An Evaluation of the Effect of the Fynbos for the Future Programme on Learners Environmental Attitudes at Three Schools in the Western Cape

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COMPULSORY DECLARATION:

This work has not been previously submitted in whole, or in part, for the award of any degree. It is my own work. Each significant contribution to, and quotation in, this research proposal from the work, or works of other people has been attributed, cited and referenced.

Signature: Signed by candidate Date: ___09/03/2021___

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List of Acronyms

ATE	Average Treatment Effect
CAPS	Curriculum and Assessment Policy Statement
CNI	Connectedness to Nature Index
COCT	City of Cape Town
DPE	Department of Education
EE	Environmental Education
FFTF	Fynbos for the Future
GREEN	Garden Resources for Environmental Education Now
IEEIA	Investigating and Evaluating Environmental Issues and Action
LQ	Learner Questionnaire
NAAEE	North American Association for Environmental Education
NGO	Non-Governmental Organisation
SES	School Environment Survey
SPIS	School Psychological Impact Scale
UNESCO	United Nations Education, Scientific and Cultural Organisation
WESSA	Wildlife and Environmental Society of South Africa

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Abstract

This paper explores the influence of Greenpop's "Fynbos for the Future" Environmental Education (EE) programme on learner's knowledge, attitudes and behaviours towards the environment. Although there is vast research on environmental importance and EE programmes specifically, there is very little within the context of South African learners from lower socio-economic areas. Therefore, programme characteristics associated with the most beneficial personal and environmental outcomes are investigated. This study utilised mixed methods and various measures to explore the effect of EE on learners between the ages of 9 and 13, from three schools in the Western Cape. The primary conclusions of the study were that environmental education programmes within this context elicit promising results, such as increased positive attitudes towards and greater awareness of the importance of the environment. However, to facilitate this result, various factors needed to be considered, including consistency, contexts and traditional knowledge systems. This paper further examined the complexity of EE and how various organisations can help play a role in shaping environmental futures - in South Africa and globally. Various recommendations are discussed, some of which include ensuring a greater emphasis on understanding environmental literacy and understandings within specific contexts, as well as putting a greater emphasis on the importance of the influence of teachers on the outcomes. Ultimately, EE programmes play an invaluable role in shaping the future of environmental sustainability and human well-being.

Keywords:

Environmental education, evaluation, environmental programmes

Chapter 1: Introduction

This dissertation presents a formative evaluation of Greenpop's Fynbos for the Future (FFTF) programme. It thus explores the efficacy of an environmental education (EE) programme and its influence on learner and school outcomes. This chapter explores the background and context of EE and how this is relevant to the current research, followed by a review of the literature that informed this paper and ultimately the rationale and need for the programme. Finally, the elicited programme theory is presented in conjunction with the evaluation questions.

Historical and Social Contexts of South Africa

The concept of EE was first introduced into Southern Africa in the 1970s and gained its influence from international understandings thereof. This led to the expansion of views from conservation-focused education (which focused on utilising resources sensibly and understanding ecological processes – but excluded social and political debates) to a broader view of EE which included varying perspectives; and approached EE in a holistic manner, thus not isolating nature and the environment (Irwin, 2007). However, different ideological, political and social views led to a lack of acceptance of EE in this holistic manner. Thus, EE has had a complex history within South Africa and continues to be vastly interconnected within these social, economic, political and biophysical deliberations (Irwin, 2007). The 1977 *Tbilisi Declaration* was approached with caution by the government at the time; however NGOs began to implement this newer understanding of EE, thus promoting it where viable. Later on, various other documents (such as the *World Conservation Strategy; Caring for the Earth: a strategy for sustainable living and the 1983 Brandt Commission report)* were introduced and again rejected by the government, despite their potential to influence national policy (Iwrin, 2007).

The advent of democracy and introduction of Constitution in 1994 included the right to a healthy environment, which focused more on "sustainable development of the environment" and rejected purely environmental conservationist views of the past (Peden, 2006). This prefigured public school curriculum reforms (Hebe, 2019). Ultimately, EE has shifted from largely conservation-focused to include more reflexive and contextual factors such as the processes of social transformation (Lotz-Sisitka, 2004). Thus, it is necessary to

view EE from this holistic perspective in order to bring about social and environmental change. In 1997, a curriculum change which aimed to incorporate EE into all school classrooms occurred (Hebe, 2019). This still exists under today's Curriculum and Assessment Policy Statement (CAPS) curriculum (Hebe, 2019). The CAPS curriculum introduced environmental learning opportunities to be implemented by teachers. This includes combining principles of social and environmental justice with human rights; and enabling learners to use science and technology to show responsibility for the environment and health of others (Hebe, 2019). However, Ham and Sewing (1988) state that there are various barriers to ensuring efficient implementation of EE. Hebe (2019) states that these barriers still exist today. They are *conceptual* (misconceptions and confusion about who should teach it); *logistical* (lack of time or funding); *educational* (lack of training for implementing EE); and *attitudinal* barriers (attitudes of teachers towards teaching EE). This last point is further evidenced by Schudel et al. (2008), who found that teachers in South Africa had a rudimentary understanding of EE. Mwendwa (2017) found this to be a similar challenge for implementing EE in Tanzania. Ultimately, executing EE in schools both within South Africa and various other countries (such as Australia and Canada) is largely left to the teachers' discretion (Hebe, 2019). This lack of structure, accompanied by the teachers generally basic knowledge of EE, as well as the constraints mentioned above; all emphasize the need for proper instruction around EE and its implementation. Additionally, it should be noted that there are various additional factors to EE implementation in South Africa such as the very recent socio-historical and geo-political contexts (Lotz-Sisitka, 2004). In relation to this, the extent of colonialism (and neo-colonialism) and its effect on the intended diminishing of indigenous knowledge, as well as imposing Western cultural standards and ideals (including scientific and industrial progress) has played a major role in EE in South Africa (Kayira, 2015). Furthermore, factors such as forced removals under the apartheid government regime meant people were forcibly removed from areas filled with rich biodiversity resources due to the ideology of centralized control and protection of certain national areas (Fabricius & de Wet, 2002). Ultimately, this can be related to the "newer" holistic view of EE which incorporates the interconnectedness of various social, economic and political factors (Irwin, 2007).

The current South African governments' approach and goals regarding EE in South Africa are in line with various organisations worldwide. One such organisation is the United Nations Education, Scientific and Cultural Organisation (UNESCO, 1978), whose definition

and understanding of EE has been widely implemented within the field. UNESCO states that the goal of EE is to develop a population that is aware of and concerned with the environment and its associated problems (UNESCO, 1978). The definition expands to individuals' gaining knowledge, skills, attitudes, motivations and commitment to the environment in order to bring about solution-focused changes to environmental problems – now and in the future (Hollweg et al., 2011). Since 1990, numerous environmental literacy frameworks have been published – all reflecting UNESCO's objectives and indicators (Hollweg et al., 2011). These include: awareness and knowledge; cognitive skills, affective disposition (attitudes) and behaviour (Hollweg et al., 2011). Another organisation is the North American Association for Environmental Education (NAAEE). The NAAEE has been an influential leader in promoting excellence in EE – both in the United States and globally. The NAAEE built on the frameworks developed by UNESCO and subsequent researchers and organisations (Hollweg et al., 2011). NAAEE published guidelines for best practice in environmental education (NAAEE, 2004). These guidelines have been implemented in the United States, Taiwan and Mexico (Hollweg et al., 2011). They cover an array of topics, some of which include: culturally appropriate goals and objectives; child-directed practices; use of the natural world and materials; play and the role of adults; social and emotional growth; and skills for understanding the environment (NAAEE, 2004).

It is important to consider the South African context and organisations that operate within it. This is where non-governmental organisations (NGOs) play an important role. One such organisation is the Wildlife and Environmental Society of South Africa (WESSA). WESSA is one of South Africa's oldest and largest independent environmental NGOs. They have run an eco-schools programme in South Africa since 2003, reaching over 4500 schools (Fullard, 2018). The programme aims to create awareness and action relating to social and environmental sustainability in schools, as well as support Education for Sustainable Development (ESD) in the national curriculum (Fullard, 2018). Another such NGO is Greenpop, which plays both a supportive and crucial role in EE, especially within South Africa and similar contexts (explored further below).

Programme Description

Greenpop is a non-profit organisation that started in 2010. The founders started with the "simple" goal of planting 1000 trees in a month. However, soon after they realised that

there was a need for an organisation which connected people to the planet on a continual basis. Today, Greenpop focuses on planting trees through urban greening and reforestation projects. They furthermore spread environmental awareness and engage people through green festivals and workshops throughout Southern Africa. Additionally, members of Greenpop recognized how city expansion threatens the unique ecosystem and natural assets of the Cape Floral Kingdom – an area more biodiverse (per square kilometre) than the Amazon rainforest (UNESCO, 2004). In order to combat these effects, and uphold biodiversity and ecosystem services, Greenpop developed Fynbos for the Future (FFTF), which was launched in late 2018.

This programme aims to incorporate fynbos into urban landscapes and increase the ecological links between natural spaces. Fynbos was specifically chosen in response to Cape Town's water crisis, as it flourishes in harsh conditions. FFTF aims to work with 30-40 learners from ten under-greened schools in the Western Cape. Consultations with Greenpop representatives, as well as the programme documents elucidated various aims and objectives, including:

- Planting fynbos biodiversity gardens
- Increasing urban ecosystems services
- Reconnecting urban biodiversity corridors
- Instilling a love for nature in learners
- Creating empowered environmental stewards
- Promoting water-wise practices
- Encouraging active community engagement
- Inspiring biophilia

As of August 2019, plantings days had already occurred at four of the schools (three of which were included in the data collection process for this evaluation). In totality, the programme duration is three years, with the intended finish being at the end of 2021 (however, this may be extended due to various limitations during covid-19). Ultimately, the programme consists of two complementary stages: phased fynbos gardens that serve as an outdoor classroom, and educational workshops on various environmental topics that connect children with the garden and specific ecosystems therein.

Phase 1: The fynbos garden. The garden (approximately 150m^2) incorporates various fynbos and other species that are of cultural and medicinal importance – with the selection being as endemic as possible. The actual planting activities are done with the learners and are accompanied by discussions and hands-on educational activities relating to fynbos, the environment and how to engage in active citizenry. The gardens are intended to be used by teachers at all schools as outdoor classrooms, whereby all learners are encouraged to touch, smell and experience the plants and natural elements.

Phase 2: Educational workshops. Throughout the three-year duration of the programme, Greenpop aims to facilitate 6 workshops per school. These workshops are presented by trained facilitators, based on the CAPS learning outcomes – to ensure relevance and not add to teacher's already challenging workloads. Topics included in the workshops include: water-wise and low impact living; wonderful waste ecosystem services and urban ecology; fynbos history; biodiversity and ecology; citizen science; and green careers and environmental innovation/entrepreneurship. These workshops are aimed at students, teachers, groundsmen and volunteers. The programme functioning, process and outcomes is reflected in the elicited programme theory (*Figure 1*). However, it is important to note that EE and literacy perspectives were largely drawn from UNESCO's understanding thereof.

