness** | **Brief description of sessions** |
|---|---|---|
| **Icebreaker:**<br>**Choose your litter**<br>**15 min** | To help the researchers and participants to get to know each other and to create a relaxed and 'fun' atmosphere conducive to learning. | Placed on the ground were many different examples of 5 types of litter: tin cans, paper, plastic, cigarette butts and glass. Each participant was asked to pick up one piece of litter. Then participants were asked to a group with other participants in which they think their litter could be categorized. In their groups they had to choose a group name pertaining to the prevention of the type of litter they are grouped in e.g. *The tin Terminators* and give each person in the group nick names also relating to litter prevention e.g. Recycler Reggie |
| **Activities** | To create basic awareness that the littering problem exists; and to provide information | The participants were made aware of the impact that the anti-environmental behaviour, littering, had on the environment, by means of a PowerPoint presentation that included research findings, photos and gripping video describing the problem. |

| | | |
|---|---|---|
| **(Urgency and Association)**<br><br>**35 min** | To indicate the scale, urgency and relevance of the problem; | The participants were shown videos of different natural environments to show them the contrast between a highly polluted and degraded environment vs. a well-preserved environment. |
| **20 min** | To break the problem down into smaller components (e.g. causes and consequences) and thereby deepen understanding of cause and effect; | After watching the videos of polluted and clean environments, participants were asked to make drawings of what they saw/felt, with a short, written description (descriptive of what the saw/felt) at the back of each drawing. |
| **10 min** | Homework activity instructions. | At the end of this session participants were asked to perform a pro-environmental activity (in their own time) with regards to littering each week, for the upcoming 4 weeks and to document these activities by means of photos or videos. |
| **Session 2:** | **Goal/s: Education and communication** | **Brief description of sessions** |
| **Icebreaker: Litter basketball…**<br><br>**15 min** | To help the researchers and participants create a relaxed and | Participants were again asked to break into the groups they formed in the previous session. The groups then competed against each other by throwing litter in the form of trampled up |

| | | |
|---|---|---|
| | ‘fun’ atmosphere conducive to learning. | newspapers (balls) from a certain distance through a hoop on top of a bin. The group with the highest number of newspaper balls thrown into the bin won a prize. |
| **Activities: (Modelling and Demonstrations)** **36 min** | To provide information, training, etc. on how to: Administer a clean-up activity/campaign | Participants took part in a practical exercise in the form of a clean-up session. During this session, participants were briefed on the technical and safety precautions of a clean-up activity (wearing gloves, having a black refuse bag etc.). |
| **Informational session** **30 min** | To provide information, training, etc. on how to: Recycle | An informational session was presented on how to recycle, where nearby recycling stations are, how the process of recycling works and possible entrepreneurial opportunities in recycling in South Africa |
| **Operant conditioning** **10 min** | Operant conditioning: to facilitate the provision of intrinsic and extrinsic rewards and feedback.<br>To foster the establishment of a new pro-environmental identity via | Participants were asked to share what pro-environmental activities pertaining to littering they have done for the homework activity. They were also asked to discuss their experiences and feelings in relation to these activities in a group context. Following this, all participants that partook the homework activity, received a certificate. The best activity (as voted for by the whole group) received a designated award (for example, two tickets to visit a nearby zoo). |

| | | |
|---|---|---|
| | discussion and acknowledgement in front of an audience. | |
| **Session 3:** | **Goal/s: Dealing with barriers** | **Brief description of sessions** |
| **Icebreaker: Litter treasure hunt… 15 min** | To create a relaxed and 'fun' atmosphere conducive to learning. | Participants were asked to break into their groups and embark on a litter scavenger hunt. This entailed that groups should go pick up litter according to a list provided to them by the researcher, the team with the highest score won a prize. |
| **Activities: Group discussions 35 min** | To identify and deal with physical and psychological barriers that might prevent non-littering behaviour; | The participants were asked to engage in an informal discussion in their groups on their own experiences with littering and recycling and the barriers in their own lives that may cause or encourage littering and not being able to dispose of litter or recycle in the correct and responsible way. Participants were asked to come up with an action plan to address littering and to find solutions that are applicable in their lives and communities. |
| **Dealing with psycho-social barriers 30 min** | To deal with psycho-social barriers preventing non-littering behaviour (an opinion leader will serve the purpose to remove the misconception that it is socially acceptable to litter). | A PowerPoint presentation and video clip were played with information about how prominent leader figures and role models support anti-littering campaigns. The informational session addressed common misconceptions or 'myths' about littering for instance that littering creates jobs instead of causing economic degradation and health problems. |

| | | |
|---|---|---|
| | To remove the psychological barrier of the limiting belief that one person's actions does not make a difference (supporting the development of an internal locus of control which is the extent to which people believe they can influence events and their outcomes). | Participants watched a series of thought-provoking videos showing the impact of how one person's litter can impact the environment as well as of how one person's anti-littering behaviour can have a substantive positive impact on the behaviour of others. |
| **Operant conditioning**<br><br>**10 min** | Operant conditioning: to facilitate the provision of intrinsic and extrinsic rewards and feedback.<br><br>To foster the establishment of a new pro-environmental identity via discussion and acknowledgement in front of an audience. | Participants were asked to share what pro-environmental activities pertaining to littering they have done for the homework activity. They will also be asked to discuss their experiences and feelings in relation to these activities in a group context. Following this, all participants in the homework activity received a certificate. The best activity (as voted for by the whole group) received a designated award (for example, two tickets to visit a nearby zoo). |

| Session 4: | Goal/s: Reflection, integration, intrinsic motivation and commitment | Brief description of sessions |
|---|---|---|
| **Icebreaker: The Litter quiz...**<br><br>**15 min** | To create a relaxed and 'fun' atmosphere conducive to learning. | Participants broke into their groups and took part in an on-line litter quiz that was on interesting facts about reducing litter that they have learned about throughout the previous sessions e.g. guess which every-day items are more environmentally friendly in terms of packaging e.g. biodegradable packaging, consequences of litter etc. |
| **Activities: Focus group session**<br><br>**40 min** | To increase intrinsic motivation to engage in anti-littering behaviour. To learn about other cultures / religions values about the environment and specifically about littering. | Participants were asked to sit in a group and discuss how looking after the environment/not littering, links up with each group members' values in their different cultures and religions and how the programme have influenced how the think about the environment. |

| | | |
|---|---|---|
| **Operant conditioning**<br><br>**30 min** | To increase intrinsic motivation by encouraging participants to take on an identity of being environmentally conscious by recognizing and rewarding this identity in front of an audience. | An award ceremony was held where participants received (in front of others) a certificate with title 'Environmental Champion'. This event was attended by various stakeholders that will include representatives of the environmental conservation industry and tertiary education sector. This ceremony was followed by a Picnic and debriefing. |

### *4.3.2 Setting of the study*

The study area for the intervention programme is the culturally diverse, Vanderbijlpark campus of the North-West University (NWU), South Africa, situated on the banks of the Vaal River. The Vanderbijlpark campus was selected because is a good representation of the South African society with regards to demographics. For instance, according to the website, *IndexMundi* (2018), the SA society consists of black African 80.2%, white 8.4%, coloured 8.8%, Indian/Asian 2.5%. These numbers are very similar to the ethnic composition of the Vanderbijlpark campus. Furthermore, the campus is logistically closer and easier accessible to the researchers. The Vanderbijlpark campus boasts a unique environmental setting, with various species of game roaming the campus grounds (North-West University, 2018). According to the NWU's official website the estimated number of students enrolled at this campus in 2017 were around 7,925. The student population per race consisted of 6,507 African students, 160 mixed race, 129 Indian/Asian, 1,127 White and the number of unknown students were 2. The Vanderbijlpark campus is situated in the town of Vanderbijlpark and has an estimated population of 95,840. About 60% of the town's workforce is employed in factories. The rest work for the Government, private businesses, shops, or in the service sector (North-West University, 2018).

### *4.3.3 Participants and sampling*

Thirty-six participants responded to the invitation and completed the pre-test. Over the course of the intervention, 12 participants dropped out, and therefore 24 participants completed the littering behaviour prevention programme and post-test. Ages of the participants ranged from 18 to 27 years (M = 21.46, SD = 1.91). Other characteristics are set out in Table 4.2. Given the association that previous research has revealed between EAs and income bracket, connectedness to nature, and political orientation, these were also assessed. The participant group was found to lean slightly towards the liberal end of the spectrum in terms of their political views (M = 2.37, SD = 1.25) as measured on a 5-point scale. Political orientation was measured on a scale from 1 – 5, 1=extremely liberal and 5= extremely conservative. M = 2.37 refers to the mean participants scores. The

participants also fell into the moderate to low family income bracket (M = 43.25, SD = 27.76), as measured on a sliding scale from 0 (Lower) to 100 (Upper). The participant group exhibited moderate to high levels of connectedness to nature (M = 64.58, SD = 26.26), as measured on a scale from 0 (Not connected) to 100 (Very connected).

Ages of the drop-out group ranged from 18 to 24 years (M = 20.92, SD = 1.73), which is not dissimilar from that of the participant group who completed the intervention. The drop-out group was also found to lean very slightly towards political liberalism (M = 2.67, SD = 0.99), as measured on a 5-point scale, and fall into the moderate to low family income bracket (M = 50.92, SD = 24.43), as measured on a scale from 0 (Lower) to 100 (Upper). The drop-out group were found to have moderate to high levels of connectedness to nature (M = 65.50, SD = 32.47), as measured on a scale from 0 (Not connected) to 100 (Very connected).

**Table 4.2**

***Characteristics of the participants* (*n* = 24) *and drop-out group* (n=12)**

| | | Participants (n=24) | Dropout group (n=12) |
|---|---|---|---|
| Item | | % | % |
| Gender | Male | 16.7 | 58.3 |
| | Female | 83.3 | 41.7 |
| Ethnicity | African | 100 | 91.7 |
| | White | 0 | 8.3 |
| Religion | Christian | 87.5 | 91.7 |
| | Traditional African religion | 12.5 | 8.3 |
| Member of environmental organisation | Member | 4.2 | 8.3 |

As is evident from Table 4.2, the racial, religious and age demographics, as well as the degree of connectedness to nature of the drop-out group and the participant groups are very similar. However, participants who dropped out of the study appear to be fractionally more politically conservative than the group who completed the study, and also classified themselves as falling into a slightly higher income bracket. As such, this would very tentatively suggest that somewhat more

liberal students from families with lower income brackets were more likely to complete the study. Similarly, Craffert and Willers (1994) found that monthly income correlated positively with the tendency to be concerned about and aware of environmental issues. This may imply that the drop-out group were already more inclined towards pro-environmental attitudes and behaviour than the experimental group and might feel that the study is not applicable to them. Whilst the reasons for this cannot be determined with certainty from the data, it could be speculated that due to the fact that refreshments and basic meals were provided during each session as part of the ethical requirements of the study, the programme would have been rendered more attractive to students with lower income brackets than to their peers from higher income bracket contexts. Furthermore, students who are slightly more liberal-minded might also be more open to new ideas and experiences than their more conservative counterparts who may have a slightly more pronounced preference for the status quo. This notion seems to be supported by several studies indicating that pro-environmental EAs are positively related to liberal political ideology (Fransson & Gärling, 1999; Theodori & Luloff, 2002; Milfont, 2007).

Whilst these notions are speculative, is important to consider the possibility that the outcome of the intervention might have differed if these participants had not dropped out. As such, this is a limitation that needs to be considered when interpreting the results of the study.

### *4.3.4 Procedure and ethical considerations*

Ethical clearance to conduct the research was obtained from the NWU's Health Research Ethics committee. An invitation to take part in the study was sent to students by means of the university's electronic online communication platform (eFundi). All participants who agreed to take part in the study were asked to sign a written consent form which explained to them that their participation would be entirely voluntary and confidential and could be terminated at any time without penalty.

Participants were requested to access and complete a pre- and post-intervention questionnaire online. Questionnaires were completed in an anonymous format, with participants only being

identified via a unique participant number known only to them. This strategy was also deemed to be of importance from a methodological point of view, in order to maximise the likelihood of avoiding response bias and obtaining honest ratings on the scales included in the questionnaire. Responses were captured electronically by direct loading into a website database as a password restricted file, and subsequently extracted into SPSS for analysis.

### *4.3.5 Data collection*

The pre-intervention questionnaire consisted of demographic questions, the LPBS (Ojedokun, 2016), and the EAI-24 scale (Milfont, 2007). The (EAI-24) scale is a culture-general and fully-balanced assessment-tool developed to measure the multidimensional and hierarchical structure of EAs (Milfont, Duckitt & Wagner, 2010a). This inventory captures both the vertical and horizontal structure of EAs by measuring twelve specific facets, or first-order factors that define the two-dimensional higher order structure of EAs (i.e., *Preservation* and *Utilization*). The scale consists of 24 items, with two positively worded and two negatively worded items for each of the 12 subscales, with all items being assessed on a 5-point Likert scale. Example items include: '*I really like going on trips into the countryside, for example to the bushveld or nature reserves*' and '*I think spending time in nature is boring*'.