Programme Theory

There was no existing programme theory for FFTF. Thus, one was developed after meeting with the head of programmes and urban greening manager of Greenpop. *Figure 1* depicts the programme theory logic model.

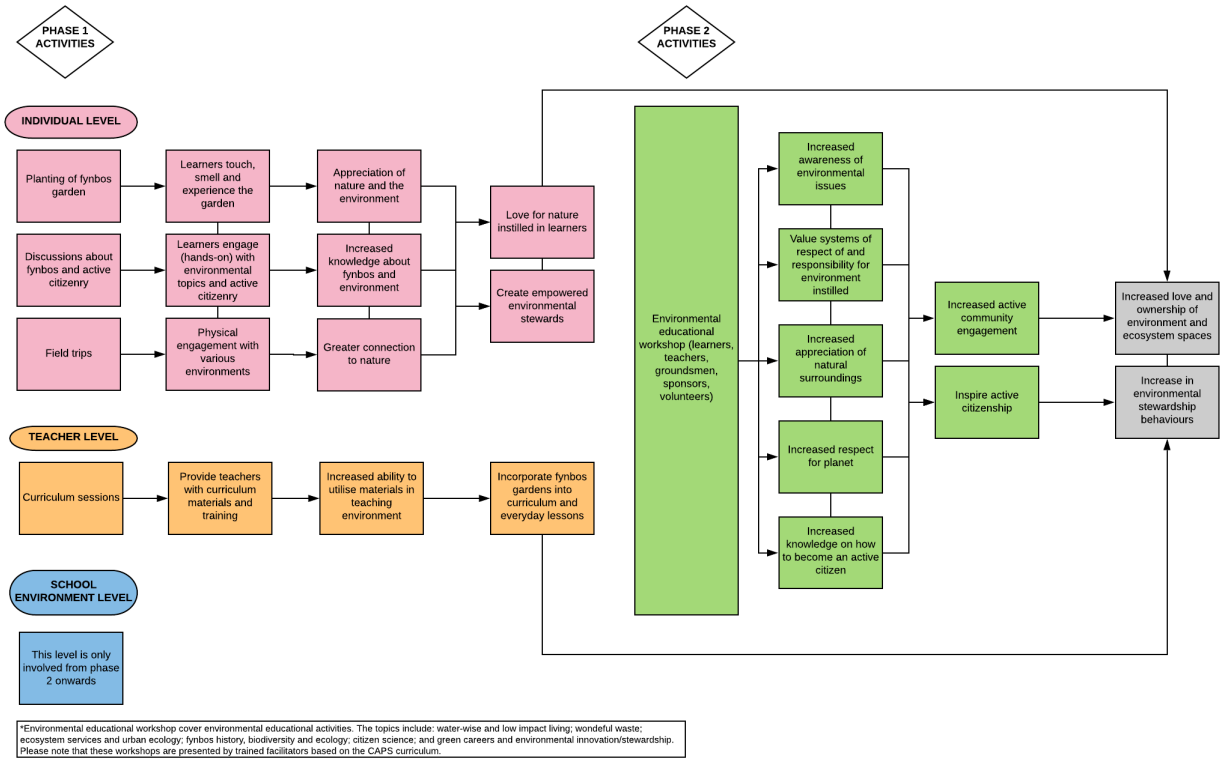


Figure 1. Fynbos for the Future Programme Theory

Overall the programme aims to provide synergy and collaboration in order to bring about the intended changes. Thus, the City of Cape Town's (COCT) Spatial Development Framework, Integrated Development Plan and Urban Sustainability strategies were utilised during programme development. Further, the programme aims to align with the COCT's Infrastructure Plan. This plan focuses on protecting and enhancing existing natural environmental assets, connecting people with nature, promoting improved access to safe, well maintained and protected natural areas and public open spaces, as well as promoting new green infrastructure assets. Thus, Greenpop's teaching approach in the FFTF programme can be viewed as more conservationist than holistic – focusing more on the natural environment, rather than the environment within specific contexts; such as part of a political and interconnected view between human life and the surrounding environment. Though ultimately, these interrelated factors are vastly important to consider, the focus of the FFTF programme is more so on the "nature as the natural environment" than the environment in context that shapes their participants lives.

Evaluation Context

The many intended goals of FFTF are wide-reaching, however narrowing the focus to the school environment and individual learner level is important in understanding how the programme affects psychological well-being, attitudes and experiences. Thus, an outcome evaluation approach was used. The approach was inspired by Realist Evaluation principles (Pawson & Tilley, 1997) in the framing of the evaluation design and questions. This evaluation therefore examines the effects of the programme to establish if and how it was related to intended outcomes within specific contexts.

The evaluation consisted of two parts: process and outcomes. A process evaluation measures the implementation of a programme (Rossi et al., 2019). Thus, this examined the broader school environment, understanding the processes of the programme and if it was used as intended. Rossi et al. (2019) state that such an evaluation is important in understanding whether a programme has established its operations effectively. This is very important for this programme, considering how recent the rollout was. Implementation questions are utilised to gain an understanding of programme delivery and use of the gardens by learners and teachers. Subsequently, the outcome evaluation measured the effects of the programme on the target population (Rossi et al., 2019). This explored the effects of the programme on individual learner attitudes (especially in relation to biophilia and psychological well-being) and behaviours towards nature, as per the programme objectives.

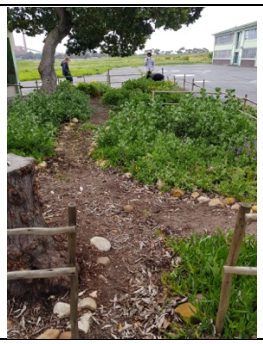
School Site Description

A site description of each school is displayed in Table 1; and a representation of school location in *Figure 2*. The ranking of schools in South Africa falls into 5 quintiles, with quintile 1 representing the poorest schools and quintile 5 the least poor schools (Van Dyk & White, 2019). However, Van Dyk and White (2019) state that schools in quintiles 2-4 may need just as many resources as quintile 1, and are being misidentified into higher quintiles. The schools in quintile 4 are equal to or only slightly above the national average in terms of the proportion of disadvantaged families, but still receive much less funding than quintiles 1-3 (Van Dyk & White, 2019). To illustrate an example, Van Dyk and White (2019) illuminate the fact that a school was wrongly identified to be in quintile 5, when 80% of learners were actually from poor areas. The school site description enables a further understanding of context – which should be considered throughout the evaluation. Background factors such as socioeconomic status, gender, age and ethnicity may have a large influence on accessibility to

resources and environmental contexts (Larson et al., 2010). Bayat, Louw and Rena (2014) state that in South Africa (though various targeted efforts to redress that after-effects of apartheid have been implemented) wealth and education quality are correlated, such that more affluence is associated with better education. This, in addition with the fact that South African education quality scores badly in comparison to the rest of the world, means that learners from disadvantaged schools generally do not acquire a mastery of basic subjects such as reading, writing and mathematics (Bayat et al., 2014). This is especially pertinent, as previous research and scales used within this evaluation were developed in Western contexts.

Table 1.

School Site Description

School	Cypress	Mountain Road	Strandfontein
Quintile (socioeconomic indicators)	4	5	5
Language of Instruction	Part English, part Afrikaans	English	English
Soil types	Acid sands and calcareous sands	Granite and shale derived clay	Calcareous sands
Original ecosystems	Strandveld (coastal dune sand) and Sand Fynbos (low pH, poor in nutrients)	Renosterveld (rich clay soil)	Strandveld (coastal dune sand)
Accessibility (to garden)	All the time	Only with supervision	Only during specific times
Image of garden			

The above information was sourced from the Western Cape Education Department (WCED; 2017) and University of the Western Cape (n.d.)

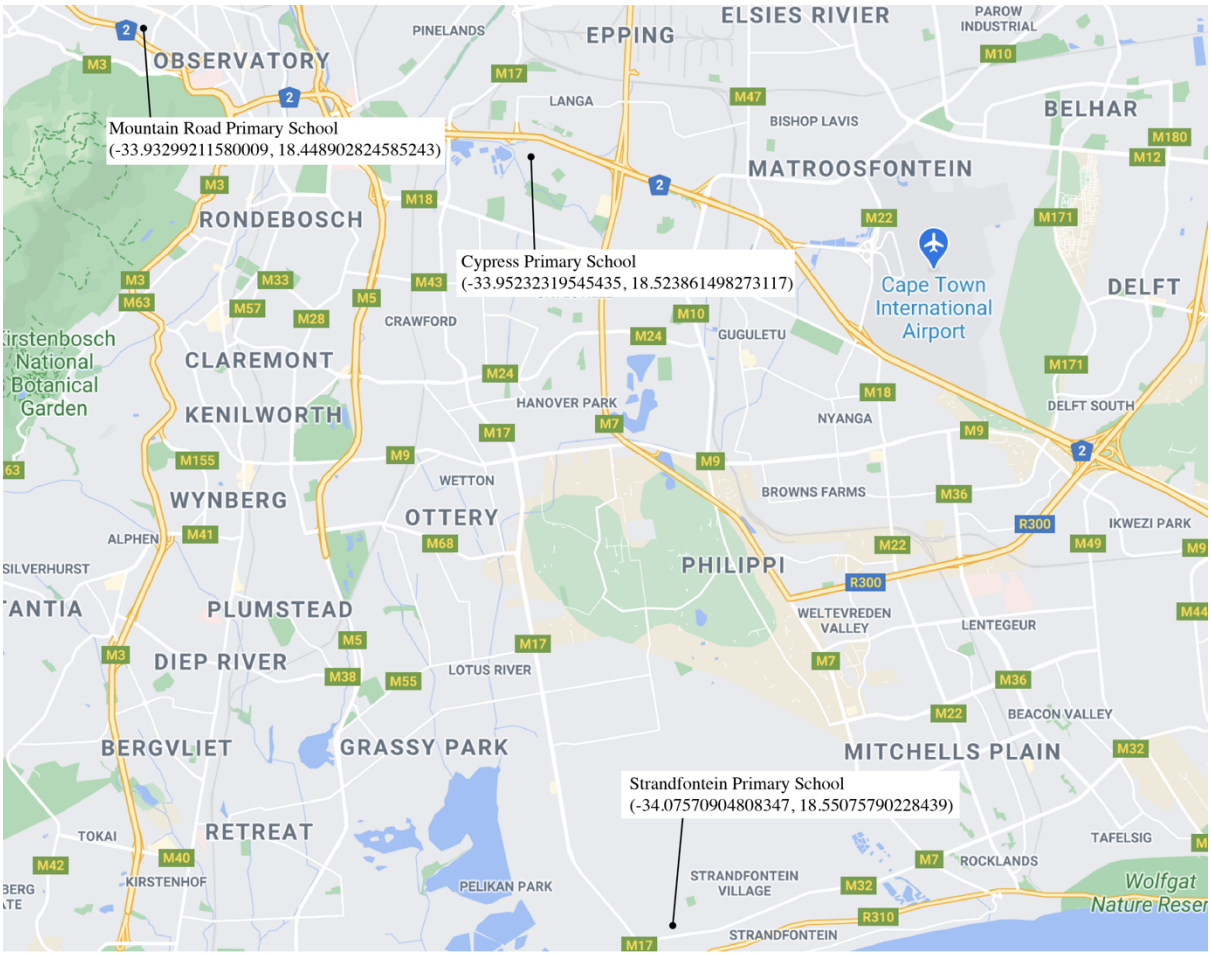


Figure 2. School Locations

Literature Review

Nature plays a significant positive role in human health, economics, educational settings, social environments and general well-being within the human population (Elmendorf, 2008; Irwin, 2002; Nowak et al., 2001; Ulrich, 1984). Grinde and Patil (2009) found that natural settings engage fascination where most cultures reflect a fondness for nature. Further, research has shown that humans prefer green and natural spaces over built landscapes; and that humans derive physical and psychological benefits from exposure to green areas (Hand et al., 2017). Kahn Jr. (1997) states that even minimal connection to nature can have positive effects, ranging from increased health in the workplace to better recovery for hospital patients. Ultimately, there is a growing body of research which focuses on the benefits of connection to nature – both for individuals and the community in which they interact (Elmendorf, 2008).

Nature and Environment

As explored earlier in the chapter, nature and the environment are at the core of EE – but each one is related to a different understanding thereof. EE if oftentimes viewed only as teaching about the "natural environment", at the neglect of understanding the interaction between human and the surrounding environment (Irwin, 2007). Le Grange (2002) states three broad approaches to EE (that may be viewed as in line with its history). These are education: *about* (emphasizes knowledge about natural systems and processes); *in/through* (emphasizes experience in the environment as a way of developing competencies); and *for* (emphasizes the critical agenda of values, social change and transformation through exploration of and involvement in environmental problems) the environment (Le Grange, 2002). Greenpop's objectives are largely based on environmental conservation and "outdoor" activities, thus it can be argued that they aim to educate learners about and through the environment; thus not deeply engaging with the varying contexts in which this exists for different individuals.

The Love of Nature

The love of nature is described by some researchers to be an affective affiliation with life (Hand et al., 2017; Joye & De Block, 2011). In order to understand the love of nature in context, it is important to understand a brief history of how human connection to nature has been explained. The term *biophilia* first arose in 1964 (Fromm, 1964/2011), where it was referred to as a love for life. Thus, it asserts the existence of a positive attitude towards all that is alive and vital (Simaika & Samways, 2010). In 1984, Wilson wrote a book titled *Biophilia,* in which he defined the term as an innate love for nature (Simaika & Samways, 2010). Wilson (1984) further proposed that biophilia is genetically inherited – albeit weakly so (Kellert, 2009; Wilson, 1992/1984). With this book followed what is known today as "the biophilia hypothesis", more specifically understood as the innate tendency for humans to focus on life and lifelike processes – especially in relation to nature (Gullone, 2000; Kellert & Wilson, 1995; Wilson, 1993). Subsequently, biophobia is described as the feeling of fear and rejection towards natural elements (Ulrich, 1984).

The above "biophilia hypothesis" can be linked to evolution, as nature has historically provided an array of resources and environments for survival (Grinde & Patil, 2009; Gullone, 2000). History has seen indications of human's efforts to maintain contact with nature – from Persian settlements to medieval Chinese villages – all filled with elaborate gardens (Gullone,

2000). However, societies have advanced at an unprecedented rate in recent times and rapid urbanisation has created vast shifts away from nature (Gullone, 2000). Furthermore, various other factors have played a role in this shift in South Africa, such as colonialism, apartheid and concurrent racism, and subsequent class and language biases (Gough, 1999).

In South Africa, colonialism and apartheid are significantly intertwined such that European and Western modes of knowledge are viewed as universal truth and rationality (Gough, 1999). Thus, colonialism gave rise to an era that allowed for legalized racism. This is exacerbated by the fact that racism is primarily seen as an individual problem, however, Scheurich and Young (1997) outline four levels of racism: individual, institutional, societal and civilizational – which could be particularly relevant in South Africa to this day, considering its history. In this context, individual racism is viewed as not seeing a member of another race with a negative judgement on an individual level. However, this view may restrict racism to only this level at the detriment of understanding the broader factors (Scheurich & Young, 1997). This is especially true in South Africa, which included explicit societal (broader societies favouring one race over another) and civilizational racism (favouring privileged attitudes such that they become the everyday reality for the entire population despite being constructed by a dominant societal group; Scheurich & Young, 1997). The complicated history of South Africa (and the facets of its recent past) may still play a large role in the approaches to EE in contemporary society and must thus be addressed with more contextual understanding and caution to not only apply international learning methods, but to adapt and base them on the relevant context. Ultimately, there are various factors that have changed human connections to nature over time, but many still argue that the natural environment is as important to human history as life and social behaviour (Gullone, 2000; Wilson, 1993). Thus, considering these various factors should play an important role in informing EE within South Africa specifically – but also on a more broader scale.

Positive Effects of Nature

Researchers have largely found that exposure to nature fosters psychological well-being and promotes physical well-being (Gullone, 2000; Hand et al., 2017; White, 2004). Further, Matsuoka and Kaplan (2008) state that people have a particular set of landscape needs – urban residents especially express a desire for contact with nature, other people,

attractive environments and places for play and recreation (Matsuoka & Kaplan, 2008). In other words, the design of landscapes – particularly in urban areas – strongly influences the behaviour and well-being of individuals within their proximity (Matsuoka & Kaplan, 2008). Fulfilment of such needs are related to reduced stress, as well as increased self-esteem, productivity, happiness and longevity (Gullone, 2000; Matsuoka & Kaplan, 2008; Yost, 2011). Additionally, studies have found that environment focused experiences influence youth's attitudes and actions towards nature, as well as their own-well-being (Hollweg et al., 2011). However, despite the positive associations, not many people are aware of or consider the benefits of spending time in nature (Berto et al., 2018).

Decreased Contact with Nature

The tendency for humans to express pleasure and preference for natural phenomena has been seen from as young as two years of age (Moore & Cooper Marcus, 2008). However, this connection is only maintained if it is adequately stimulated (Fattorini et al., 2017). In modern societal living, such stimulation is insufficient and children's access and association to nature is rapidly declining (Aaron, 2009; Hand et al., 2017). Urbanisation has played a large role in this, as contact to nature has become increasingly scarce (Hand et al., 2017; White, 2004). This decline may be associated with decreased motivation to protect nature (Hand et al., 2017). Thus, the cycle perpetuates, as less contact to nature breeds less care for nature – which in turn is associated with less contact thereto.

A systematic review by Tillmann et al. (2018) explored the results of 35 studies that looked at environmental interaction and mental health in youth under 18. A vastly positive relationship was found between engagement with nature and overall increased mental health and resilience, as well as decreased stress levels (Tillmann et al., 2018). Moreover, implementing gardens at an Austrian middle school was associated with significantly reduced blood pressure compared to students at two control schools (Kelz et al., 2015). Further, deeper exploration of studies of children in poverty, war and displacement show positive effects of green refuges on psychological well-being (Chawla, 2014). Wells and Evans (2003) further substantiate this, as they found higher levels of contact with nature related to decreased psychological distress and a higher sense of self-worth (after controlling for family income). Interestingly, the more stressful events that children experienced, the greater role nature played as a buffer for psychological well-being (Wells & Evans, 2003). Thus,

connection to nature plays an important role in children and adolescents' well-being in various contexts.

The vastly positive effects of nature, combined with the decreasing contact therewith in the contemporary world require the need for widespread interventions. This exposes the importance of environmental education (EE). EE increases understanding, knowledge and attitudes towards the natural world (Duvall & Zint, 2007). Beginning in the 1990s, EE programmes increasingly sought to increase immersion within nature. Thus, providing individuals with an experiential aspect that allows them to be positively influenced in various ways and to understand the complex nature of their interactions with the natural world (Duvall & Zint, 2007; Fisman, 2005). A review by Duvall and Zint (2007) describes how many researchers recognize the need to focus EE programmes on adults. However, there are various barriers to this – such as a lack of, or minimal, spaces in which adults can be part of a captive audience, as well as a lack of free time in adults' lives and limited funding for adult programmes (Duvall & Zint, 2007). Thus, many researchers focus their efforts on children as there are more spaces and environments that provide opportunities for wide reach and engagement – such as schools and after-care programmes. Focusing on children further enables a future focus, whereby such programmes can provide future generations with the knowledge, desire, commitment and ability to contribute to an ecologically sustainable future (Duvall & Zint, 2007). Duvall and Zint (2007) do however state that parents play a large role in the possible positive effects of such programmes. This is especially true as a "culture of fear" increases concern for children's safety – and consequently less allowance from the parents for their children to play outdoors (White, 2004). Thus, an elimination of experience may occur, whereby children don't interact with nature regularly, which in turn produces apathy towards the environment (White, 2004). Therefore, engaging parents in such programmes may be beneficial for broader understanding and change. Furthermore, intergenerational learning, whereby programmes encourage children to share what they have learnt with adults, may be valuable in contributing to knowledge amongst both children and adults (Duvall & Zint, 2007).

Environmental Education Programmes

Biophilia can be developed and maintained through environmental contact – which can be achieved through EE programmes, emphasizing the need for more EE programmes to promote and influence environmentally conscious individuals.

A review by Rickinson (2001) found that certain programme characteristics are associated with positive EE outcomes. These characteristics include role modelling, direct experience outdoors and collaborative group discussions (Rickinson, 2001) – all of which Greenpop aimed to include in their programme. A more recent review by Stern et al., (2014) analysed the results of 86 evaluated programmes across the globe. Stern et al. (2014) found that programme outcomes that were typically focused on were knowledge, attitudes, skills, intentions, enjoyment, behaviour and awareness. The programmes that had the most positive effect were those that involved immersion in nature; collecting real-world data; scientific collection and observation; project (students involved in planning, implementing and evaluating EE programmes); guided inquiry (educators ask questions and facilitate pursuit of answers); group work; teacher engagement; and reflection on prior or new experiences through journaling or discussions (Stern et al., 2014). The worst outcome was associated with a traditional programme structure, which included indoor, lecture-only learning (Stern et al., 2014). The outcomes that were most positively influenced were enjoyment, knowledge, skills, intention, attitudes and behaviour, respectively (Stern et al., 2014).