The LPBS (Ojedokun, 2016) was developed to be a valid measure of littering prevention behaviour and to evaluate the effectiveness of behaviour change interventions designed to increase littering prevention behaviour. The scale consists of 44-items and is a self-report measure with a Likert-scale response format ranging from never (1) to always (5). The higher the scores, the higher the individual's tendency to engage in littering prevention behaviour is. Example items include: '*Tell litterers that littering harms the environment*' and '*Show family and friends the difference between a clean and littered environment*'.

The post-intervention questionnaire was identical to the pre-intervention questionnaire, except that biographical information was not assessed as this data had already been captured during the pre-test. The following qualitative questions were added to the post-intervention questionnaire to obtain

explanatory data related to the quantitative results, and to obtain evaluative data on how to improve the programme in the future:

- 'Did the programme change the way you think about littering? If so, please elaborate how?'
- 'Are you planning to implement what you have learned in this programme in your own life? If so, how?'
- 'What did you enjoy the most about this programme and why?'
- 'What did you enjoy the least about this programme and why?'
- 'What suggestions do you have to improve this littering prevention programme?'

### *4.3.6 Data analysis*

Quantitative data

The inter-item reliability of the LPBS and EAI-24 scales and sub-scales were assessed via Cronbach's alpha coefficients, with scales and subscales equalling or exceeding the threshold of 0.7 being regarded as exhibiting adequate inter-item reliability (Field, 2005). In the case of the LPBS, Cronbach's alphas of 0.93 and 0.94 were obtained for the pre-test and post-test, respectively, suggesting that the scale has reliably measured its underlying construct. However, in the case of the EAI-24, most subscales exhibited Cronbach's alpha coefficients that were below the threshold of 0.7 (see Table 4.4 for a complete listing of all reliability coefficients). Only two of the EAI-24 subscales exhibited acceptable levels of reliability in both the pre-test and post-test conditions, subscale 1 (support for interventionist conservation policies) and subscale 9 (Human dominance over nature). The low reliabilities associated with the remaining subscales suggest that the measurement of EAs by means of the EAI-24 might be problematic in the context of South African student groups such as those who took part in the present study. Whilst reasons for this remain unclear, these results do raise the possibility that there might be a lack of cross-cultural construct equivalence in terms of EAs, given that the scale has found to be reliable in most Western cultural contexts (Milfont, Duckitt & Wagner, 2010a). Given the lack of scale reliability, all further statistical tests were restricted to subscales 1 and 9. Validity of scales is commonly assessed by means of a confirmatory factor analysis strategy, which

is aimed at verifying that the proposed factor structure of a given scale is replicated in the context of the respondent group under investigation (Field, 2005). However, given the high levels of inter-sample fluctuation of correlation coefficients that commonly occur in small samples, for factor analysis to be conducted, a sufficient number of participants are required. Typically, it is suggested that there should be at least 10-15 participants per variable in order for factor analysis to be feasible (Field, 2005). In the context of intervention studies, where participant groups are typically much lower than this threshold, as was also the case in the present study, factor analysis could therefore not be employed. Once scale reliability was assessed, descriptive statistics such as means, standard deviations, variances, and ranges were computed for all variables using statistical software - SPSS. To assess mean differences between participants' pre-test and post-test scores for statistical significance, paired-samples t-tests were employed. In all instances, the cut-off level for statistical significance was set at $p < .05$ (Field, 2005).

Qualitative data

Qualitative data were collected with the aim of providing additional insight as to the impact of the programme, as well as its strengths, weaknesses, and concomitant suggestions for improvement, as perceived by the participants. Given the comparatively small size of the data set, the processing and analysis of the data were done manually without any special software. Thematic analysis was used to analyse the data, which is the process of reducing broad information into patterns and themes by means of a strategy of coding, in order to interpret data and to answer the research questions, which is be described individually under the results section. (Nowell, Norris, White, & Moules, 2017; Boyatzis, 1998)

The researcher read through the transcripts carefully to try and gain an overall understanding and to become familiar with participants' feedback on the littering prevention behaviour programme (Maguire & Delahunt, 2017). In analysing and interpreting the text, the researcher attempted to be aware of her own personal and cultural biases. The researcher is an Afrikaans speaking, white female from a middle class income bracket and is a protestant Christian. The researcher also identifies strongly with environmentalism. However, the researcher attempted to empathize with the perspective

of the participants and to gain a deeper understanding of the way African students think and feel about the environment. Self-reflection was aided by writing in a personal journal during the analysis process, indicating what the researcher felt to be prevalent and prominent themes emerging from the data, and doing this in conjunction with reflexive notes in relation to how the researcher's own positioning might have influenced her perspective on the data. In the data, trends or recurring patterns were identified and the process of initial coding was used to create order out of the different patterns in participant responses. The codes were clustered into broader themes that were named to represent an overarching or re-occurring phenomenon in accordance with the objectives of the study (Strauss & Corbin, 1990; Schurink, Fouché & De Vos, 2011). The themes were then reviewed to ensure that they form a logical pattern. The final document with the themes that emerged from the analysis of the feedback received from the participants can be seen in Appendix D.

## *4.4 RESULTS*

### *4.4.1 The Littering Prevention Behaviour Scale*

The participants' average score on the LPBS (as measured on a 5-point scale) was 2.97 (SD = 0.65) before the intervention, and 4.23 (SD = 0.48) after the intervention, a mean difference of 1.26. In order to assess whether this represents a statistically significant difference, the data were first assessed for normality, in order to facilitate the selection of the appropriate statistical test. As such, a Kolmogorov-Smirnov test was conducted in SPSS.

**Table 4.3. Kolmogorov-Smirnov tests of normality for LPBS scores**

| | Kolmogorov-Smirnov[a] | | |
|---|---|---|---|
| | Statistic | df | Sig. |
| LPBS Pre-test | .092 | 24 | .200* |
| LPBS Post-test | .104 | 24 | .200* |

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

As reflected in Table 4.3 by the non-significant result of the test (Field, 2005), the distributions of the participant group's mean scores on the LPBS during the pre-test as well as the post-test did not deviate significantly from a normal distribution, $D(24) = 0.92$, $p > .05$, and $D(24) = 0.1$, $p > .05$, respectively. As recommended by Field (2005), these results were confirmed by visual examination of the associated Q-Q plots, which indicate that observed values closely adhere to the values that are expected in a normal distribution (see Figure 4.2 & 4.3).

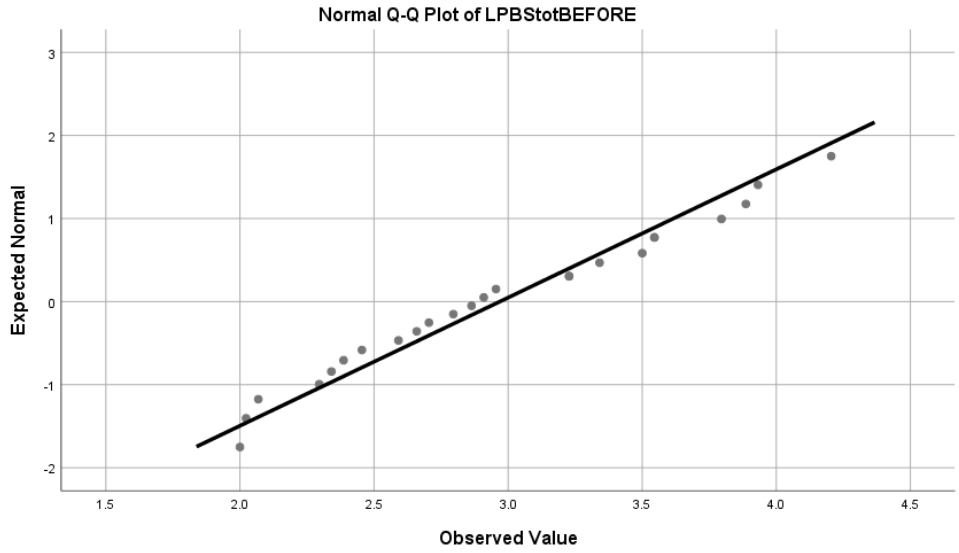


**Figure 4.2: Normal Q-Q plot of LPBS pre-test scores**

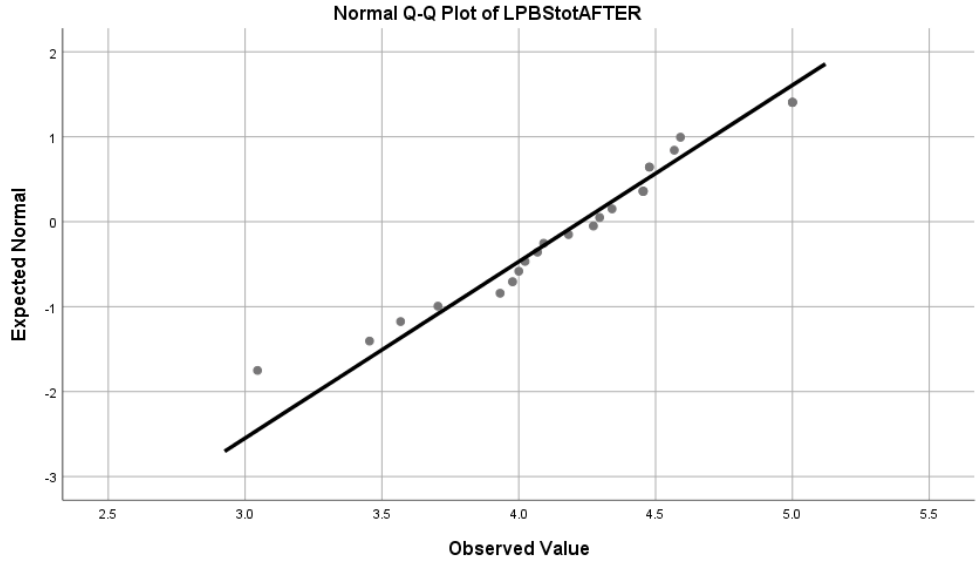


**Figure 4.3: Normal Q-Q plot of LPBS post-test cores**

As a result, a paired-samples t-test was identified as the appropriate test to assess the observed differences in the mean scores for statistical significance (Field, 2005). The results of this paired t-test showed that the difference between these means is statistically significant ($t$ = -7.61, df = 23, $p$ < .001, 95% CI: -1.60 to -.92), suggesting that the intervention was likely effective in reducing littering behaviour among the participants. To calculate the effect size of this difference, the formula: $d = (x_1 - x_2)$/mean *SD*, was used to compute Cohen's *d* (Brace, Kemp, & Snelgar, 2012). Results of this test indicate that the effect size was very large ($d$ = 2.23), implying that the programme made a very substantive difference to participants' self-reported littering behaviour.

The drop-out group's average score on the LPBS (as measured on a 5-point scale) was 3.54 (SD = 0.73). This suggests that this group might have been slightly more prone to littering prevention behaviour than the participant group who completed the study. It might also offer another feasible explanation as to why these participants dropped out, seeing that they were possibly already less likely to litter than their counterparts, and thus might have decided that the programme would not have much relevance to them.

### *4.4.2 The Environmental Attitudes Inventory – short form (EAI-24) scale*

Table 4.4 presents the results obtained from the EAI-24 in both the pre-test and post-test conditions, along with their associated reliability coefficients. Subscales 1 and 9 exhibited adequate reliabilities in both the pre-test and the post-test, and even though there were no statistically significant differences, contrary to expectations, scores for both these scales indicated that EAs were affected negatively by the intervention. According to Milfont and Duckitt, (2010) subscale 1 refers to *support for conservation policies* regulating industry and the use of raw materials, and subsidising and supporting alternative eco-friendly energy sources and practices, versus opposition to such measures and policies. It could be speculated that the students did not properly comprehend the question and/or that they might have become confused with the reverse phrased questions. Scale 9, *human dominance over nature*, assesses the belief that nature exists primarily for human use, versus the belief that humans and nature have the same rights (Milfont & Duckitt, 2010). Again, contrary to expectations,

scores were higher on the post-test than on the pre-test. A possible explanation of this could be found in relation to religiosity, as 87.5 % of the participants indicated they were Christians and may have understood *human dominance over nature* in the light of environmental stewardship (as will be discussed in more detail in the discussion section).

The other scales did not exhibit adequate reliabilities, as such, the extent to which this scale adequately and reliably measures EAs is called into question, and points to the existence of possible concerns about the cross-cultural equivalence of EAs as measured by the EAI-24, or to the presence of underlying psychometric issues related to the content, wording or language used in the scale. Participants' scores on the *environmental threat* subscale of the EAI-24 during the pre-test, suggest that as a group, the students had a comparatively low sense that the environment may be under threat. Furthermore, they had high scores on the *human utilization of nature* subscale which is the perception that nature exists primarily for human use. Participants scored high on the *confidence in science & technology* subscale which is the perception that human ingenuity, especially science and technology, can and will solve all current environmental problems and avert or repair future damage or harm to the environment. This implies that students may not realise the imminent and urgent need to protect natural resources and implies that there's a need to address the misconception that the responsibility for protecting the environment should be left to other people or to technological advancements.

Moreover, these subscales are associated with the anti-environmental higher order factor *utilization*. As such, participants' concern for nature was not only based on the extent to which it was viewed as serving human needs, but consumption of natural resources for human benefit was strongly endorsed.

**Table 4.4**

**Means, standard deviations and Cronbach's Alpha reliability coefficients for the EAI-24 pre-test and post-test subscales**

| | | Mean | N | Std. Dev. | Cronbach's alpha |
|---|---|---|---|---|---|
| Pair 1 | Support interventionist conservation policies (pre-test) | 2.58 | 24 | 0.69 | 0.78 |
| | Support interventionist conservation policies (post-test) | 2.31 | 24 | 0.98 | 0.75 |
| Pair 2 | Enjoyment of nature (pre-test) | 1.88 | 24 | 0.98 | 0.44 |
| | Enjoyment of nature (post-test) | 1.96 | 24 | 1.04 | 0.07 |
| Pair 3 | Environmental movement activism (pre-test) | 1.56 | 24 | 0.92 | 0.86 |
| | Environmental movement activism (post-test) | 1.25 | 24 | 0.57 | 0.60 |
| Pair 4 | Conservation motivation by anthropocentric concern (pre-test) | 2.92 | 24 | 1.31 | 0.57 |
| | Conservation motivation by anthropocentric concern (post-test) | 3.38 | 24 | 1.02 | 0.14 |
| Pair 5 | Confidence in science & technology (pre-test) | 2.67 | 24 | 1.09 | 0.78 |
| | Confidence in science & technology (post-test) | 2.13 | 24 | 1.10 | 0.64 |
| Pair 6 | Environmental threat (pre-test) | 1.75 | 24 | 1.08 | 0.76 |
| | Environmental threat (post-test) | 1.48 | 24 | 0.79 | 0.11 |
| Pair 7 | Altering nature (pre-test) | 2.31 | 24 | 1.04 | 0.21 |
| | Altering nature (post-test) | 2.60 | 24 | 1.08 | 0.01 |
| Pair 8 | Personal conservation behaviour (pre-test) | 2.42 | 24 | 1.00 | 0.47 |
| | Personal conservation behaviour (post-test) | 1.97 | 24 | 0.93 | 0.31 |
| Pair 9 | Human dominance over nature (pre-test) | 2.58 | 24 | 1.38 | 0.93 |
| | Human dominance over nature (post-test) | 2.90 | 24 | 1.52 | 0.76 |
| Pair 10 | Human utilization of nature (pre-test) | 3.46 | 24 | 1.14 | 0.75 |
| | Human utilization of nature (post-test) | 3.94 | 24 | 1.06 | 0.63 |
| Pair 11 | Ecocentric Concern (pre-test) | 2.60 | 24 | 1.19 | 0.72 |
| | Ecocentric Concern (post-test) | 2.04 | 24 | 1.04 | 0.62 |
| Pair 12 | Support for population growth (pre-test) | 4.44 | 24 | 0.68 | 0.20 |
| | Support for population growth (post-test) | 3.65 | 24 | 1.31 | 0.51 |

Paired-samples t-tests (Field, 2005) were used to determine the statistical significance of mean differences between 12 EAI-24 subscales in the pre-test and post-test conditions. Results of

these tests are reflected in Table 4.5. Only two of the subscales (8 and 12) were found to exhibit statistically significant differences. Analysis of the 12 subscales of the EAI-24 scale (as shown in Table 4.5) reveal that the participants' average score on the *personal conservation behaviour* subscale (as measured on a 5-point scale) was lower on the post-test (M = 1.92, *SD* = 0.93) than on the pre-test (M = 2.42, *SD* = 1.00, mean difference = 0.5). A paired *t*-test (as shown in Table 4.5) showed that the difference between these means is statistically significant (*t* = -2.20, df = 23, *p* < .038, 95% *CI*: 0.03 to 0.97). However, given the inadequate levels of reliability of the scales, this finding is extremely speculative at best, and cannot be considered as reliable, and as such, additional research would be required to ascertain if this pattern is replicated in future implementations of the programme. On the *support for population growth subscale* (as measured on a 5-point scale) participants scored lower on the post-test (M = 3.65, *SD* =1.31) than on the pre-test (M = 4.44, *SD* =0.68) with a mean difference of 0.79. A paired *t*-test (as shown in Table 4.5) showed that the difference between these means is statistically significant (*t* = 2.86, df = 23, *p* < 0.009, 95% *CI*: 0.22 to 1.37), suggesting that the intervention was successful in changing participants attitude towards supporting population growth, possibly suggesting that participants realised that there are limited amounts of resources and that population growth cannot be left unmonitored. However, given the low reliabilities associated with this subscale in both the pre-test as well as the post-test, this finding remains little more than speculation and cannot be regarded as valid without additional empirical verification.

**Table 4.5**

**Paired Samples t-tests**

| | | Paired Differences | | | | | *t* | *df* | Sig. (2-tailed) | Reliabilities | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean difference | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference Lower | Upper | | | | Before | After |
| Pair 1 | Support for interventionist conservation policies | 0.27 | 1.06 | 0.22 | -0.18 | 0.72 | 1.25 | 23 | .225 | 0.78 | 0.75 |
| Pair 2 | Enjoyment of nature | -0.08 | 1.02 | 0.21 | -0.51 | 0.35 | -0.40 | 23 | .692 | 0.44 | 0.07 |
| Pair 3 | Environmental movement activism | 0.31 | 1.04 | 0.21 | -0.13 | 0.88 | 1.47 | 23 | .155 | 0.86 | 0.60 |
| Pair 4 | Conservation motivation by anthropocentric concern | -0.46 | 1.09 | 0.22 | -0.92 | 0.003 | -2.06 | 23 | .051 | 0.57 | 0.14 |
| Pair 5 | Confidence in science and technology | 0.54 | 1.34 | 0.27 | -0.03 | 1.12 | 1.98 | 23 | .060 | 0.78 | 0.64 |
| Pair 6 | Environmental threat | 0.27 | 1.28 | 0.26 | -0.27 | 0.81 | 1.04 | 23 | .309 | 0.76 | 0.11 |
| Pair 7 | Altering nature | -0.29 | 1.22 | 0.25 | -0.80 | 0.22 | -1.18 | 23 | .252 | 0.21 | 0.01 |
| Pair 8 | Personal conservation behaviour | 0.50 | 1.11 | 0.23 | 0.03 | 0.97 | 2.20 | 23 | .038 | 0.47 | 0.31 |
| Pair 9 | Human dominance over nature | -0.31 | 1.65 | 0.34 | -1.01 | 0.38 | -0.93 | 23 | .362 | 0.93 | 0.76 |
| Pair 10 | Human utilization of nature | -0.48 | 1.23 | 0.25 | -0.99 | 0.04 | -1.91 | 23 | .069 | 0.75 | 0.63 |
| Pair 11 | Ecocentric Concern | 0.56 | 1.39 | 0.28 | -0.02 | 1.15 | 1.99 | 23 | .059 | 0.72 | 0.62 |
| Pair 12 | Support for population growth | 0.79 | 1.36 | 0.28 | 0.22 | 1.37 | 2.86 | 23 | .009 | 0.20 | 0.51 |

### *4.4.3 Thematic analysis of qualitative post-test responses*

**Table 4.6**

**Themes emerging from thematic analysis of qualitative post-test responses**

| | Themes | Subthemes and number of times emerged in data () |
|---|---|---|
| Question 1 | | |
| Did the programme change the way you think about littering? If so, please indicate how? All participants indicated "yes" or a positive response to the question.<br><br>(Number of times emerged in data: 24) | Change in beliefs about littering | • Indicating commitment not to litter (5)<br>• Picking up litter (2)<br>• Tell people not to litter (3)<br>• Becoming more aware of littering behaviour (10)<br>• Realization of the impact of littering on humans (5)<br>• Realisation of the impact of littering on nature (6)<br>• Feeling responsible to keep the environment clean (4) |
| Question 2 | | |
| Are you planning to implement what you have learned in this programme in your own life? If so, how? All participants indicated "yes" or a positive response to the question.<br><br>(Number of time emerged in data: 24) | Implementation of new knowledge | • Educating others (16)<br>• Creating awareness (7)<br>• Recycling (3)<br>• Commitment not to litter (4)<br>• Picking up litter (3)<br>• Joining environmental organisations (3) |
| Question 3 | | |
| What did you enjoy the most about this programme and why? | Enjoyment of the programme | • Watching videos (3)<br>• Learning about the impact of littering (5)<br>• Playing games (icebreakers) (12)<br>• Doing activities (5)<br>• Eating the snacks (2)<br>• Socialising (4) |
| Question 4 | | |
| What did you enjoy the least about this programme and why? | Weaknesses of the programme | • Unorganized (1)<br>• Not enough time spent outside (1)<br>• Experiencing uncomfortable feelings (3)<br>• Being shy (2)<br>• Not enough practical activities (2)<br>• Running on campus (3)<br>• Cheap prizes (1)<br>• Not enough participants (1)<br>• Nothing (13) |
| Question 5 | | |
| What suggestions do you have to improve this littering prevention programme? | Improvements to the programme | • More outside activities (1)<br>• More participants (5)<br>• More littering prevention projects/ running for a longer time (12)<br>• More rewards and compensation (2)<br>• Joining a green programme or society (4)<br>• Creating awareness with posters and social media. (2) |

Theme 1: Change in beliefs about littering

The aim of the first question was to determine if previously held beliefs about littering had been changed and in which way, to which all the participants (24 out of 24) indicated "*yes*" or a positive response. A number of subthemes were identified that were found to be of value in answering the question of how the programme changed their perception about littering of which the most prevalent was *an increase in awareness of littering behaviour*. An example of one of participant responses is: *'I am more aware of the litter around me and can see the effects'*. As such, the qualitative responses echo the findings from the LPBS that indicated students' littering behaviour were positively influenced, and thus realises one of the main objectives of this research. Literature has proven that environmental knowledge and awareness is a necessary first step for adequate organisational behaviour (Zsóka, 2008).

Theme 2: Implementation of new knowledge

The aim of this question was to determine if the programme had an impact on the participants' littering behaviour, and how they were planning to incorporate what they have learned into their own lives to which all participants indicated "*yes*" or a positive response. The two most prevalent subthemes that emerged from how the participants' indicated to implement what they have learned, were educating others and making them aware of the impact of littering. At first glance this response seems to reflect a positive result; however, it may indicate a lack of commitment from the participants to change their own littering behaviour. This argument will be further explored in the discussion section.

Theme 3: Enjoyment of the programme.

The aim of this question was to determine whether the participants enjoyed the programme and if so, which parts they enjoyed, and why. This information would help the development of future programmes since enjoyment of the programme may lead to future participation in similar programmes (Fitz-Walter, Tjondronegoro, & Wyeth, 2011). A significant number of students indicated that they enjoyed the games and activities the most in this programme. For instance, one

student said the following: "*the little games we played, they were not just games, but they were making difference and making us aware of how clean or dirty our environment*".

Theme 4: Weaknesses of the programme

The aim of this question was to determine which facet of the programme the participants enjoyed the least and why. This will help researchers with refining the programme for the purposes of future implementation. The most prevalent themes were that participants did not find any aspect of the programme to be unenjoyable. One participant said: "*I literally don't have any moment that I did not like or even enjoy. I had fun*". However, some of the participants indicated that the videos and information led them to experience uncomfortable feelings such as guilt and sadness. Furthermore, whilst only expressed by a minority of participants, a few felt that there weren't enough practical activities and time spent outdoors and that there were not enough participants. Overall, however, these are encouraging outcomes as it points to a large extent the programme had a positive impact on the participants.

Theme 5: Improvements to the programme

The aim of this question was to determine what the participants felt could be done to improve the programme. The most prevalent theme was to have more projects similar to this programme and letting the programme run for a longer period. The participants also indicated that this programme should be accessible to more students. Other suggestions that were considered to be of value are to increase the rewards or compensation for taking part in the programme, and to increase awareness about the programme and littering on social media and with posters. For a comprehensive overview of the thematic analysis refer to Appendix D.