Studies that have investigated programme outcomes individually have found similar results. A school programme that had been running for five years, with a sample of fifth and sixth grade students on an island in Hawaii also found positive results (Volk & Cheak, 2003). The programme was based on the EE curriculum, Investigating and Evaluating Environmental Issues and Actions (IEEIA). Quantitative methods were used to investigate the programme outcomes of environmental literacy and critical thinking skills (Volk & Cheak, 2003). Results of the study show that children who participated in the programme outperformed those who didn't on environmental literacy and critical thinking – measured using standardised instruments (Volk & Cheak, 2003). Another school garden programme known as Project GREEN (Garden Resources for Environmental Education Now) was implemented in seven elementary and junior schools in the United States (Waliczek & Zajicek, 1999). Results from the study show that participation in the programme positively and significantly increased students' environmental attitudes (Waliczek & Zajicek, 1999). Overall results show that EE programmes have positive effects on children's knowledge, skills and attitudes towards nature. However, these results were taken from outcomes of programmes implemented in Western cultures, which is important to consider as South Africa is vastly complex and segmented by various aspects such as culture, race, historical background, language, religion, and economic status (Bornman, 2010). This is further

compounded by the divisiveness of the apartheid era and the difficulty this brought forward in developing a South African national identity (Bornman, 2010).

Rationale

Humans have a greater impact on the environment than at any other time in history (Hollweg et al., 2011). Thus, environmental problems have rapidly increased in the past few decades (Ernst & Theimer, 2011; Hollweg et al., 2011). Therefore, EE holds many potential benefits globally, which increases the need to evaluate such programmes to explore which designs and delivery are most beneficial (especially within a South African context – which has a complex history and still struggles from divisiveness amongst its citizens (Bornman, 2010).

Some researchers suggest that biophilia and biophobia are innate (Wilson, 1995/1984; Yost, 2011); others argue that the two are not innate and do not link to each other – but rather that the bond to nature is experiential and can thus be learned (Gullone, 2000; Katcher & Wilkins, 1993; Simaika & Samways, 2010). A challenge faced in this domain of research and development is the measurement of biophilia – especially within a real-world setting (as it has only been used in peer-reviewed articles; Simaika & Samways, 2010). Nevertheless, there are an array of approaches that can be taken to understand the attitudes and feelings towards nature, as well as knowledge and behaviours associated therewith. Thus, the focus of this evaluation looks at individual's reaction to nature on a broader scale than just biophilia. It incorporates knowledge, attitudes, feelings and relevant behaviours. This approach, in combination with the South African context and constraints increases the need for understanding the effectiveness of implementing EE programmes in various situations. Considering this along with the overwhelming evidence that elucidates that increased connection to nature is possible through real-world experiences, evaluations are necessary to determine what types of EE programmes are most beneficial (and in what contexts). They will further enable the adaptation of the presently available research to the South African context – something that is currently missing. Ultimately, it will allow for a deeper understanding of how to approach EE most efficiently with the best outcomes. Thus, it would enable organisations such as Greenpop (and others) to play a more active role in helping shape the environmental future of South Africa and its citizens.

Need for the Evaluation

Conversations with the client illuminated that the programme had already begun. Thus, Greenpop needed to know what was working and why it worked better (or didn't work) for some students and not others. A traditional impact evaluation approach - measuring average treatment effect (ATE) - wouldn't have been able to explore this with the necessary depth. ATE measures outcomes through the average effect in the population (not individuals). This is often used with random assignment, which was long deemed one of the most straightforward and reliable ways to make causal inferences (Schafer & Kang, 2008). However, other settings such as this one (a quasi-experimental design) may consist of various other confounding factors, deeming the ATE method impractical for inferring causality (Schafer & Kang, 2008). Thus, researchers (and evaluators) have begun accepting various other approaches to examining causal relationships – which are now recognised as layered and multidirectional (Gates & Dyson, 2017). One such approach is Pawson and Tilley's (1997) realist evaluation, which focuses on how mechanisms work in particular contexts to generate effects.

Ultimately, Gates and Dyson (2017) state that evaluations should be situationally responsive, which involves customizing the evaluation design and methods to the needs, constraints and contexts of the specific situation – which was the case for this evaluation. The client needed to know who the programme was working for and why, which is the perspective that a realist evaluator would have – the perspective that informed this evaluation. The realist perspective commits to the idea that programmes deal with real problems, not social constructions (Pawson & Tilley, 1997). It aims to understand and test how, for whom and in what contexts programmes are effective (Pawson & Tilley, 1997). The primary intention of a realist evaluation is to inform realistic developments of programmes that benefit the participants and the public (Pawson & Tilley, 1997). Thus, it is important to consider all situations and individuals that the programme may be affecting – both directly and indirectly. This enables a deeper exploration of the context and broader level changes that a programme may influence. Thus, this approach was ultimately selected to answer the primary questions brought forward by the client.

Evaluation Questions

The evaluation questions are broken down into process and (short-term) outcome evaluation questions for each level of the evaluation. This is illustrated in Table 2.

Table 2.

Evaluation Questions

	Process	Outcome
Individual level		
Do learners have a greater love of nature after participating in the programme?		✓
Which learners were more responsive to the programme's efforts to improve their love of nature, and why?		✓
Which learners showed increased positive action in changing their own environmental habits?		✓
Which learners have encouraged others to change their environmental habits? (Do these learners speak to others or engage in conversations about the environment? Are they more involved in their community? If so, how?)		✓
Teacher Level		
How have the teachers utilised the training resources, materials (i.e. posters, etc.) and outdoor spaces? (Are the outdoor spaces being used as classrooms?)	✓	
How do teachers feel about the delivery of services by Greenpop?	✓	
How do teachers feel about the gardens? How do they think the gardens are bringing about changes?		✓
How have teachers attitudes towards nature changed? If so, how?		✓
What observations have teachers made regarding students who participated in the programme?		✓
School Environment Level		
How well are school gardens being maintained by the garden prefects?	✓	
Did field trips take place? How were they experienced?	✓	
How were the educational workshops experienced by learners and teachers?	✓	
What was the learners' overall experience of planting days? Did all the selected children participate in planting days?	✓	
How have the outdoor spaces been utilised by children and teachers in the school? – (Have they influenced the love of nature of other individuals who did not participate in the programme?)		✓

Chapter 2: Method

This chapter explores the researcher positionality, methods undertaken during the evaluation of the FFTF programme. It first explores the overall design of evaluation, as well as the participants of the programme, followed by the measures used – reporting on process and outcome evaluation aspects separately.

Researcher Positionality

This evaluation project was chosen from a list provided by the UCT Knowledge Co-Op. It was chosen as the researcher was vastly interested in working on an evaluation within the environmental field. Further, the researcher aspires to work in the environmental field in some capacity in the future, thus this evaluation provided a great opportunity to learn more about the field.

Design

In this research, mixed methods are applied, as addressing human intricacies and encounters cannot be done using one method exclusively (Patton, 2014). Therefore, the overarching paradigm employed to understand these methods is a pragmatist paradigm, which understands the process of acquiring knowledge on a continuum (Kaushik & Walsh, 2019). Pragmatism involves the belief that multiple paradigms and methods can be used to address research problems (Patton, 2014). It explores how things work and how they are used, encouraging practical answers aimed at addressing tangible problems (Patton, 2014). This allows for a more reflexive approach to inquiry (Kaushik & Walsh, 2019). The overarching paradigm therefore applied here is pragmatism, however due to the sequential nature of the research, this is further understood utilising post-positivism for quantitative components; and constructivism for qualitative components (Creswell & Plano Clark, 2017). Post-positivism utilizes precise processes to produce social scientific reports that enable generalisations to be made about the population within the research (Patton, 2014). It recognises subjectivity within research as an important factor (Patton, 2014). Constructivism is based on the idea that people construct their own knowledge through their experiences (Kaushik & Walsh, 2019). Thus they build their own representations and incorporate new information into their pre-existing knowledge (Patton, 2014). Creswell and Plano Clark (2017) suggest that evaluation designs benefit from a strong theoretical perspective and

guiding framework throughout a study's multiple phases. Thus, applying each paradigm at suitable stages aims to both frame and aid in the analysis process.

The evaluation incorporates both quantitative and qualitative methods of inquiry to deeper understand any changes that occurred and why as a result of the programme. Organisational and interpersonal challenges mandate the use of multiple methodological tools (Cook, 1985; Mathison, 1988). It is thus broken down into a process and outcome evaluation. Mixed methods are vastly important as they enable the collection of multiple types of data (Patton, 2014). Incorporating both quantitative and qualitative methods into research within the complex realm of social science has become increasingly recognised (Creswell et al., 2003). Approaching research in this multifaceted way neutralizes the disadvantages seen in either method (Creswell et al., 2003). In this study specifically, both methods are utilised for different perspectives. Quantitative data is useful to the study as it allows outcomes to be measured in a standardized way with significance tests. Qualitative data allows for further exploration of the reasons behind results. This is very helpful to this evaluation, as it allows for context-specific outcomes to be measured and explored. In this case it would allow Greenpop to know what is working, what is not, and why. Julnes (1995) explicates the importance in mixed methods designs for integrating two inquiry dimensions – both deductive and inductive. Ultimately, this method provides an overall picture for Greenpop to utilise in the programme design and implementation moving forward.

The realist-influenced perspective, in combination with the various factors above make it necessary to incorporate various aspects into the evaluation design. The design and methods used aimed to understand why the programme did or did not work, and why it worked for certain learners and not others.

Process Evaluation. The process evaluation follows a descriptive design, which aims to accurately and thoroughly describe a population or situation. Exploring the implementation of a programme requires such detailed information about how it operates (Patton, 2014). Thus, such descriptive data allows for further detail to be explored, deepening the understanding of individual variation.

Outcome Evaluation. The outcomes of the programme were measured using a quasi-experimental single group, pre-post design. Such a design lacks random assignment into either participant or control group, and is (often) more practical in evaluation settings (Patton, 2014). It was necessary for the evaluation, as similar characteristics between individuals in each group was required. This pre-test post-test design aimed to examine the changes of

indicators over time (Patton, 2014). Data was therefore collected twice: before programme implementation (pre-test) and one year after implementation (post-test). To make causal inferences using such designs, 3 factors need to be considered: temporal precedence (cause occurs before effect), covariation between variables and establishing that there are no plausible alternative explanations (Albers & Kratochwill, 2010).

Table 3.

Data Collected for Each Level of Inquiry

	Time of data collection	Process	Outcome
Learners – control group	Post-test only		✓
Learners – participant group	Baseline and post-test	✓	✓
Teachers	Post-test only	✓	✓
School environment	Post-test only		✓

Participants

Participants included children between the ages of 9 and 13 from three schools in the Western Cape. The schools are Mountain Road, Strandfontein and Cypress primary school. The sample size differs at each school – this information is presented in Table 4. The total sample size is $N = 95$ (control = 50; participants = 45). A participant group was used to measure direct programme implementation aspects and outcomes from baseline to post-test; whereas a control group was used to test differences in scores between the participant and control group at post-test (see Table 3). Information on the participant and control group samples can be found in Table 4.