## *4.5 DISCUSSION*

Littering is an environmentally destructive behaviour performed by humans and seems to be prevalent in many developing countries such as South Africa and may remain so if a behavioural

solution is not adopted. The contribution of this study to the PEB behaviour literature is that it aims to evaluate the efficiency of a littering intervention programme developed by Evert et al. (Submitted) aimed at preventing littering, rather than solving its consequences. Even though littering prevention seems to be an easy route to solving the problem of littering, its measurement remains poorly represented in environmental psychology (Ojedokun, 2016).

Results showed that the participants had a statistically significantly higher score on the post-test of the *Littering Prevention Behaviour Scale* (Ojedokun, 2016) than on the pre-test, indicating a positive change in students' littering behaviour. Furthermore, qualitative responses indicated strongly that the programme was successful in changing the students' littering behaviour. Moreover, this is evident in the themes arising from each of the questions posed to the participants in the post-test. In addition to the positive outcome of the qualitative responses, there seems to be similarities in the major themes identified in the answers to the goals set out for each session. For instance, the goal of the first session, *creating awareness* was the most prevalent theme emerging from the qualitative data from the first question in the post-test. Participants' responses point to the possible successful achievement of influencing their littering behaviour as research from Pinto, Nique, Añaña and Herter (2011) indicates that creating awareness, could predict wasteful habits. Furthermore, similar findings from Nordlund and Garvill (2002) showed that problem awareness could activate personal norms such as self-transcendent and ecocentric values that could facilitate proenvironmental behaviour. In light of these findings the participants' responses prove to be a good indication of their intention to act pro-environmentally with regards littering. Another significant result was that all participants indicated that they enjoyed the programme, seeing that research suggests that enjoyment of an activity will more likely lead to sustained behaviour change of that activity (Fitz-Walter, Tjondronegoro, & Wyeth, 2011). Furthermore, Kukkonen, Kärkkäinen and Keinonen (2018) found that the enjoyment of nature is directly and positively related to the intention of pro-environmental behaviour and to environmental knowledge. Moreover, they also concluded that enjoyment of nature could facilitate an effect on ecological knowledge, concern, or the belief of human dominance over nature (Kukkonen, Kärkkäinen & Keinonen, 2018).

To address if the programme changed students overall EAs the EAI-24 scale (Milfont & Duckitt, 2010) was used. Statistical analysis of the 12 subscales indicated that only two exhibited statistically significant differences between the pre-test and the post-test. On the *support for population growth* subscale which is associated with the second-order factor, *preservation,* participants scored lower on the post-test than on the pre-test. Whilst this appears to suggest that the intervention was successful in changing participants' attitude towards less *support for population growth*, the subscales were found to be highly unreliable from a psychometric point of view, and as such, these results likewise cannot be regarded as reliable. A similar lack of reliability characterised the second subscale that showed a statistically significant difference between the post-test and the pre-test - *personal conservation behaviour*. This subscale entails taking care to conserve resources and protect the environment in personal everyday behaviour, versus lack of interest in or desire to take care with resources and conserve in one's everyday behaviour (Milfont & Duckitt, 2010). An example of an item to address this subscale includes, "*in my daily life I try to find ways to conserve water or power*" with its reverse score item "*In my daily life I'm just not interested in trying to conserve water and/or power*" (Milfont & Duckitt, 2010). Whilst participants scored lower on the post-test than on the pre-test, suggesting that the intervention reduced participants' personal conservation behaviour (which is the opposite of the desired outcome), this finding is however psychometrically unreliable. In addition to this finding, albeit unreliable, the participants' qualitative responses also underscored low levels of personal conservation behaviour as indicated in their lack of commitment not to litter. The most prevalent subtheme emerging from the question '*Are you planning to implement what you have learned in this programme in your own life? If so, how?'* was that the students would educate others and raise awareness. This could be interpreted as positive results as it indicates the participants becoming inclined towards activism. However, the absence of intentions towards reducing personal littering behaviour could also be interpreted as the participants not realising that they first have to commit to not littering themselves. Research from Davies, Foxall and Pallister (2002) indicates that self-report behavioural intent indicate a positive relationship with pro-environmental behaviour, and is in accordance with Ajzen's theory of planned behaviour. As such, it would seem that facilitating strong

self-reported commitment from the participants not to litter, is an important step towards littering prevention.

The subscales 1 and 9 of the EAI-24 scale (Milfont & Duckitt, 2010) that did exhibit adequate reliabilities did not show statistically significant pre- and post-test differences.

Scale 9, *human dominance over nature*, assesses the belief that nature exists primarily for human use, versus the belief that humans and nature have the same rights (Milfont & Duckitt, 2010). Some researchers have associated this anthropocentric belief with Christianity because human dominance over nature is a theme that can be found in the Bible. They argue that this belief might play a causal role in relation to current environmental issues (Curry, 2006; Simmons, 2006; White, 1967). The majority of the participants are Christians (87.5%) and they scored higher on this subscale after the intervention, which is contrary to the desired outcome. However, it could be speculated that the participants associate dominance over nature with stewardship over nature, which could be interpreted as a pro-environmental attitude. A similar approach to interpreting this theme was adopted by Roper (2007) who argued that although humans had dominion over the earth and all living creatures according to Christian belief, humans are supposed to cultivate and care for the earth as stewards of nature. In addition, other researchers also indicated that instead of dominion, the Bible refers to the God-given power to rule the earth, as a responsibility that humans will be held accountable for (Kempton, Boster, & Hartley, 1995; Roper, 2007). Furthermore, Barbour (1980) and Ponting (1991) also came to similar conclusions that the Bible could be interpreted as humans being caretakers of what God has entrusted to them rather than having authority and ultimate dominion over nature. Moreover, this perspective emphasizes that the natural world has not been put there for the exclusive use of humankind (Ponting, 1991; Barbour, 1980). Even though the EAI-24 describes dominion over nature as an anti-environmental attitude, in the light of the above argument, this belief could be interpreted as a pro-environmental attitude and points to the possibility that the intervention might in fact have resulted in a positive change in terms of participants' EAs. Again, this calls into questions the validity of the EAI-24, as the understanding of this subscale can be ambiguous.

However, in light of the lack of psychometric reliability of the EAI-24, the impact that the programme may or may not have had on the EAs of the participant group could not be established, and additional research, employing alternative measures of EAs is called for.

### *4.6 LIMITATIONS AND RECOMMENDATIONS*

In the present study, reliabilities of many of the subscales of the EAI-24 were found to be problematic. As such, results from these scales should be viewed in an extremely tentative light, and future research is needed to verify the findings reported here. The validity and relevance of many items in a South African context were brought into question.

Items such as '*I really like going on trips into the countryside, bushveld or nature reserves'*, '*One of the most important reasons to keep dams and rivers clean is so that people have a place to enjoy water sports'*, and '*I'd prefer a garden that is wild and natural to a well-groomed and ordered one'* probably would not make much sense to students who come from very impoverished communities (which is the case with a significant portion of the student sample) where the notions of going on trips, enjoying water sports, or owning a garden would be completely foreign. Other items such as '*Families should be encouraged to limit themselves to two children or less*' would be incongruent with prevailing traditional notions in some African cultures of the *utilitarian values of children* (Sam, Peltzer & Mayer, 2005; Spjeldnaes, Sam, Moland, & Peltzer, 2007). However, this finding is significant in itself as it points to a need to develop culturally and contextually sensitive measures of EAs to reliably assess this construct in a South African context.

In addition, another possible reason for this outcome of lack of psychometric scale reliability of the EAI-24 might be associated with African students' English language proficiency, taking into consideration that a vast majority of the participants speak English as an additional language. In a study done by Stephen, Welman and Jordaan (2004), a significant difference was found between Indian students' English language proficiency levels compared to their African counterparts, which could in part be attributed to being part of a previously disadvantaged group in South Africa. Similar results were found in a study done by Van Rooy and Coetzee-Van Rooy, (2015) about language and

academic performance at a South African University. It is thus conceivable that the participants' language proficiency may have interfered with their ability to fully comprehend the language used in some of the items in the scale. In particular, the reverse-phrased items might have caused some confusion. This suggests that a need exists to develop a psychometrically reliable scale to assess EAs in a South African context. Prior to this, there might be value in conducting studies on the cross-cultural equivalence of the construct of EAs to ascertain whether or not predominantly Westernized notions of EAs are congruent with African conceptualizations thereof.

Whilst the study only focused on students from one university, future research should investigate EAs of students at other South African tertiary educational institutions, given that South Africa is a diverse country and that different universities have student populations with vastly differing demographic characteristics (and possible attendant EAs). Given the important role that such institutions can play in fostering and promoting pro-EAs and behaviours, a better understanding of students' EAIs as well as implementing and assessing the impact of littering interventions might result in a significant contribution towards enhancing pro-environmental behaviour.

## *4.7 CONCLUSION*

Overall the littering prevention programme developed by Evert et al. (Submitted) was found to be effective at changing students' littering behaviour as measured by the LPBS (Ojedokun, 2016). However, in addressing whether the programme was successful in influencing students' general EAs, the EAI-24 (Milfont, 2010) proved to be psychometrically unreliable. For future use of EAs and PEB measures it is suggested that the language used in these measuring instruments is critically assessed to determine if it would be applicable in different social and cultural contexts. This finding is reiterated by Ajedokun (2016) and Gifford and Nilsson (2014) who have stressed the need for more research aiming to bridge the gap between theory and practice with regards to the understanding of personal and social factors in developing environmental interventions. Despite these limitations, the initial results are however encouraging and indicate that at least as far as littering prevention is concerned, the intervention programme is effective at creating some self-reported change within a period of time

as little as one month. This research is vital in facilitating student participation in campus sustainability programmes such as the Green Campus initiative as research from Butt, More and Avery, (2014) indicates that current sustainability programmes will fail without widespread engagement of the student body. The findings from this study contribute to the existing body of research on Green Campus initiatives and can be used as a basis to develop and implement intervention programmes in an effort to encourage student participation in these programmes to reduce students' littering behaviour.

## *4.8 ACKNOWLEDGEMENTS*

The researcher wishes to express her gratitude to the NRF for its financial contribution towards the completion of this research.

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# CHAPTER 5: CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

This chapter reviews the limitations, recommendations and conclusions that emerged in the present study, which was aimed at developing and evaluating an approach to understand and influence environmental attitudes (EAs) at a higher education institution in South Africa. The first section is a discussion of significant conclusions drawn from the findings. The next section is a discussion of important barriers or limitations that arose throughout the study followed by recommendations for future research.

## 5.1 Conclusions

The overarching aim of this study was to develop and evaluate an approach to understand and influence EAs at higher education institutions in South Africa. University students were targeted for this study because they are the future leaders and policy makers, and as a target group, are potentially able to make a meaningful impact in their communities and workplace. However, as preliminary observations suggested that they are oblivious to the urgency of environmental threats, which was evident by their unsustainable behaviour and therefore, the aim of the first study (stage 1) was to determine the overall stance of the students' EAs at the NWU. The results of the first study, which surveyed the EAs of 1283 students on the three campuses of the NWU indicated that students' EAs lean more towards *utilization*, which is an anti-environmental factor, than to the pro-environmental factor of *preservation* in the two-dimensional higher-order structure of EAs of the EAI-24. In addition to this, the scores on the EAI-24 scale indicated that EAs related to the pro-environmental factor, preservation, e.g., enjoyment of nature, activism and personal conservation behaviour were. Furthermore, the findings revealed that demographic factors such as gender and ethnicity are significantly correlated with students' EAs.

The aim of the second study (stage 2) was to develop an intervention programme aimed at changing students' littering behaviour and overall EAs. The study was conducted in three phases. The first phase of this study consisted of a literature review that was conducted to develop an initial intervention programme. During this phase, it became evident that littering is an environmentally harmful act often

associated with university students and was therefore chosen as the specific behaviour to target during this intervention. In addition, it was observed by the researcher as constituting a prevalent phenomenon among university students at the NWU. These findings, along with findings from the previous study indicating students' EAs to lean more towards anti-environmental principles such as *utilisation*, deemed it necessary to address this behaviour among university students. During the second phase of this study, the intervention programme was subjected to an expert panel review. This approach entailed the programme to be evaluated by a panel of experts that consisted of academics as well as environmental management practitioners. Phase 3 of this study involved the refinement of the programme via incorporating useful feedback from the expert panel, which was analysed by means of thematic analysis. Prominent themes such as gamification and adding detailed descriptions to all activities were prominent themes identified from the expert panel feedback and were incorporated in the finalised programme.

The third study (stage 3) aimed at implementing the intervention programme developed in study 2 (stage 2) and determining to which extent the programme was successful in changing university students' EAs and littering behaviour. This was done by measuring the participants' self-reported littering behaviour and EAs before and after the intervention by means of the LPBS and the EAI-24.

Findings from this study emphasized the concern that university students, as future leaders, are found to be somewhat indifferent towards environmental issues and often engage in littering behaviour. It was proposed that the development of an intervention programme drawing on existing literature on littering behaviour interventions and subjecting the programme to an expert panel for further refinement would be an efficient approach to tackle the littering challenge. Furthermore, research is needed to further develop a psychometrically reliable scale to measure EAs in a South African context. Due to a lack of psychometric reliability of the EAI-24, it is unclear whether and to what extent the students' EAs had been affected. Despite these limitations, the initial results are however encouraging and indicate that at least as far as littering prevention is concerned, the intervention programme is effective at creating some self-reported change within a period of time as little as one month. This approach to understand and influence EAs and littering behaviour could be especially helpful in developing countries such as South Africa where there seems to be a lack of research on littering behaviour. To the extent that the findings

might be representative of other student populations, the findings indicate that interventions (such as Green Campus initiatives) might be needed to change EAs related to the utilization of nature for anthropogenic purposes.

## 5.2 Limitations of the study

An important limitation of this study is the lack of reliability found in certain subscales of the EAI-24 (especially scales 2, 4, and 8). This limitation was evident in stage 1 and 3 of this study. As such, results from these scales should be viewed in an extremely tentative light, and future research is needed to verify the findings reported here. However, the significance of this finding could be that it brings to light the possible lack of validity and cultural relevance of many of the items in these scales as measures of EAs in a South Africa context. Items such as '*One of the most important reasons to keep dams and rivers clean is so that people have a place to enjoy water sports*', and '*I'd prefer a garden that is wild and natural to a well-groomed and ordered one*' probably would not make much sense to students who come from very impoverished communities (which is the case with a significant portion of the student sample) where the notions of going on trips, enjoying water sports, or owning a garden would be not be applicable. Other items such as '*Families should be encouraged to limit themselves to two children or less*' would be incongruent with prevailing notions in some African cultures that children represent a source of wealth. In addition, another factor contributing to the lack of psychometric scale reliability of the EAI-24 might be associated with African students' English language proficiency, taking into consideration that a vast majority of the participants speak English as an additional language. In a study done by Stephen, Welman and Jordaan, (2004), a significant difference was found between Indian students' English language proficiency levels compared to their African counterparts, which could in part be attributed to being part of a previously disadvantaged group in South Africa. Similar results were found in a study done by Van Rooy and Coetzee-Van Rooy, (2015) about language and academic performance at a South African university.

During the second study, the expert panel only received the intervention programme and not the literature review that led to the development of the programme. This was done to make the review of

the programme as time efficient as possible. However, this has proven to be a limitation of the study as it led to a number of concerns raised about the programme being unnecessary because they had already been addressed in the literature review. In addition, to the above mentioned limitation, waiting for feedback from the experts proved to be time-consuming.

During the third study, a number of limitations were encountered. The first was the high number of participants who dropped out from the study after the first session. The characteristics that differentiated the drop-out group from the participant group were political conservatism and higher family income bracket. As such, this would very tentatively suggest that slightly more conservative students from families with higher income brackets were more likely drop-out of the study because they were already more inclined towards pro-environmental attitudes and behaviour than the experimental group and might feel that the study is not applicable to them. Furthermore, students who are slightly more conservative and possibly more comfortable with the existing state of affairs might not be as open to new ideas and experiences as their more liberal-minded counterparts. Other possible reasons for the high drop-out number could include time constraints due to academic duties, logistic factors such as lack of transport to and from the venue and finally the first session might not have lived up to some of the student's expectations. Although the reasons for this cannot be determined with certainty from the data, a factor that contributed to the participants completing the programme, could the refreshments and basic meals provided during each session as part of the ethical requirements of the study. Whilst the reasons leading to the participants to drop-out are only speculative, it cannot be denied that that the outcome of the intervention might have differed if these participants completed the programme. As such, when considering the results of this study, this is a limitation that needs to be taken into account.

In conclusion, the most concerning limitation encountered during this study is the lack of a psychometrically reliable scale to assess EAs in a South African context. Furthermore, factors such as participants' language proficiency, cultural relevance of questionnaire items, and socio-economic status are factors to consider when developing a EAs measure.

## 5.3 Recommendations

Based on the limitations outlined above, it is recommended that future research be conducted to determine the extent to which the findings made in this study would generalise to other South African tertiary institutions given the important role that such institutions can play in fostering and promoting pro-EAs and behaviours.

It is recommended by the researchers that care is taken when choosing a measuring instrument related to EAs and behaviour for a multi-cultural South African setting. It was evident that the participants' proficiency in the English language should be considered especially if the student sample only speaks English as second or sometimes third language. Therefore, it is recommended that culturally and contextually sensitive measures of EAs should be developed that is reliable to assess this construct in a South African context.

During the second study, a recommendation that came forward was to send experts the document with the proposed programme along with a separate document containing the background information such as the literature review that led to the development of the programme. This will enable reviewers to have access to more information about the programme if they required it. Although there is ample research about the theories of behaviour change and intervention design, little research exists that addresses the implementation of interventions and whether these interventions were successful, and it is therefore recommended that future research be done on this subject. Although the objective of producing a littering intervention programme was achieved, the programme needs to be tested at other tertiary institutions as well to evaluate its effectiveness.

Whilst the study only focused on students from one university, future research should investigate EAs of students at other South African tertiary educational institutions, given that South Africa is a diverse country and that different universities have student populations with vastly differing demographic characteristics (and possible attendant EAs). Given the important role that such institutions can play in fostering and promoting pro-EAs and behaviours, a better understanding of students' EAs as well as

implementing and assessing the impact of littering interventions might result in a significant contribution towards enhancing pro-environmental behaviour.

## 5.4 References

Stephen, D.F., Welman, J.C., & Jordaan, W.J. 2004. English language proficiency as an indicator of academic performance at a tertiary institution. *SA Journal of Human Resource Management*, *2*(3):42-53.

Van Rooy, B., & Coetzee-Van Rooy, S. 2015. The language issue and academic performance at a South African University. *Southern African Linguistics and Applied Language Studies*, *33*(1):3

# APPENDICES

# APPENDIX A

## PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM FOR UNDERGRADUATE STUDENTS REGISTERED AT THE NORTH-WEST UNIVERSITY

**TITLE OF THE RESEARCH PROJECT:**

**The development and evaluation of an approach to understand and influence environmental attitudes at higher education institutions in South Africa**

**REFERENCE NUMBERS: (NWU-00343-15-S1)**

You are being invited to take part in a research project that forms part of a PhD thesis in the development and evaluation of an approach to understand and influence environmental attitudes at higher education institutions in South Africa. Please take some time to read the information presented here, which will explain the details of this project. Please ask the researcher any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is **entirely voluntary,** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the **Health Research Ethics Committee of the Faculty of Health Sciences of the North-West University (NWU-00343-15-S1)** and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki and the ethical guidelines of the National Health Research Ethics Council. It might be necessary for the research ethics committee members or relevant authorities to inspect the research records.

**What is this research study all about?**

- *This study will be conducted on the North West University, Vanderbijlpark Campus and will involve questionnaires, focus group sessions and interventions with experienced researchers trained in conducting research within the Faculty of Social Sciences and Natural Sciences. 20 to 30 participants will be selected for the qualitative phase. The objectives of this research are:*
    - *The development and implementation of an intervention programme to influence attitudes and behaviour towards the environment.*

**Why have you been invited to participate?**

- *You have been invited to participate because you are you have complied with the following inclusion criteria:*
    - *Full-time, registered undergraduate student of the NWU Vanderbijlpark campus 2018;*
    - *Willingness to complete the Environmental Attitudes Inventory (EAI);*
    - *Willingness to participate in digitally recorded focus-group discussions;*
    - *Willingness to participate in the research by way of informed consent;*
    - *Ability to communicate freely and to express themselves adequately in English (writing and reading);*
    - *Willingness to participate in environmentally friendly activities as part of interventions.*

- *You will be excluded if you are:*
  - *Not registered as a student at the NWU;*
  - *NWU Staff;*
  - *Post-graduate students*

**What will your responsibilities be?**

- *You will be expected to attend 4 intervention sessions. The sessions will be held every Wednesday afternoon from 16:00 to 18:00 for 4 weeks at the NWU, Vanderbijlpark campus. The session with the completion of a questionnaire followed by an intervention programme which will consist of an ice-breaker, intervention and focus-group discussions.*

**Will you benefit from taking part in this research?**

- *The indirect benefits will be that you will help to contribute to research that will aid creating awareness about important environmental issues and aid in possibly changing students' attitudes towards the environment to become more pro-environmental. You as a participant will be exposed to nature during the interventions, which has been proven in literature to restore cognitive restoration and concentration abilities. The interventions may include but are not limited to an ice-breaker, intervention and focus-group discussions. You will also gain knowledge about the importance of the environment and receive insight into your peers' environmental attitudes and knowledge.*

**Are there risks involved in your taking part in this research?**

- *The risks in this study are that there might be discomfort during focus group sessions and during interventions. Students may not enjoy spending time in a natural setting or interaction with animals. Participation in interventions will be completely voluntary.*
- *The benefits outweigh the risk*

**What will happen in the unlikely event of some form of discomfort occurring as a direct result of your taking part in this research study?**

- *Should you have the need for further discussions after the focus group discussions or intervention activities an opportunity will be arranged for you to talk to a registered student counsellor.*

**Who will have access to the data?**

- *During transcription, data will be coded to ensure that no association can be made with a specific participant. Confidentiality will be ensured by way of the method used to capture data, i.e. changing identifying data during transcription and deleting digital recordings once transcribed. Confidentiality, however, will only be partial due to the method of data gathering, but group rules will protect participants.*
- *Only the researcher and the person doing the transcriptions will have access to the data. Data will be kept safe and secured under lock and key in locked cupboards in the researcher's office, and electronic data will be password protected. Reporting of findings will be anonymous. (As soon as data has been transcribed it will be deleted from the recorders.) Data will be stored for 3 years.*
- *The questionnaire is totally anonymous.*

**What will happen with the data/samples?**

- *This is a once off collection and data will be analysed in SA by the NWU statistical service. The analysis of the findings will be purely statistical using all responses as a single sample and looking at how the sample as a whole responded and this data may be used for publication in social scientific journals.*

**Will you be paid to take part in this study and are there any costs involved?**

- *No you will not be paid to take part in the study, however, light refreshments will be available during the focus group discussions. There will thus be no costs involved for you, if you do take part.*

**Is there anything else that you should know or do?**

- You can contact Madeline Huyser at 21086443@nwu.ac.za or 0765433077 or Hendri Coetzee at hendri.coetzee@nwu.ac.za or 018-285 2073 if you have any further queries or encounter any problems.
- You can contact the Health Research Ethics Committee via Mrs Carolien van Zyl at 018 299 2089; carolien.vanzyl@nwu.ac.za if you have any concerns or complaints that have not been adequately addressed by the researcher.
- You will receive a copy of this information and consent form for your own records.

**How will you know about the findings?**

- The findings of the research will be shared with you by the researcher during a seminar held on campus. During this seminar the researcher will explain the findings. Invitation to the seminars will be sent out via mass mail. The findings of the research will also be available on e-fundi for participants that were not able to attend the seminars.

**Declaration by participant**

By signing below, I ……...……. agree to take part in a research study titled: **The development and evaluation of an approach to understand and influence environmental attitudes at higher education institutions in South Africa**

I declare that:

- I have read this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions to both the person obtaining consent, as well as the researcher and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) .....…..…….. on (*date*) ……...……... 20....

| | |
|---|---|
| ..... | ..... |
| **Signature of participant** | **Signature of witness** |

**Declaration by person obtaining consent**

I *(name)* ……...…… declare that:

- I explained the information in this document to ……...
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use an interpreter.

Signed at (*place*) .....….....…….. on (*date*) ……...……... 20....

| | |
|---|---|
| ..... | ..... |
| **Signature of person obtaining consent** | **Signature of witness** |

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**Higher Degrees Administration**

APPENDIX B 1

# SOLEMN DECLARATION AND PERMISSION TO SUBMIT

## 1. Solemn declaration by student

I, **Madeline Huyser (Evert)**

declare herewith that the thesis/dissertation/mini-dissertation/article entitled (**exactly as registered/approved title**),

The development and evaluation of an approach to understand and influence environmental attitudes at higher education institutions in South Africa

which I herewith submit to the North-West University, Potchefstroom Campus, is in compliance/partial compliance with the requirements set for the degree:

Doctor of Philosophy in Environmental Sciences

is my own work, has been text-edited in accordance with the requirements and has not already been submitted to any other university.