The schools were chosen based on Greenpop's pre-existing planting sites. They implemented previous planting days at these schools, which aided in their selection of which schools would participate in the programme. The 10 schools who had a 40% plant survival rate from this prior planting would take part in the first three-year rollout of the programme. Only three of these schools were eventually selected for this evaluation, as plant days (the first step in the programme) had already been run there (as of August 2019), thus baseline data was available.

The protocol for selecting children from each school varied and was dependant on the principal at each school (Table 4). The baseline programme data was provided by Greenpop

(as it was collected prior to the evaluation). However, all the follow-up data were collected during the course of this evaluation.

Table 4.

Participant Information and Selection Protocol per School

School	Grades	Number of learners	Selection Protocol
Participant Group			
Mountain Road Primary	4	20	Specific grade
Strandfontein Primary	4-7	6	Eco-club
Cypress Primary	3-5	19	Eco-club
Total		45	
Control Group			
Mountain Road Primary	4	19	Same grade as participant group
Strandfontein Primary	4-7	17	Same grade as participant group
Cypress Primary	3-5	14	Same grade as participant group
Total		50	

Procedure and Measures

This evaluation consisted of various levels of assessment, as explored in Table 5. Thus, the following section details the procedure and measures used in the evaluation utilised to explore both process and outcome questions at each level (in order of use; Table 6).

Table 5.

Levels of Assessment per Evaluation Question Grouping

Questions	Level	Target (data providers)
Individual level		
Q1-4	Outcome	Learners' who were participants in the programme (surveys and interviews)
Teacher level		
Q5-6	Process	Teachers (surveys)
Q7-9	Outcome	Teachers (surveys and interviews)
School Environment level		
Q10-13	Process	Learners and teachers

Q14	Outcome	Learners who weren't participants in programme, teachers, observation

Table 6.
Research Measures Used and Procedure for Each Method

Research Tool and Process	Measure Description	Procedure
Interviews with Greenpop staff	Informal conversational interview	Two informal conversational interview sessions were held with the head of programmes and the urban greening manager at Greenpop. Each discussion lasted for an hour and provided valuable insight into the programme. An informal conversational interview was used as opposed to a structured interview, as this was less restricting and allowed for the programme staff to provide as much detail as they deemed necessary. Further, using an informal conversational interview allowed for certain questions to be asked, whilst still ensuring open communication and maximum insight from the individuals who designed and work with FFTF regularly.
Document review	FFTF programme documents and information	Programme documents and questionnaires were reviewed to further understand the rationale and activities of the programme. This, in combination with the interviews with Greenpop staff aided in the development of the programme theory; which was ultimately used to guide the development of the evaluation questions.
Connectedness to Nature Index (CNI)	This index developed by Cheng and Monroe (2012; Appendix A) is used to assess four dimensions of children's connection to nature (which are the subscales): enjoyment of nature (7 items); empathy for creatures (4 items); sense of oneness (3 items); and sense of responsibility (3 items). It is suitable to measure connection to nature in children between the ages of 8 and 12. It consists of 16 items on a 5-point Likert-like scale ranging from 1 (strongly agree) to 5 (strongly disagree). It is scored by creating a mean of the 16 items. A CNI score of 1-2 indicates the lowest connection to nature ("disconnected"); a score of 3 indicates neither low nor a high connection to nature ("neutral"); and a score of 4-5 indicates a higher level of connection to nature ("connected").	This was handed out to both the participant and control group in a separate sitting during school hours.
Social and Psychological Impact Scale (SPIS)	This scale (Appendix B) was developed by members of Greenpop, to assess the social and psychological impact of the FFTF programme (in other words – short term outcomes in attitudes, behaviours	This was given to the participant group by Greenpop before the evaluation started (to collect baseline data). At post-test time (August 2019), the survey was provided to

	and knowledge). It was conceptualised and adapted from a scale developed by Zhang et al., (2014). It aims to measure four key constructs: children's contact with nature, children's biophilia, children's biophobia, and environmental stewardship. Students from Mountain Road Primary School were asked to write freely about all of the activities they have experienced with wild plants and animals. From this, a list of 15 most common activities were developed and turned into Likert-like style questions. The overall scale consists of 50 Likert-like questions on a 3-point scale. However, the scale is divided into two subsections – section A measures contact with nature, whereas section B measures biophilia and biophobia. Section A consists of 15 questions with a Likert-like format including the categories, "Often"; "Sometimes"; and "Never". Section B consists of 35 questions with a Likert-like format including the categories, "Yes, I agree"; "I'm not sure"; and "No, I disagree". Environmental stewardship is measured through the behavioural manifestations of biophilia. It is important to note that the content within this survey is very Western-centric (including items such as donating money and watching television shows with nature). Thus, it may not have been completely suitable for use within this context (this is explored further in the discussion).	the teachers to hand to children at each school by Greenpop and collected a week later.
School Environment Survey (SES)	This was developed for this evaluation specifically and consists of 2 sections (Appendix C). Section 1 consists of 6 items on a 3-point Likert-like scale ranging from 1 (disagree) to 3 (agree). This is scored by creating a mean of the 6 items – with higher scores indicating more agreement with the statements. Section 2 consists of 2 open-ended questions, asking about personal thoughts on the gardens influence on the individuals, as well as the school environment.	The SES was needed to ask control group learners about the garden specifically, and not about aspects of the programme. This was handed to the control group learners' in a classroom setting during school hours.
Learner Questionnaire (LQ)	The LQ (Appendix D) consists of 13 open-ended questions, and one polar question (yes-no). It covers topics including personal feelings towards nature; home and family environment; community involvement; environmental habits and motivation; together with process questions related to the garden prefects at the schools.	This was handed to participants of the programme during school hours in a classroom setting.
Teacher Survey	The teacher survey consisted of 3 sections (Appendix E). Section 1 was made up of 11 Likert-like questions, ranging from 1	A semi-structured survey was developed and sent to teachers at one school. It was collected a week later. The survey explored:

	(never) to 5 (every time). This explored use of the garden by both teachers and learners (through observation). Section 2 consists of 12 Likert-like questions, ranging from 1 (disagree) to 3 (agree). This covered process aspects of the programme. Section 3 consists of two open-ended questions, exploring teacher observation and insights into the garden.	programme training; service delivery; and the use of materials provided (such as posters). It further measured attitudes towards and use of the garden, by the teachers. This provided more context into how the gardens are utilized and teachers' attitudes towards them.
Teacher Interview	This interview (Appendix F) was a 26-item, standardized open-ended interview format exploring participant background, programme delivery and attitudes thereto.	One teacher was interviewed telephonically using a semi-structured format. The aim was to gain a further understanding of programme efficiency (process) and outcomes from the teachers perspective. An individual case was chosen due to the availability of teachers and closing of schools amidst the coronavirus pandemic. Interviewing is an interactive process whereby a contextually bound story is created between interviewer and interviewee (Young et al., 2018). Interviews have the potential to fill knowledge gaps – in this case, complimenting the quantitative findings within the evaluation (Young et al., 2018). Further, interviews are often used in conservation research as they are in-depth, flexible and focus on participants' research views (Young et al., 2018). A thematic analysis was done to coherently present the data and explore service delivery, programme implementation and observational outcomes from the teachers perspective.

Ethics

Data was collected after ethical clearance was obtained from the Commerce Faculty Ethics in Research Committee. As the study involved children (who were all under 18), consent letters were sent home for the parents to sign if they agreed that their child may participate in the evaluation. There was also a section for the child to sign, to ensure they wanted to participate. Consent forms were further given to teachers who interacted with the learners, to ensure their voluntary participation. These consent forms are displayed in Appendices A, C, D and E.

Covid-19 Implications

Various processes did not take place due to covid-19 (and consequent lockdown restrictions). These included:

1. The teacher survey (only took place at one school – not all as originally intended)
2. The teacher interview (only took place at one school – not all as originally intended)
3. Learner and parent interviews did not take place

Data Analysis

Data analysis was divided based on the measures used. All quantitative data was analysed using IBM SPSS Statistics 25. Descriptive statistics were performed on all quantitative data. An independent t-test and ANOVA was used on the CNI to compare scores between the participant and control group. A repeated measures t-test was used on the SPIS to compare differences in individual scores pre- and post-programme.

Qualitative data was analysed using NVivo. Patton (2014) states that qualitative analysis is oriented towards the exploration of data and subsequent discoveries within it, thus transforming data into findings in the absence of a formula. However, this brings forth various challenges, deeming it necessary to utilise various approaches (Patton, 2014). As such, multiple methods were used to gain a vast and in-depth understanding of the meaning behind the data in this evaluation. This section is divided into findings from each method and the combined findings therefrom to provide a coherent analysis and interpretation of the data. Qualitative survey data was analysed using inductive and deductive methods. A thematic analysis was conducted on qualitative survey data utilising the six-phase approach formulated by Braun and Clarke (2006). This was done in two phases: an initial inductive analysis followed by a deductive analysis – which is a part of the pragmatic approach utilized in research. Interview data was analysed using only an inductive method. The use of qualitative analysis here ultimately aimed to understand why the programme did or did not work, and why it worked for certain types of learners and not others.

Inductive analysis. This begins with specific observations and builds towards general patterns and identifies themes (Patton, 2014). This was done to identify any specific codes (concepts within the data and the relationships between them) and consequent themes within the data itself (Gibbs, 2018). A preliminary analysis revealed 35 codes, which were grouped together to form themes. After refinement, three broad themes with relevant subthemes were deduced (displayed in Table 11).

Deductive analysis. A deductive analysis was done, utilising Ajzen's (1991) Theory of Planned Behaviour (TPB) as a framework. This theory aims to predict and explain human behaviour in specific contexts by elucidating the link between beliefs and behaviours (Ajzen, 1991). It is an extension of the Theory of Reasoned Action (TRA; Ajzen & Fishbein, 1980). This behaviour change theory explains how attitudes towards a behaviour, subjective norms and perceived behavioural control in combination are able to predict intentions and subsequent behaviours (Ajzen, 1991; Ajzen & Fishbein, 1980). However, the TPB differs

from this original model as it has an added component of volitional control not present in the TRA. The three components mentioned above, combined with actual behavioural control evidently predict behavioural intention highly accurately (Ajzen, 1991). Generally, as can be seen in *Figure 3*, the theory states that a more favourable attitude and subjective norm towards a behaviour, along with greater perceived behavioural control thereover would lead to a stronger intention to perform the behaviour (Ajzen, 1991). Thus, intentions denote the motivational factors such that stronger intentions are linked to increased likelihood of performing a specific behaviour.

The TPB was chosen for this evaluation for various reasons.

1. It has been used in environmental research and exploring pro-environmental behaviours (Mahmud & Osman, 2010; Nigbur et al., 2010; Si et al., 2019).
2. It cross-cultural (Hassan et al., 2016; Kumar, 2019)
3. It can be shown to link back to the programme theory (see *figure* 1)
4. It has been used with learners in a similar age group as this evaluation (Gratton et al., 2007)
5. It has been used within EE programmes and evaluations (Vina & Mayangsari, 2020).
6. It can be applied to interventions aimed at behaviour change (Hardeman et al., 2002).