**LATE SUBMISSION: If a thesis/dissertation/mini-dissertation/article of a student is submitted after the deadline for submission, the period available for examination is limited. No guarantee can therefore be given that (should the examiner reports be positive) the degree will be conferred at the next applicable graduation ceremony. It may also imply that the student would have to re-register for the following academic year.**

Signature of Student: Madeline Huyser — Digitally signed by Madeline Huyser Date: 2018.10.02 10:17:50 +02'00'

University Number: 21086443

Signed on this 31 day of May of 20 19

## 2. Permission to submit and solemn declaration by supervisor/promoter

The undersigned declares that the thesis/dissertation/mini-dissertation complies with the specifications set out by the NWU and that:

- the student is hereby granted permission to submit his/her mini-dissertation/ dissertation/thesis:
  (●) Yes ( ) No
- that the student's work has been checked by me for plagiarism (by making use of TurnItIn software for example) and a satisfactory report has been obtained:
  (●) Yes ( ) No

Signature of Supervisor/Promoter: Hendri Coetzee — Digitally signed by Hendri Coetzee Date: 2019.05.31 09:52:24 +02'00'

Date: 31 May 2019

APPENDIX B 2

**Higher Degrees Administration**

# SOLEMN DECLARATION AND PERMISSION TO SUBMIT

## 1. Solemn declaration by student

I, **Hermann Werner Nell**

declare herewith that the thesis/dissertation/mini-dissertation/article entitled (**exactly as registered/approved title**),

The development and evaluation of an approach to understand and influence environmental attitudes at higher education institutions in South Africa

which I herewith submit to the North-West University is in compliance/partial compliance with the requirements set for the degree:

Doctor of Philosophy in Environmental Sciences

is my own work, has been text-edited in accordance with the requirements and has not already been submitted to any other university.

**LATE SUBMISSION: If a thesis/dissertation/mini-dissertation/article of a student is submitted after the deadline for submission, the period available for examination is limited. No guarantee can therefore be given that (should the examiner reports be positive) the degree will be conferred at the next applicable graduation ceremony. It may also imply that the student would have to re-register for the following academic year.**

Signature of Student: Madeline Huyser — Digitally signed by Madeline Huyser Date: 2019.05.31 13:44:14 +02'00'

University Number: 21086443

Signed on this 31 day of May of 20 19

## 2. Permission to submit and solemn declaration by supervisor/promoter

The undersigned declares that the thesis/dissertation/mini-dissertation complies with the specifications set out by the NWU and that:

- the student is hereby granted permission to submit his/her mini-dissertation/ dissertation/thesis:
  (•) Yes ( ) No
- that the student's work has been checked by me for plagiarism (by making use of TurnItIn software for example) and a satisfactory report has been obtained:
  (•) Yes ( ) No

Signature of Supervisor/Promoter: Werner Nell — Digitally signed by Werner Nell Date: 2019.05.31 10:08:30 +02'00'

Date: 31052019

APPENDIX C1

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
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Tel: +2718 299-1111/2222
Web: http://www.nwu.ac.za

**Dean: Student Affairs**
Tel: +2718 299 2831
Fax: +2718 299 2833
Email: rikus.fick@nwu.ac.za

12 October 2015

Lectori salutem

I was duly informed of the research to be undertaken by Ms Madeline Evert with the following title: "*The Development and Evaluation of an Approach to understand and influence environmental Attitudes at Higher Education Institutions in South Africa*".

After taking in consideration the extent, methodology and content thereof, I, in my capacity as Dean Student Affairs, herewith give my consent for the execution and completion of this project as far as the Potchefstroom Campus of the North-West University is concerned.

Yours sincerely

**Prof P H Fick**

**Dean Student Affairs**

APPENDIX C2

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
INSTITUTIONAL OFFICE

Private Bag X1290
Potchefstroom
2520
Tel: 018 299-4935
Fax: 018 299-4910
Web: http://www.nwu.ac.za

**Director: Community Engagement**
*email: Bibi.Bouwman@nwu.ac.za*

1 September 2015

**To Whom It May Concern**

**Re:** Ethical Clearance for PhD study in Environmental Sciences and Management, North-West University, Potchefstroom Campus: *"The development and evaluation of an approach to understand and influence environmental attitudes at Higher Education Institutions in South Africa"*

The NWU subscribes to a global alliance of higher education institutions (HEIs) and organisations in the Talloires Network and the Globally Responsible Leadership Initiative concerned with transforming higher education to serve the common good, affirming our commitment to the role of higher education in finding and implementing solutions towards climate change mitigation and adaptation.

Through leadership at many levels: as individuals, as institutions and through collaborating with other stakeholders both locally and globally we have committed to:

- Increasing the pace and scale of HEI's research, teaching and operational efforts which advance society's knowledge and understanding of climate change, in order to accelerate the implementation of mitigation and adaptation solutions in practice.
- Position our institutions of higher education and their campuses as agents of change in local and national communities, by establishing living collaborative laboratories where solutions to climate change mitigation and adaptation may be developed, piloted and showcased.
- Encourage the staff, students and faculty and institutional networks of the organisations we serve and represent, to adopt the necessary trans-disciplinary and

issue-centred teaching, learning, research and governance approaches and methodologies required to address the multi-faceted challenge of climate change.

The NWU has taken the first steps towards an integrated report which contributes towards the transparency, credibility and overall sustainability of the institution. At the moment it is not mandatory to report in an integrated manner, but this situation may change soon as our reports to the Department of Higher Education requires more and more content relating to sustainability. If the NWU starts early, it will give us that opportunity to become a leader in integrated reporting. Integrated reporting has the potential to bring about greater cohesion both internally (amongst staff and students) and externally (in the wider community) since it shows that the NWU is relevant and views social issues that could have an impact on the community holistically.

In this regard we have compiled our first report in 2013 and an expanded version in 2014. We have formed an Institutional Green Campus Committee and have also provided some training for key stakeholders at the NWU. The role of this committee is to coordinate the campus greening activities of the NWU and oversee the rectifications that are currently underway as recommended in an Environmental Legal Compliance Audit which was conducted in 2012.

In order for the NWU to manage its environmental impacts in a scientific and calculated cost-effective manner we shall require the information that will be obtained by the abovementioned study. The methodologies to implement for a change management strategy cannot be developed without the findings that we hope to acquire in this study. The training of socially and civically-minded students is part of our core business and we cannot provide this training without the relevant base-line data.

I hereby indicate my support of the study as a key ingredient to long term sustainability strategic planning at the NWU.

Best regards

Beatrix Bouwman

APPENDIX C3

NORTH-WEST UNIVERSITY
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MAFIKENG CAMPUS

Office of the Dean

Private Bag X2046, Mmabatho
South Africa 2735

Tel: 018-3892051
Fax: 018-3892052
Email: Helen.Drummond@nwu.ac.za
Web: http://www.nwu.ac.za

6 October 2015

**TO WHOM IT MAY CONCERN**

Dear Sir/Madam

**RE: MS MADELINE EVERT**

Ms Madeline Evert is a student at the NWU, Potchefstroom Campus, registered for a PhD in Environmental Sciences.

The title of her thesis is:

**THE DEVELOPMENT AND EVALUATION OF AN APPROACH TO UNDERSTAND AND INFLUENCE ENVIRONMENTAL ATTITUDES AT HIGHER EDUCATION INSTITUTIONS IN SOUTH AFRICA**

She wishes to conduct research on all three campuses of the NWU over the course of the next two years.

I hereby give her permission to do her research on the Mafikeng Campus. However, a condition is that she obtain ethical clearance before she starts with the data collection.

Yours Sincerely

H.P. Drummond

Prof H.P. Drummond
Dean, Faculty of Agriculture, Science and Technology
North-West University (Mafikeng Campus)

APPENDIX C4

NORTH-WEST UNIVERSITY ®
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
VAAL TRIANGLE CAMPUS

PO Box 1174, Vanderbijlpark
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Fax: 016 910-3116
Web: http://www.nwu.ac.za

**Campus Registrar**
Tel: 9103290
Fax: 9103292
Email: 10060073@nwu.ac.za

6 November 2015

Me M Evert
21086443@nwu.ac.za

**Re: PhD studies on Environmental Sciences and Management entitled:**
***The development and evaluation of an approach to understand and influence environmental attitudes at higher education institutions in South Africa***

Consent is herewith granted to you to conduct the proposed research on the Vaal Triangle Campus, subject to the following three conditions:

1. That ethical clearance is obtained. The ethical clearance should ensure that:

   The scope of research is clearly stated in order to determine:
   - Persons/subjects that will form part of the research;
   - The type of information that such subjects will have to reveal;
   - Informed consent from the subjects who will be requested to participate;
   - Where and how the gathering of information will be done;
   - Subjects will be afforded the opportunity to consider whether they want to participate;
   - Clear and understandable communication to the subjects in order for them to have comprehension of the contents and consequences of participation, and the purpose of the study.

   Due consideration should be given to the rights of such subjects and they may under no circumstance be made to believe that they are giving up legal rights or brought under the impression that they are being asked to do so.

   The risk and/or discomfort factors for both the NWU and the proposed data subjects should be duly considered.

2. In terms of legislation, especially POPI, the NWU is obliged to protect the personal information of both students and employees. Consequently you are required to comply with the same obligations regarding the disclosure of personal information and personal information gathered in the course of data collection.

3. The use of data and subsequent conclusion that does not form part of the initial study, but may be harmful to data subjects or other legal persons should be brought to the attention of the campus registrar.

I trust you find this in order. We wish you all of the best with your studies.

M E Steyn
Campus Registrar

original details: (10060073) P:\Registrar's Office\Letter Evert.doc.docm
6 November 2015

# APPENDIX D

Article 3 - Thematic Analysis Code Book

*Themes, Verbatim quotes of Qualitative data*

| Question 1 | Themes | Subthemes and number of times emerged in data () | Participant no. | Verbatim quotes |
|---|---|---|---|---|
| Did the programme change the way you think about littering? If so, please indicate how?<br><br>All participants indicated "yes" or a positive response to the question.<br><br>(Number of times emerged in data: 24) | Change in beliefs about littering | Indicating commitment not to litter (5) | 3. | "I dont litter anymore" |
| | | | 4. | "i no longer throw stuff on the floor but on my bin" |
| | | | 11. | "i put my little litter in my pockets if i dont see any bins" |
| | | | 14. | "now i am aware and doing all i can not to litter" |
| | | | 23. | "I am no longer littering" |
| | | Picking up litter (2) | 3. | "i always pick after those who litter" |
| | | | 20. | "So, when I see litter I pick it up irrespective of who put it there..." |
| | | Tell people not to litter (3) | 3. | "tell people not to litter" |
| | | | 13. | "and i can even tell one who throws paper down to pick it up unlike before i join the programme." |
| | | | 16 | "because right now if a person is to litter in front of me I get angry at them" |
| | | Becoming more aware of littering behaviour (10) | 1. | "i just was a bit ignorant, but can say i am now a bit more conscious" |
| | | | 14. | "now i am aware and doing all i can not to litter" |
| | | | 7 | "i have always been a cautious one but now I am extra cautious." |
| | | | 9. | "I am more aware of the litter around me and can see the effects" |
| | | | 12. | "This has given me a motivation to start making campaign posters to give others awareness" |
| | | | 15. | "after taking part in the programme my mentality changed leading to me being cautious of littering..." |
| | | | 19. | "…all these sessions has really made me aware of not only how unpleasant the environment looks with litter…" |

| | | | | |
|---|---|---|---|---|
| | | | 22. | “i am now conscious about littering and the environment in general.” |
| | | | 23. | “this programme has made me aware of how dangerous it is for our health to litter.” |
| | | | 5. | “yes, am very conscious now with my litter” |
| | | Realisation of the impact of littering on humans (5) | 6. | “How I behave and treat the environment also impacts on my tomorrow.” |
| | | | 10. | “It has made me realise that littering does not only affect the human health, but the animals and nature as well” |
| | | | 17. | “programme i have learn that littering is problematic as it can cause some diseases” . |
| | | | 20 | “I have now learned the dangers it can cause to the environment.” |
| | | | 23. | “this programme has made me aware of how dangerous it is for our health to litter...” |
| | | Realisation of the impact of littering on nature (6) | 8. | “...especially when we watched that video showing us how animals die from eating the litter they find in the environment” |
| | | | 10. | “It has made me realise that littering does not only affect the human health, but the animals and nature as well” |
| | | | 20. | “So, when I see litter I pick it up irrespective of who put it there because I have now learned the dangers it can cause to the environment.” |
| | | | 23. | “The marine animals die annually because of litter that we throw into rivers and dams, this litter end up going to the sea and contaminate it.” |
| | | | 24. | “before i litter i always think about how much the litter will affect the environment especially when considering how long the litter takes to disappear” |
| | | Feeling responsible to keep the environment clean (4) | 2. | “my duty to keep the environment clean” |
| | | | 18. | “it changed my perspective and taught me to save the beauty of the environment.” |
| | | | 21. | “I am responsible for what I breathe, drink and the environment I live in because I am not the only<br>species that lives on earth.” |
| | | | 8. | “I even started feeling guilty about throwing litter everywhere” |
| Question 2 | | Themes | Verbatim quotes | |
| Are you planning to implement what you have | Implement ation of | Educating others (16) | 1. | “…I have already started with that at Res with my units mate…” |
| | | | 2. | “I plan on educating my friends and family about the dangers of littering” |
| | | | 3. | “always teach young ones to always keep clean” |