To explain behaviour, the TPB states that there are antecedents to each component within the theory – these can be seen in *Figure 3* (Ajzen, 1991). The components are described in more detail below.

Attitude. Attitude refers to the individual's appraisal of a behaviour as either favourable or unfavourable (Ajzen, 1991). According to Fishbein and Ajzen's (1975) expectancy-value model, these attitudes develop from an individual's belief about a behaviour. Such beliefs are held by the individual associating the object or task with certain attributes. Specifically, when investigating attitudes towards a behaviour, each belief held is related to a specific outcome or attribute - such as the cost of performing the behaviour (Ajzen, 1991). Thus, individuals automatically acquire an attitude toward a specific behaviour, as the attributes linked to it are already valued positively or negatively. Ultimately, this part of the theory postulates that people favour behaviours with positive consequences and form unfavourable attitudes towards behaviours associated with negative consequences (Ajzen, 1991). In the context of this evaluation, if an individual positively appraises attributes related to environmental behaviour and anticipates favourable outcomes from performing the behaviour, the increase in behaviour attitude is enhanced.

Subjective Norms. Normative beliefs precede subjective norms. Such beliefs relate to the probability that important individuals or groups approve or disapprove of performing a behaviour. The individuals motivation to comply with the views of such important referents in turn influences the strength of the normative belief (Ajzen, 1991). In this case, if an individual's parents believe in the importance of taking care of the environment, and the individual is likely to comply with these beliefs, the subjective norm of a positive attitude towards nature is reinforced. According to Ajzen (1991), subjective norms in combination with attitudes impact the individual's intention, which precedes the behaviour outcome.

Perceived Behavioural Control. Ajzen (1991) states that intention can only be articulated if the individual has volitional control over whether or not to perform the behaviour. Volitional control is influenced by control beliefs which are based on past experiences or second-hand information about the behaviour and its difficulty, based on others experiences. Thus, these beliefs in combination with the individuals available resources and opportunities play a large role in whether or not the individual will perform the behaviour. Since confidence in one's own ability most strongly influences behaviour, the theory states that realistic perceived behavioural control, combined with intention can predict behaviour outcomes quite accurately (Ajzen, 1991). In this case, if an individual has the resources and believes that they have the necessary skills to partake in pro-environmental behaviours, their perceived behavioural control may increase – ultimately increasing the potential for behaviour change.

Actual Behavioural Control. Perceived behavioural control (above) moderates the influence of attitude and subjective norms on intention. Though this section isn't explicitly in Ajzen's (1991) TPB diagram, actual behavioural control moderates the effect of intention on behaviour. Ultimately, the TPB is comprised of six constructs (explained above) that collectively signify the individual's actual control of the behaviour (Ajzen, 1991).

In summary the theory states that behind attitudes there are behavioural beliefs which are evaluative and affective, such that a positive belief will be related to a positive attitude. Behind subjective norms there are normative beliefs, which involve the likelihood that important individuals or groups will approve or disapprove of a behaviour. Finally, behind perceived behavioural control there are control beliefs, which involves the presence (or absence) of requisite resources and opportunities (Ajzen, 1991). Ultimately, the theory states that these factors express themselves in various ways to influence behaviours in individuals.

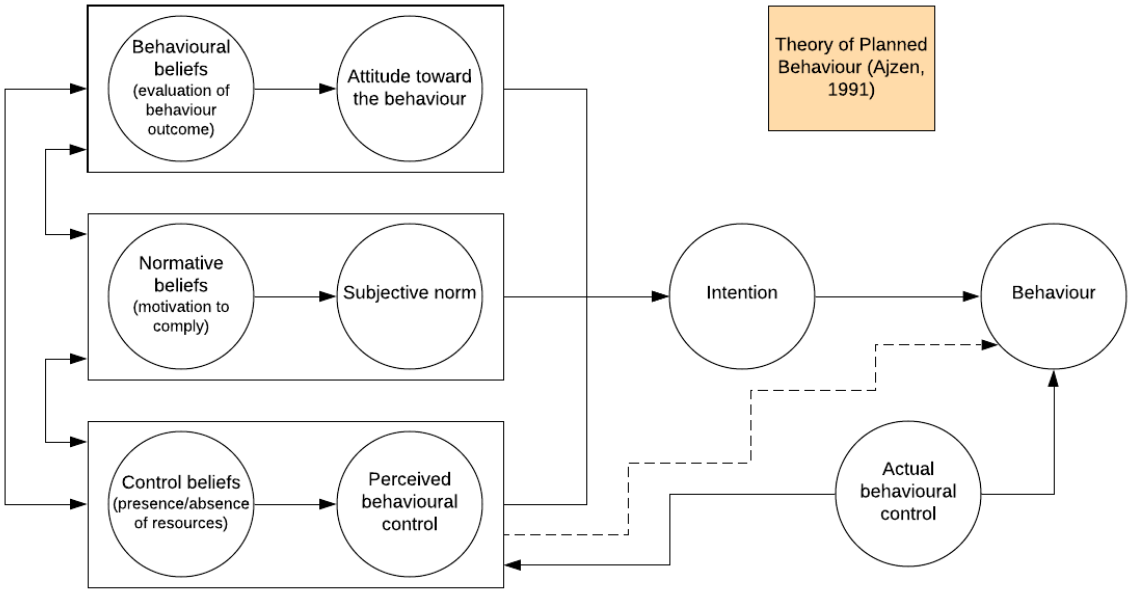


Figure 3. Theory of Planned Behaviour (Ajzen, 1991)

In the context of this evaluation, the TPB was used to understand whether or not the FFTF programme influenced the learner's environmental attitudes, knowledge and subsequent behaviour; and if so, which factors contributed to these changes. Overall, this was an important short-term outcome measure related to the programme. *Figure 4* shows an adjusted model of the TPB, in relation to the context of this evaluation.

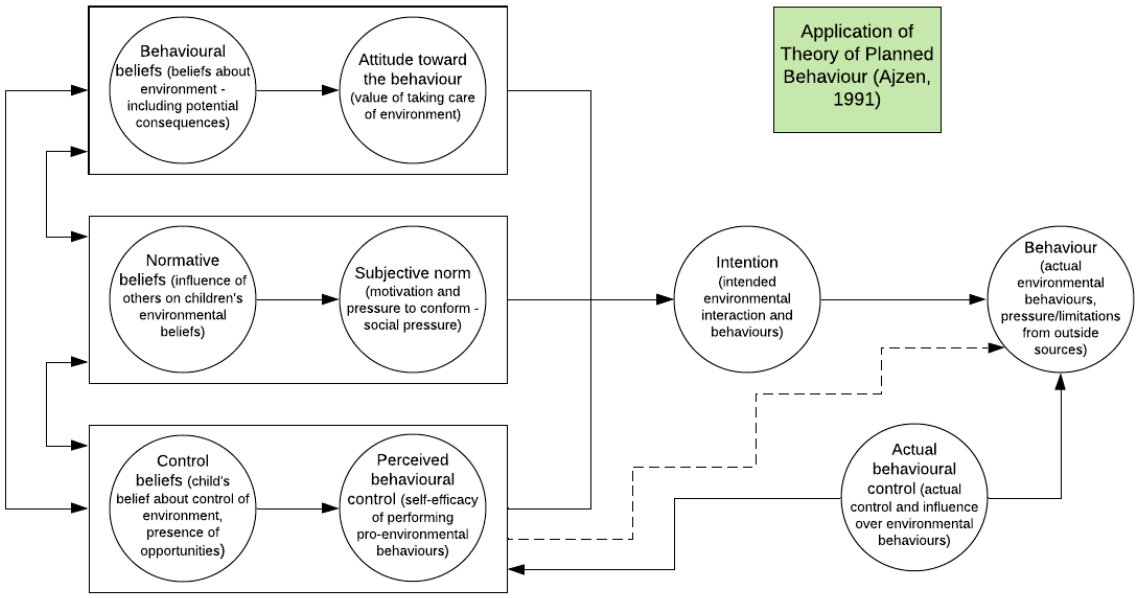


Figure 4. Applied Theory of Planned Behaviour

Figure 4 shows the pathway to potential changes in environmental behaviours. As stated by the TPB, attitudes, subjective norms, perceived behavioural control and intention each reveal different aspects of the behaviour (Ajzen, 1991). Therefore, each can serve as a point of influence in attempts to change behaviours (Ajzen, 1991). For a more in-depth figure of how this is related to programme activities, see Appendix G.

Chapter 3: Results

The results from this evaluation are split by data collected from learners and teachers. They are presented for each method of inquiry as each one covered various aspects of processes and outcomes (Table 7).

Table 7.

Data Inquiry and Analysis Methods

Measure	Type of data collected	Outcome/process
	Learner data	
Connectedness to Nature Index (CNI)	Quantitative	Outcome
School Psychological Impact Scale (SPIS)	Quantitative	Outcome
School Environment Survey	Quantitative	Outcome
Learner questionnaire	Qualitative	Process and outcome
	Teacher data	
Teacher survey	Quantitative	Process and outcome
Teacher interview	Qualitative	Process and outcome

Learner Data

Connectedness to Nature Index (CNI)

The following analyses were performed on the CNI, which measured short-term outcomes of the programme (Cheng & Monroe, 2012). The learners who participated in this survey were between the ages of 9 and 13 and consisted of control and participant groups. There were a total of $N = 99$ responses ($n = 51$ control; $n = 48$ participants). However, one response was removed from the control group, and three from the participant group due to missing data. Thus, the new total of overall responses was $n = 95$ ($n = 50$ control, $n = 45$ participants).

The means of all responses (participant and control group) were relatively close to 5, indicating high levels of connection to nature. There was only one outlier in the control group ($M = 1.31$), showing a very low connection to nature ("disconnected" according to CNI scoring). This shows that generally, respondents in the control group had strong connections to nature. The lowest mean score in the participant group was $M = 2.88$, indicating a neutral feeling towards nature. However, most scores here ranged between 4-5, showing high levels of connection to nature for participants.

Table 8 displays the overall mean results of the CNI and its subscales. The mean scores of the control group are generally higher on all four subscales (and the overall scale). However, it should be noted that although only selected learners participants in the programme, the garden implementation was intended to benefit all learners at the respective schools. Furthermore, there may have been diffusion of treatment (which occurs when there is an exchange between participant and control group members) as the learners were all of a similar age group and may have discussed the programme with their friends (as intended). Finally, there may have been compensatory rivalry – which can occur when a study group does not receive the intervention, thus feeling disadvantaged or left-out, creating competition (Conrad & Conrad, 2014). Therefore, control group may have felt the need to score higher, slightly inflating scores. However, this is explored further in the discussion. The highest mean value in the control group lies within the subscale, "oneness" (which represents the importance of nature for human survival). However, the highest mean value in the participant group lies within the subscale, "empathy" (which represents caring for nature, animals and a clean environment).

Table 8.

Mean Score of Overall Scale and Subscales of the CNI

Participant or Control		Mean	Std. Deviation
Control (n = 50)	Enjoyment	4.23	.63
	Empathy	4.38	.60
	Oneness	4.43	.68
	Responsibility	4.36	.72
	Overall Mean	4.31	.59
Participant (n = 45)	Enjoyment	4.02	.55
	Empathy	4.34	.59
	Oneness	4.30	.67
	Responsibility	4.18	.73
	Overall Mean	4.18	.49

Reliability Testing

Reliability testing on the CNI within this sample was conducted using Cronbach's alpha, which is one of the most widely used tests of reliability within the social and organisational sciences (Bonett & Wright, 2015). Overall, the CNI had a high reliability (α =

.87). This corresponds with the reliability statistics (α = .87) Cheng and Monroe (2012) found in their initial reliability testing. When testing the subscales, the reliability was as follows: enjoyment (α = .76); empathy (α = .61); oneness (α = .68); and responsibility (α = .53). Cronbach's alpha values are largely dependent on the number of items in a scale such that fewer items (less than 10) relates to lower reliability – as in the scales of the CNI (Nunnally, 1978). However, in such situations reporting the mean inter-item correlation is acceptable (Piedmont, 2014). Inter-item correlations assess the extent to which one item is related to scores on all other items in the scale (Piedmont, 2014). Briggs and Cheek (1986) recommend optimal mean inter-item correlation values between .20 and .40 (seen in this evaluation); which suggest that items are relatively homogenous but still represent unique variance and are thus not too similar. The mean inter-item correlations for the subscales are as follows: enjoyment (r = .32); empathy (r = .28); oneness (r = .41); and responsibility (r = .30). The oneness subscale just passes the threshold of .40, suggesting that it may only be capturing a small portion of the construct.

Normality

Normality tests were performed on the overall CNI and subscales, which elucidated that the participant and control data was negatively skewed. Due to the relatively small sample size, no transformation was performed. However, subsequent analyses on this data (namely the t-test and ANOVA) were performed with bootstrapping. Bootstrapping is a non-parametric approach that is less dependent on normal sampling distributions (Mooney et al., 1993). Bootstrapping is a technique whereby the sampling distribution of a statistic is estimated using repeated samples with replacement from the data set (Field, 2013). In other words, the method treats the data as the population from which to take smaller samples and calculate the sampling distribution, as well as the standard error of estimate (Field, 2013). Ultimately, this enables confidence intervals and significance tests to be computed (Field, 2013). The bootstrapping method utilised here was bias corrected and accelerated confidence intervals (BCa), as this method is more accurate than the 95th percentile confidence interval alone (Field, 2013). Bootstrapping is useful when the underlying population distribution is unknown and the distribution is not assumed to be normal, deeming it suitable for this data analysis (Brace et al., 2016).

T-Test

A t-test was run to compare the means between the participants and control group across all three schools (the total data set). Levene's test was not significant ($p > 0.5$), therefore homogeneity of variance is assumed. On average, respondents in the control group who did not receive the programme ($M = 4.31$, $SE = 0.08$) performed higher than those in the participant group who received the programme ($M = 4.18$, $SE = 0.07$). This difference, 0.13, BCa 95% CI [-0.08, 0.32] was not significant $t(93) = 1.22$, $p = .250$; however, it did represent a small-sized effect, $d = 0.25$. An additional t-test on the means was run between participants and control groups on each subscale of the CNI (see Table 8 for mean and standard deviation results), which further revealed no significant differences ($p > .05$).

An additional t-test was run to analyse whether or not there were any significant differences in the means between the participants and those in the control group at each school. The results for both Cypress and Strandfontein Primary schools were non-significant ($p > .05$). However, the results for Mountain Road Primary school indicated that the control group on average scored higher ($M = 4.53$, $SE = 0.08$) than the participant group ($M = 4.20$, $SE = 0.11$); and that this difference, 0.32, BCa 95% CI [0.01, 0.63] was significant $t(37) = 2.32$, $p = .032$; and represented a large-sized effect, $d = 0.76$. This shows that on average, individuals in the control group exceed the scores of 76% of the intervention group. Finally, t-tests were run on the subscales between participants and control groups at each of the schools. The means are shown in *Figure 5*. Significant differences were analysed using the BCa 95% confidence intervals. The results varied according to the school and test (Table 9). Significance was tested using the confidence intervals such that those that did not include a zero value were deemed significant, whereas those that contained zero were deemed insignificant (Field, 2013).

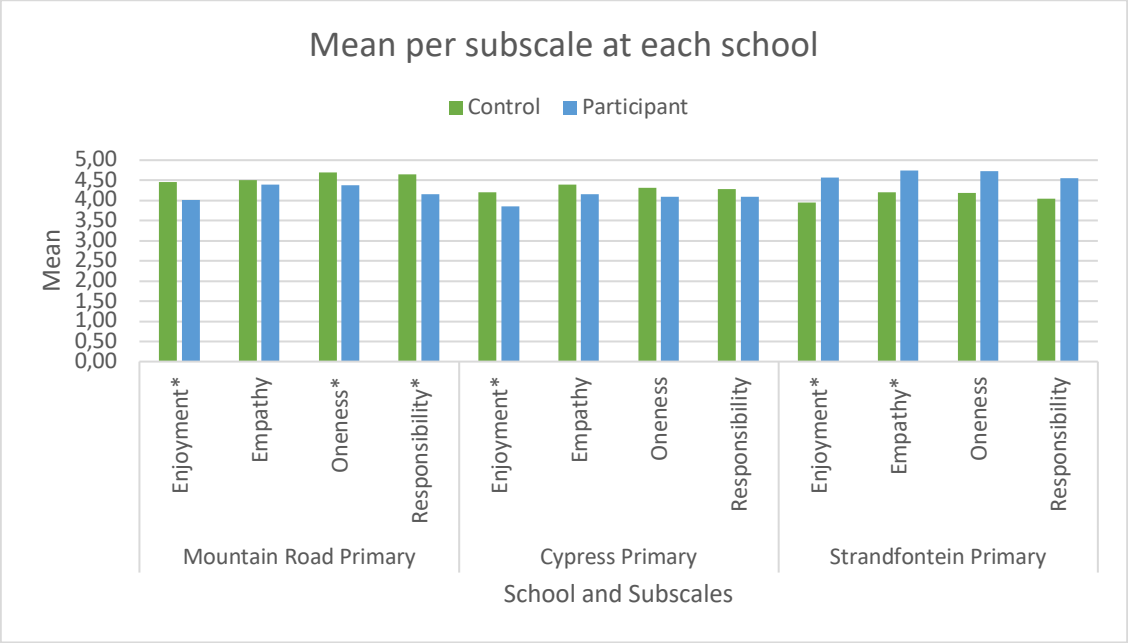


Figure 5. Means of Participant and Control Groups per Subscale at Each School

Note: * = significant result ($p < .05$)

Table 9.

Independent Samples T-Test Results (Bootstrapped)

School	Subscale	Mean Difference	BCa 95% Confidence Interval	
			Lower	Upper
Mountain Road Primary	Enjoyment	0.44*	0.11	0.80
	Empathy	0.10	-.26	0.47
	Oneness	0.32*	0.00	0.60
	Responsibility	0.50*	0.09	0.94
Cypress Primary	Enjoyment	0.34*	0.03	0.63
	Empathy	0.24	-0.10	0.59
	Oneness	0.23	-0.16	0.65
	Responsibility	0.21	-0.23	0.62
Strandfontein Primary	Enjoyment	-0.62*	-1.29	-0.10
	Empathy	-0.55*	-1.02	-0.11
	Oneness	-0.53	-1.23	0.11
	Responsibility	-0.51	-1.22	0.23

*=significant result (p < .05).

ANOVA test between Mountain Road, Cypress and Strandfontein (participants only).

A one-way ANOVA was run to test for any significant differences in participant scores between different schools. Levene's test of homogeneity of variance was not significant ($p > .05$), indicating that the variance is equivalent at the respective schools. The results show that there was a significant effect of school site on participant scores, $F(2, 42) = 4.03$, $p = .025$, $\omega = 0.34$. This indicates that there is a difference in mean scores and thus, connection to nature between the schools. Hochberg's *post hoc* tests revealed that this difference lies between Cypress and Strandfontein, such that Strandfontein on average scored higher than Cypress ($p = .022$). This is relatively expected, as Strandfontein has a variety of their own garden activities, eco-clubs and garden facilities. However, Cypress only has the garden implemented by Greenpop – and the maintenance and use of the garden isn't as prominent as at Strandfontein. Further, there were few follow ups and interactions with Cypress, which could have influenced the final results. There were no other significant differences between the schools ($p > .05$).

A further ANOVA was run on the subscales of the CNI to test for differences in scores between schools. Levene's test of homogeneity of variance was not significant ($p > .05$) for three subscales, namely empathy, responsibility and enjoyment; however it was . significant for the oneness subscale ($p = .041$), indicating a violation of homogeneity of variance on this subscale (thus Welch's F was used here). The ANOVA results for the subscales empathy and responsibility were not significant ($p > .05$). Further, on the oneness subscale, Welch's robust test of equality of means shows that there were no significant differences in scores between the schools, Welch's F (2, 14.84) = 2.73, $p = .098$, est. $\omega^2 = 0.07$. However, the results show that there were significant differences in scores between schools on the enjoyment subscale, F (2,42) = 4.49, $p = .017$, $\omega = 0.37$. This subscale encompasses aspects such as spending time in nature, feelings when in nature, gardening, collecting rocks and seeing wildflowers. Games Howell *post hoc* tests revealed that Strandfontein, on average scored higher than both Mountain Road and Cypress on the enjoyment subscale – and that these differences were significant ($p = .036$ and $p = .006$, respectively). This result is confirmed by the bootstrapped confidence intervals which do not cross zero. There was no significant difference between Mountain Road and Cypress ($p > .05$).

School Psychological Impact Scale

The data from this survey was collected from participants of the programme. The analyses for the SPIS were broken down into various sections: contact with nature (section A); biophilia; biophobia; and environmental stewardship. Biophilia and biophobia are further assessed in terms of three manifestations: behavioural (actions), cognitive (thoughts or beliefs) and affective (feelings). Environmental stewardship is measured through the behavioural manifestations of biophilia. The results of (a) the subscales and (b) the manifestations are presented below. A further breakdown of the scale is provided in Appendix B.

Baseline data was collected at the beginning of programme implementation and post-test data was collected one-year post implementation (with the overall programme duration being three years). A difference between the mean pre-test and post-test was computed and normality tests were run on this data, indicating a normal distribution. All data analysed below utilised listwise deletion due to the nature of the data. The analysis compared the mean differences in overall scores of participants. Therefore, missing data may have influenced learners overall mean scores and ultimately accuracy of results from pre- to post-test. Thus, there are different group sizes in the analysis for each part of the survey[1].