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| learned in this programme in your own life? If so, how?<br><br>All participants indicated "yes" or a positive response to the question.<br><br>(Number of time emerged in data: 24) | new knowledge | | 4. | "So if we teach people about how litter can make them money they would literally start taking care of the environment…" |
| | | | 6. | "so i need to first teach my siblings on how to be clean and how to preserve the little things that we have…" |
| | | | 7. | "…to not just play games with the kids, but also teach them about littering and its effects in the environment…" |
| | | | 8. | "I have a few ideas on teaching people about littering…" |
| | | | 13. | "Educating people around me that litter does not create jobs but damage our lives" |
| | | | 15. | "ill start by teaching the people around me about the importance of recycling to save the environment" |
| | | | 16. | "I will now teach people about the bad things littering does to the environment and animals" |
| | | | 17. | "by educating the community at home on how littering can affect us as humman being and what we can do to avoid littering…" |
| | | | 18. | "and am already implementing to not litter to my closed ones which are family and friends, but again even before the littering session I used to tell them to throw the rubbish in the rubbish bins now am even worse." |
| | | | 19. | "Teach them the benefits of keeping a good and clean environment instead of forcing them to clean it, make them aware of all the reasons to be within a clean space." |
| | | | 22. | "yes. teach my peers about what i learnt." |
| | | | 23. | "I am planning to always make more student aware and educate them about littering" |
| | | | 24. | "and also teach my family members about how bad littering is for the environment" |
| | | Creating awareness (7) | 3. | "i will always make sure that they are aware of the impact of littering" |
| | | | 5. | "am willing to make awareness campaigns" |
| | | | 10. | "make others aware of the impact littering" |
| | | | 12. | "i will make more awareness campaigns even in my environment" |
| | | | 19. | "make them aware of all the reasons to be within a clean space." |
| | | | 20. | "by spreading the word to other people who have no idea" |
| | | | 23. | "I am planning to always make more student aware" |
| | | Recycling (3) | 6. | "i have made it my vow to always live a healthy lifestyle to recycle and to save the earth from dying out." |
| | | | 8. | "The other thing would be to try and recycle as much as I can." |

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| | | | 23. | “by collecting cans and taking them for recycling to earn little bit of pack money” |
| | | Commitment not to litter (4) | 3. | “i will will alway keep my home,school,work environment clean” |
| | | | 10 | “by making sure that I do not litter” |
| | | | 18. | “I have already started by putting rubbish in my pocket until i find the nearest bin to throw it” |
| | | | 19. | “I've already started by challenging myself to keep away from littering even a candy cover” |
| | | Picking up litter (3) | 9. | “I am planning to do so but ill start off small, by picking up litter whenever I see it.” |
| | | | 14. | “I am now going to pick litter that was done by other people,…” |
| | | | 11. | “i will pick up litter where i can” |
| | | | 21. | “we can be consistent about cleaning the environment” |
| | | Joining environmental organisations (3) | 9. | “I am also planning on joining the green evironment initiative” |
| | | | 11. | “i would like to enter a littering programme” |
| | | | 21. | “I am willing to join a programme that can uplift and educate our youth even back at home” |
| Question 3 | | Themes | Verbatim quotes | |
| What did you enjoy the most about this programme and why? | | Watching videos (3) | 1. | “The videos that were shown in the session. They thought me more about littering” |
| | | | 4. | “The videos that teach us that humans are the ones that endanger the environment” |
| | | | 24. | “and i fund the videos very interesting to watch as it made me aware of how much litter is affecting the environment” |
| | | Learning about the impact of littering (5) | 2. | “I enjoyed learning about how other countries are implementing laws relating to littering” |
| | | | 3. | “the knowledge i have gained from the four session i have attended” |
| | | | 7. | “Learning and socialising” |
| | | | 10. | “The informative part of it about recycle and ways to make money out of it.” |
| | | | 21. | “We had a lot of fun and learned important aspect about littering” |
| | | Playing games (icebreakers) (12) | 4. | “The Kahoot! game also that me that one could learn a lot about the environment and pollution through games.” |
| | | | 5. | “i enjoyed the games so much as they taught me that in life you have to do certain things for yourself like picking out littering from the ground” |

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| | | | 9. | “The clean up scavenger hunt where we had to pick up litter around campus, it helped raise awareness because people kept asking about it and wanted to be a part of it.” |
| | | | 11. | “The ice breakers because they were fun and effective” |
| | | | 14. | “the little games we played, they were not just games but they were making difference and making us<br>aware of how clean or dirty our environment” |
| | | | 16. | “Games or activities where we had to go around the campus to clean it up as groups” |
| | | | 17. | “when we were playing games and also when we were cleaning our campus” |
| | | | 18. | “the ice breaker game before every session start, running around the campus” |
| | | | 20. | “The activities we did as groups ad the ice breakers were really fun.” |
| | | | 21. | “we got to do practical stuff we went out cleaning and competing against each other and that was so fun. The ice breakers and the games were fun also” |
| | | | 23. | “The activities, games and most importantly the lessons” |
| | | | 24. | “the ice-breaker” |
| | | Doing activities (5) | 3. | “i enjoyed cleaning around the school” |
| | | | 8. | “I enjoyed the activities we did each session, I had so much fun and I learnt so much about what littering can do to us…” |
| | | | 13. | “When we go outside and pick up litter.” |
| | | | 19. | “I enjoyed the challenges that we had to go do outside (picking up stuff outside),” |
| | | | 21. | “we got to do practical stuff we went out cleaning and competing against each other and that was so fun. The ice breakers and the games were fun also” |
| | | Eating the snacks (2) | 6. | “The Food; The Food; The Food” |
| | | | 9. | “And the food!” |
| | | Socialising (4) | 7. | “Learning and socialising. Well, this is because i got to know more people from the campus and learn about what they think and believe about littering.” |
| | | | 12. | “i have made new friends” |
| | | | 18. | “To be diverse with different students” |
| | | | 22. | “interacting with other people. getting to know different backgrounds” |

| Question 4 | | Themes | Verbatim quotes | |
|---|---|---|---|---|
| What did you enjoy the least about this programme and why? | | Unorganized (1) | 1. | “I feel like it was a bit not organised” |
| | | Not enough time spent outside (1) | 1. | “It would also have been better if it was outdoors since it concerns the environment.” |
| | | Experiencing uncomfortable feelings (3) | 2. | “I did not enjoy the reality of how littering can affect people's health, kill animals and destroy nature. And admitting to myself that I am guilty of littering” |
| | | | 8. | “I think the only thing I did not like during our sessions was those sad videos but they did me good” |
| | | | 12. | “i didn't like but it has proven to me that many or some people are naive, ignorant” |
| | | Being shy (2) | 4. | “But, being a shy person it is difficult to speak” |
| | | | 23. | “open discussions because i am a shy person” |
| | | Not enough practical activities (2) | 5. | “i enjoyed the games so much as they taught me that in life you have to do certain things for yourself like picking out littering from the ground” |
| | | | 6. | “Running out Campus” |
| | | Running on campus (3) | 7. | “Running when we had to clean up” |
| | | | 9. | “The running around but that just because I'm unfit.” |
| | | | 24. | “when we had to run around the campus to collect litter” |
| | | Cheap prizes (1) | 10. | “The prices we got were cheap.” |
| | | Not enough participants (1) | 13. | “number of participates. many people will like to experiences” |
| | | Nothing (13) | 4. | “None.” |
| | | | 3. | “none, i was always fun.” |
| | | | 11. | “nothing” |
| | | | 12. | “Not really…” |
| | | | 14. | “nothing” |
| | | | 15. | “Nothing…” |
| | | | 16. | “I literally don't have any moment that I did not like or even enjoy..I had fun” |
| | | | 17. | “i enjoyed the time we were sharing opinions about littering because i have gain knowledge on how things are done in different cultures” |
| | | | 18. | “I enjoyed everything to its most” |

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| | | | 19. | “There is totally nothing I did not enjoy.” |
| | | | 20. | “Nothing really.” |
| | | | 21. | “Nothing” |
| | | | 22. | “nothing really. all was fun and productive” |
| Question 5 | | Themes | Verbatim quotes | |
| What suggestions do you have to improve this littering prevention programme? | | More outside activities (1) | 1. | “like i've said, it would be better if t was outside.” |
| | | More participants (5) | 2. | “I think the programme should be offered to all students in the university instead of a limited number of students.” |
| | | | 6. | “More programmes like these should be implemented and not only limited to certain number of people.” |
| | | | 14. | “1.i would like it to continue forever not for a short period of time; 2. allow more people to join; 3. have events to teach people about littering; 4.” |
| | | | 17. | “they must include more student in the programme” |
| | | | 22. | “accommodate large number of students due to increased interest” |
| | | More littering prevention projects/ running for a longer time (12) | 3. | “to promote more projects about littering,not only at schools even at home,work and etc” |
| | | | 4. | “Visiting on and off campus residence to do the exact thing that we have been doing for four weeks, that might help.” |
| | | | 6. | “More programmes like these should be implemented and not only limited to certain number of people.” |
| | | | 7. | “Have more littering programmes” |
| | | | 8. | “I think we could start implementing littering programmes in our communities and schools” |
| | | | 11. | “It should take place forever” |
| | | | 12. | “More sessions to be done.” |
| | | | 13. | “Going to dump areas to pick up the litter and i think it will have an impact other than picking on campus only as lives are affected in homes.” |
| | | | 14. | “1.i would like it to continue forever not for a short period of time; 2. allow more people to join; 3. have events to teach people about littering; 4.” |
| | | | 15. | “The programme needs to run for a long period of time and at least have space for everyone as it will take everyone to change the world.” |

| | | | | |
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| | | | 16. | “I suggest we start our own littering prevention programme around campus” |
| | | | 19. | “Maybe more time to the session.” |
| | | More rewards and compensation (2) | 5. | “the should be more money for food because most of the time we come to campus early and only to sit for 2 hours for snakes” |
| | | | 10. | “We should get paid for taking part in the littering programme” |
| | | Joining a green programme or society (4) | 4. | “forming a society can be useful thing with the help of the programmes participants.” |
| | | | 12. | “Creating the society group for the green campus, there should be more incentives for people to be stimulated<br>to stop littering instead of threatening to punish them because that's how often rebellion is brewed.” |
| | | | 18. | “To start the clean the environment society here at NWU-VTC CAMPUS” |
| | | | 16. | “I suggest we start our own littering prevention programme around campus and a go green intiative” |
| | | Creating awareness with posters and social media. (2) | 20. | “Posters about littering must be all around the campus, even behind toilet doors” |
| | | | 23. | “make everyone aware of the danger of litter by posting on our social media pages about litter if applicable and plucking posters at towns” |

APPENDIX E


# *Southern African Journal of Environmental Education*



Environmental Learning Research Centre, Rhodes University, PO Box 94, Grahamstown, 6140, SOUTH AFRICA

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# Editorial Policy

1. All papers published in the SAJEE should have a clear focus on Environmental Education and/or Education for Sustainable Development and should be relevant to the field of education. The SAJEE is primarily an Education journal, although papers from Communications, Environmental Sciences, Development Studies, Labour Studies etc. may also be relevant; however, the core focus of these contributions should be education, communication, learning and /or public awareness.

2. The SAJEE should seek to continually reflect its regional character, which means that papers from a diversity of countries should be represented in each edition.

3. The SAJEE is an accredited journal (accredited by the South African Department of Higher Education and Training) and editors will seek to maintain the quality standards necessary for ongoing accreditation.

4. Full research papers submitted to the journal will be blind peer reviewed by two qualified peer reviewers.

5. Viewpoint papers and Think Pieces will be reviewed by one of the journal editors and one qualified peer reviewer.

6. Full research papers can be either theoretical or empirical, and should include methodological detail, theoretical and/or literature review material and a clear argument as relevant.

7. Ethical procedures also need to be pointed out where relevant.

8. Reviewers' reports are checked and reviewed for the quality and relevance of the review comments by journal editors, and all final review communications are sent to the authors after review by the Editor-in-Chief.

9. Journal editors mediate the blind reviews with authors, and will check that all recommended changes have been substantively attended to. Authors are required to submit a report to the editors documenting how they have responded to reviewers' recommendations.

10. The SAJEE endeavours to have papers reviewed within a three to four-month period where possible. The review process may, however, take longer than this.

11. Papers will be checked for plagiarism using *Turnitin* if editors detect potential plagiarism problems. Authors are fully responsible for any plagiarism, and should check their own papers before submission. By submitting a paper to the SAJEE, authors agree that journal editors may check the paper via *Turnitin* if necessary.

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14. If co-editors submit papers to the SAJEE, then these should be dealt with by the Editor-in-Chief and the full blind review process should be followed as per normal.

15. The Deputy Editor from UNISA should handle all RU submissions, and submissions from UNISA should be handled by RU editors.

16. The SAJEE is an association journal, and editors are accountable to the EEASA Council.

17. The Editor-in-Chief should provide an annual report on the SAJEE and its publication to EEASA Members at the annual EEASA AGM.

18. Editors / Editors-in-Chief would normally serve a six-year term of office. This term of office can be renewed by the EEASA Council.

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2. Authors with existing profiles may log in with their username and password. New users will need to register.

3. Upload your paper as a *New Submission.*

4. Where relevant, provide *Notes to the Editor*, for example, indicate if the submission is for a special edition of the journal.

5. Follow the prompts to complete the submission process. This will include:

   - details of the author and all co-authors, including the email addresses and short biographies (no more than 35 words) for every contributing author.

   - a copy of the list of references as they appear in the paper.

# Author Guidelines

**Manuscripts.** Submissions should be 3 500 - 5 000 words in length, including abstract and references. The English language used should be either South African or UK, and the style should be clear and straightforward without unnecessary jargon. Footnotes should be avoided. Pages should be numbered. The submission should be uploaded as an editable Microsoft Word document, or equivalent. Please ensure that all electronic files are virus free before uploading.

**Title and abstract.** The paper should have a short title (no longer than 15 words) and a short abstract of between 150 and 200 words. Your contact details and name(s) should **not** appear on the abstract page or any other place in the paper, including the references.

**Tables and figures.** Tables and figures must be included as part of the text, clearly labelled and numbered consecutively. Figures should be in a finished form, suitable for reproduction. Figures will not normally be redrawn by the publisher. Photographs need to be high resolution.

**Referencing in the text.** This should be quoted by the name and date in brackets, e.g. (Jones, 1970) or Smith (1983) or UNCED (1992) or (Jones, 1979; Smith & Le Roux, 1983:183).

**References.** These should be listed in alphabetical order by the author's surname. If several papers by the same author and from the same year are cited; a, b, c, etc. should be included after the year of publication. The references should be listed in full at the end of the paper in the following standard form:

*For books:* Handy, C.B. (1985). *Understanding organisations* (3rd edn). Harmondsworth: Penguin.

*For journal articles:* Boschuizen, R. & Brinkman, F.G. (1990). A proposal for a teaching strategy based on pre-instructional ideas. *European Journal of Teacher Education*, 14(2), 45–56.

*For chapters within books:* Little, A. (1990). The role of assessment re-examined in international context. In P. Broadfoot, R. Murphey & H. Torrance (Eds), *Changing educational assessment*. London: Routledge. pp.213–245.

*For policy documents:* UNCED (United Nations Conference on Environment and Development). (1992). Agenda 21 (Chapter 36). United Nations Conference on Environment and Development, Rio de Janeiro.

*Unpublished theses:* Gobrechts, E. (1995). The recycling of domestic waste in the Cape Peninsula: Implications for environmental education. Unpublished master's thesis, Department of Education, Rhodes University, South Africa.

*Unpublished reports:* Gysae-Edkins, M. (Ed.). (1994). Report on the Environmental Education Workshop. Lesotho Association of Non-formal Education, Morjia.

*For personal communication:* Moosa,V.M.(2003). Minister of Environmental Affairs and Tourism, Ministry of Environmental Affairs and Tourism, Pretoria, 16 June 2003.

*For email:* Nhamo, G. (2003). Request for official position and update on the Plastic Bags Regulation implementation. Email, 1 October 2003.

*For website:* DEAT (Department of Environmental Affairs and Tourism). (2003). Inspection of readiness of retailers on the eve of Plastic Bag Regulations
effect. http://www.environment. gov.za, visited 8 May 2003.

**Error free submissions.** The author must ensure that grammar and spelling are correct and is responsible for ensuring that all factual information is correct.

**Headings and sub-headings.** The use of informative sub-headings is recommended and should adhere to the following form: ***Main Heading*** (title case, italics & bold); **Section Heading /Sub-heading** (sentence case, bold); and *Sub-section heading* (sentence case, italics).

**Units of measurement.** Use the SI metric system for units of measurement. Spell out numbers from one to ten; use numerals for larger numbers, groups of numbers, fractions or units, e.g., 4 to 27, 12kg/ha, 34 pupils. Words and abbreviations of Latin and Greek derivation, e.g. *et al.* should be in italics. Scientific names should be given in full when a genus or species is first mentioned, and they should be in italics.

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APPENDIX F

# JOURNAL OF ENVIRONMENTAL PSYCHOLOGY

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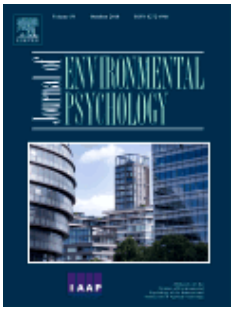

**ISSN:** 0272-4944

## DESCRIPTION

The *Journal of Environmental Psychology* serves individuals in a wide range of disciplines who have an interest in the scientific study of the transactions and interrelationships between people and their physical surroundings (including built and natural environments, the use and abuse of nature and natural resources, and sustainability-related behavior). The journal publishes internationally contributed empirical studies and reviews of research on these topics that include new insights.

As an important forum for the field, the journal reflects the scientific development and maturation of **environmental psychology**. Contributions on theoretical, methodological, and practical aspects of **human-environment interactions** are welcome, along with innovative or interdisciplinary approaches that have a psychological emphasis.

Research areas include:
• Perception and evaluation of buildings and natural landscapes
• Cognitive mapping, spatial cognition and wayfinding
• Ecological consequences of human actions
• Evaluation of building and natural landscapes
• Design of, and experiences related to, the physical aspects of workplaces, schools, residences, public buildings and public spaces
• Leisure and tourism behavior in relation to their physical settings
• Meaning of built forms
• Psychological and behavioral aspects of people and nature
• Theories of place, place attachment, and place identity
• Psychological aspects of resource management and crises
• Environmental risks and hazards: perception, behavior, and management
• Stress related to physical settings
• Social use of space: crowding, privacy, territoriality, personal space

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## EDITORIAL BOARD

# GUIDE FOR AUTHORS

## INTRODUCTION

The Journal of Environmental Psychology serves individuals in a wide range of disciplines who have an interest in the scientific study of the transactions and interrelationships between people and their physical surroundings (including built and natural environments, the use and abuse of nature and natural resources, and sustainability-related behavior). The journal publishes internationally contributed empirical studies and reviews of research on these topics that include new insights.

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•Leisure and tourism behavior in relation to their physical settings
•Meaning of built forms
•Psychological and behavioral aspects of people and nature
•Theories of place, place attachment, and place identity
•Psychological aspects of resource management and crises
•Environmental risks and hazards: perception, behavior, and management
•Stress related to physical settings
•Social use of space: crowding, privacy, territoriality, personal space

### *Submission checklist*

You can use this list to carry out a final check of your submission before you send it to the journal for review. Please check the relevant section in this Guide for Authors for more details.

**Ensure that the following items are present:**

One author has been designated as the corresponding author with contact details:
• E-mail address
• Full postal address

All necessary files have been uploaded:
*Manuscript*:
• Include keywords
• All figures (include relevant captions)
• All tables (including titles, description, footnotes)
• Ensure all figure and table citations in the text match the files provided
• Indicate clearly if color should be used for any figures in print
*Graphical Abstracts / Highlights files* (where applicable)
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Further considerations
• Manuscript has been 'spell checked' and 'grammar checked'
• All references mentioned in the Reference List are cited in the text, and vice versa
• Permission has been obtained for use of copyrighted material from other sources (including the Internet)
• A competing interests statement is provided, even if the authors have no competing interests to declare
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To foster transparency, we encourage you to state the availability of your data in your submission. This may be a requirement of your funding body or institution. If your data is unavailable to access or unsuitable to post, you will have the opportunity to indicate why during the submission process, for example by stating that the research data is confidential. The statement will appear with your published article on ScienceDirect. For more information, visit the Data Statement page.

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## AFTER ACCEPTANCE

### *Online proof correction*
Corresponding authors will receive an e-mail with a link to our online proofing system, allowing annotation and correction of proofs online. The environment is similar to MS Word: in addition to editing text, you can also comment on figures/tables and answer questions from the Copy Editor. Web-based proofing provides a faster and less error-prone process by allowing you to directly type your corrections, eliminating the potential introduction of errors.
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APPENDIX G

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## ETHICS APPROVAL CERTIFICATE OF PROJECT

Based on approval by **Health Research Ethics Committee (HREC)**, the North-West University Institutional Research Ethics Regulatory Committee (NWU-IRERC) hereby approves your project as indicated below. This implies that the NWU-IRERC grants its permission that, provided the special conditions specified below are met and pending any other authorisation that may be necessary, the project may be initiated, using the ethics number below.

**Project title: The development and evaluation of an approach to understand and influence environmental attitudes at higher education institutions in South Africa**

**Project Leader**: **Dr HC Coetzee**
**Student**: **MM Evert**

**Ethics number**:

| N | W | U | - | 0 | 0 | 3 | 4 | 3 | - | 1 | 5 | - | A | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Institution | | | | Project Number | | | | | | Year | | | Status | |

Status: S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation

**Approval date**: 2016-02-22 **Expiry date**: 2017-02-21 **Risk** **Medium**

**Special conditions of the approval (if any):**

- Translation of the informed consent document to the languages applicable to the study participants should be submitted to the HREC (if applicable).
- Any research at governmental or private institutions, permission must still be obtained from relevant authorities and provided to the HREC. Ethics approval is required BEFORE approval can be obtained from these authorities.
- Any further information and any report templates is obtainable from Carolien van Zyl at Carolien.VanZyl@nwu.ac.za.

**General conditions:**

*While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, please note the following:*

- *The project leader (principle investigator) must report in the prescribed format to the NWU-IRERC and HREC:*
  - *annually (or as otherwise requested) on the progress of the project, and upon completion of the project*
  - *without any delay in case of any adverse event (or any matter that interrupts sound ethical principles) during the course of the project.*
  - *Annually a number of projects may be randomly selected for an external audit.*
- *The approval applies strictly to the protocol as stipulated in the application form. Would any changes to the protocol be deemed necessary during the course of the project, the project leader must apply for approval of these changes at the HREC and NWU-IRERC. Would there be deviated from the project protocol without the necessary approval of such changes, the ethics approval is immediately and automatically forfeited.*
- *The date of approval indicates the first date that the project may be started. Would the project have to continue after the expiry date, a new application must be made to the NWU-IRERC and new approval received before or on the expiry date.*
- *In the interest of ethical responsibility the NWU-IRERC and HREC retains the right to:*
  - *request access to any information or data at any time during the course or after completion of the project;*
  - *to ask further questions, seek additional information, require further modification or monitor the conduct of your research or the informed consent process.*
  - *withdraw or postpone approval if:*
    - *any unethical principles or practices of the project are revealed or suspected,*
    - *it becomes apparent that any relevant information was withheld from the NWU-IRERC or that information has been false or misrepresented,*
    - *the required annual report and reporting of adverse events was not done timely and accurately,*
    - *new institutional rules, national legislation or international conventions deem it necessary.*

The IRERC would like to remain at your service as scientist and researcher, and wishes you well with your project. Please do not hesitate to contact the IRERC for any further enquiries or requests for assistance.

Yours sincerely

Prof LA Du Plessis

Digitally signed by Prof LA Du Plessis
DN: cn=Prof LA Du Plessis, o=North-West University, ou=Campus Rector, email=Linda.DuPlessis@nwu.ac.za, c=ZA
Date: 2016.02.24 08:08:32 +02'00'

**Prof Linda du Plessis**
*Chair NWU Institutional Research Ethics Regulatory Committee (IRERC)*