(A) Subscales of SPIS Analysis

Contact with Nature (Section A). A repeated measures t-test was run to test if there was a significant change in the in learners' mean contact with nature at baseline and post-test (*Figure 6*). The total sample size of this analysis was n=45.

On average, participants at baseline had more interaction with nature (M = 2.27, SE = 0.04), than those at post-test (M = 2.13. SE = 0.05). This difference, 0.14, 95% CI [0.01, 0.27], was significant $t(44) = 2.21$, $p = .032$. , and represented a medium-sized effect, d = 0.47. It should be considered that the post-test measurement was taken during the programme, thus may not have been measuring the intended final programme effects.

Biophilia, Biophobia and Environmental Stewardship. The visual representation of these results is shown in *Figure 6*. A repeated measures t-test was run to see if there was any change in learners' biophilia outcomes. Although participant's mean baseline score was higher than their post-scores, this difference was only 0.001 and was not significant ($p > .05$),

1 An analysis was run with one data set where only learners with complete data on all parts of the survey were included. Thus, they had no missing data on any subscale (n = 30). The results are in Appendix H.

with a very small effect size, $d = 0.007$. A further repeated measures t-test showed that learners' ($n = 37$) biophobia increased from baseline ($M = 2.39$, $SE = 0.05$) to post-test ($M = 2.44$, $SE = 0.05$). However, this difference, -0.05, 95% CI [-0.15, 0.05], was not significant, $t(36) = -1.04$, $p = .304$, though it had a small effect size, $d = 0.17$.

Environmental stewardship is measured through behavioural manifestations of biophilia. This includes areas such as: donating money to protect animals; watching television shows about animals; treating animals well; playing in nature; and stopping others from hurting animals. A repeated measures t-test indicated that environmental stewardship of learners ($n = 40$) decreased from baseline ($M = 2.67$, $SE = 0.05$) to post-test ($M = 2.59$, $SE = 0.05$). However, this difference, 0.08, 95% CI [-0.05, 0.21] was also not significant $t(39) = 1.28$, $p = .210$, again representing a small effect size, $d = 0.26$.

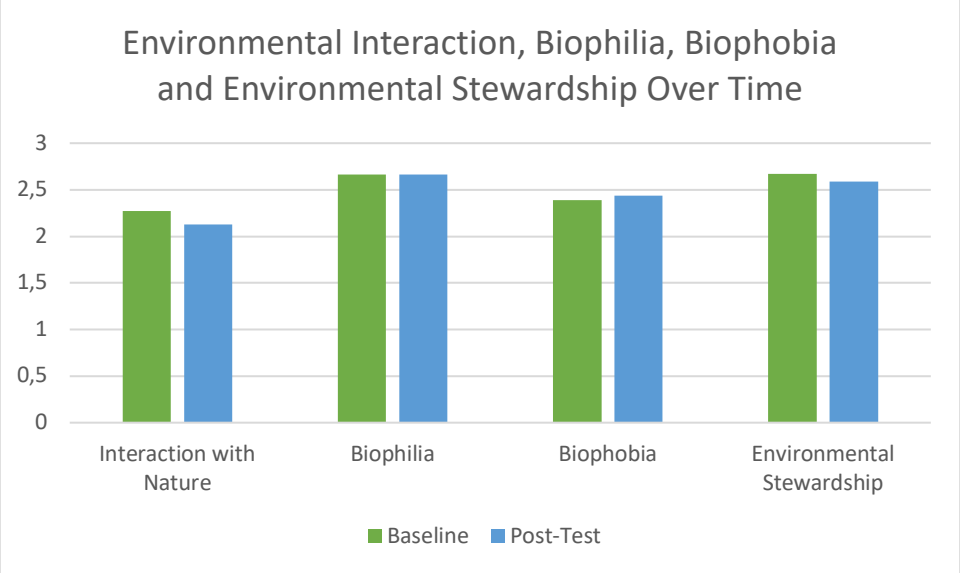


Figure 6. Environmental Interaction, Biophilia, Biophobia and Environmental Stewardship Over Time

The above t-tests were all run for each individual school, however none of these results were significant ($p > .05$). Although these results are not what was expected, it is important to consider that the programme had only been implemented for a year at time of the post-test measurement and contact with learners was not as frequent as intended. Further, the survey included items more bias towards more affluent children – which is not relevant in this context considering the environmental limitations such as economic constraints and lack of garden access.

(B) Manifestations of Biophilia and Biophobia Analysis

As mentioned above, the biophilia and biophobia sections of the survey were further expressed in terms of manifestations (behavioural, cognitive, and affective). The results of each analysis are presented below.

Biophilia Manifestations. Biophilia is measured through manifestations linked to behavioural, cognitive and affective actions and beliefs. A t-test was run for this analysis. The results of behavioural manifestations are explained above under environmental stewardship (as measurement of behaviour outcomes represents such stewardship).

Cognitive beliefs are utilised to measure children's understandings of nature. They include aspects such as thoughts about trees and nature, what role humans play in nature and thoughts about littering. On average, participants at post-test scored higher ($M = 2.67$, $SE = 0.04$) in the cognitive belief's questions than at baseline ($M = 2.55$, $SE = 0.04$). This difference, -0.12, 95% CI [-0.20, -0.04], was significant $t(40) = -3.06$, $p = 0.004$, and represented a medium-sized effect, $d = 0.53$. This can be related to the findings in the qualitative analysis of the learner questionnaire, which explored cognitive and knowledge areas surrounding nature. Further, this result is expected as knowledge increases over time, especially in the school setting. The results in the qualitative questionnaire explicated very informed and positive responses towards nature and its importance.

Affective beliefs are used to measure children's feelings towards nature. This includes feelings of love and happiness towards plants, animals and nature, as well as feelings towards the garden at learners' schools. The results show that on average, participants at post-test scored lower ($M = 2.74$, $SE = 0.04$) than those at baseline ($M = 2.82$, $SE = 0.03$). This difference, 0.09, 95% CI [-0.01, 0.18], was significant $t(40) = 1.89$, $p = .065$, and represented a medium effect size, $d = 0.44$. These results demonstrate that learner's affective feelings towards nature decreased over time. This again shows the importance of consistent reinforcement of the importance of nature, and continuous exposure thereto. Although these results are not very positive, the general attitude and feelings towards nature remains very high and is further explored in the qualitative analysis.

Biophobia Manifestations. Biophobia is measured through the same manifestations as that of biophilia (behavioural, cognitive, and affective). However, it explores negative thoughts and action towards nature. The behavioural manifestation explores the avoidance of nature, fear of animals, hurting insects or animals, and littering. Participants scored higher on the post-test ($M = 2.46$, $SE = 0.06$) than the baseline test ($M = 2.39$, $SE = 0.03$). However, this

difference, -0.08, 95% CI [-0.19, 0.04] was not significant $t(43) = -1.30$, $p = .201$, and has a small-sized effect, $d = 0.19$. Cognitive beliefs here include negative thoughts about nature, believing animals are dangerous, the environment should not be protected, and that people are more important than nature and do not need it. Participants at post-test scored higher ($M = 2.49$, $SE = 0.04$) than at baseline ($M = 2.45$, $SE = 0.06$). However, this difference, -0.04, 95% CI [-0.14, 0.06] was also not significant $t(38) = -0.85$, $p = 0.401$, and represented a very small effect size, $d = 0.13$. Finally, affective beliefs towards biophobia included: fears towards nature; running away from bees; hating wild animals; being angry if told to spend time in the garden; and not caring about wild animals or plants. Participants at post-test scored higher ($M = 2.41$, $SE = 0.06$) than at baseline ($M = 2.37$, $SE = 0.05$). However, this difference, -0.03, 95% CI [-0.17, 0.10] was again, not significant $t(41) = -0.51$, $p = 0.611$, and represented a small effect size, $d = 0.09$. Overall, the results in all domains of biophobia show an increase from baseline to post-test. However, these results are not significant. This again demonstrates the importance of exposure to nature and continuous reinforcement of its positive effects via programme intervention.

The results above show mixed outcomes. It is important to consider the marginal differences between baseline and post-test, which demonstrates not much change in the positive or negative direction. Thus, it elucidates the overall importance of ensuring that there is regular programme interaction with the learners.

School Environment Survey (SES)

The SES was given to learners who did not participate in the programme ($n = 50$). It was used to understand both how these learners feel about the garden, and how they feel it has impacted them and the school environment in its totality. Thus, it explores both individual and school level outcomes of the programme. The individual level outcomes explored garden use and consequent feelings related thereto, and both awareness about environmental challenges and feelings towards nature. The school environment level explored individuals' thoughts around the impact and enjoyability of the garden.

A descriptive analysis of the quantitative data revealed relatively high mean scores overall ($M = 2.85$, $SD = 0.22$), indicating general agreement with the statement questions asked. Thus, elucidating an overall positive feeling towards the garden planted at the schools by Greenpop. When looking at the individual schools, the highest mean score was at

Strandfontein ($M = 2.96$, $SD = 0.13$), followed by Cypress ($M = 2.83$, $SD = 0.23$) and Mountain Road ($M = 2.79$, $SD = 0.24$).

Individual and school outcomes.

Table 10 below shows that most of the students viewed the garden as a positive influence on both them as individuals and their school environment as a whole. The highest degree of disagreement was for use of the garden – which coincides with access (or lack thereof) to the garden.

Table 10.

Answers to School Environment Survey (SES) Questions - *Frequency*

Question	**Agree (*n*)**	**Neutral (*n*)**	**Disagree (*n*)**
Individual outcomes			
1 – use of the garden	38	7	6
2 – enjoy time spent in the garden	44	7	0
5 – garden increased awareness of environmental challenges	45	3	2
6 – garden increased love of nature	47	4	0
School environment outcomes			
3 – garden has made school life more enjoyable	49	2	0
4 – garden has been a positive influence on the school environment	45	6	0

The open-ended section further probed what the garden has done for (a) them as individuals and (b) the school environment, from the learners' perspectives. A content analysis was utilised to analyse these responses.

(A). Individual influence. Various common codes emerged from the responses to this question. These were grouped into three themes:

1. Positive feelings (garden made students feel calm, happy and excited about nature)
2. Environmental responsibility (students were happy to water the garden, pick up litter and ensure others don't damage the garden; and had a better understanding of environmental problems)
3. Increased time spent in nature (students spent more time in the gardens at home and at school)

(B). School environment. Responses to the overall school environment illuminated the emergence of two main themes:

1. Physical space to enjoy (students enjoy spending time in the garden with their friends as it gives them a peaceful place to "chill").
2. Increased awareness (learners are more motivated to keep their play area clean, and have a greater understanding for the importance thereof). However, some answers still reflected that learners destroy the garden – which means that the reach within the schools themselves aren't large enough.

These results demonstrate that although these learners did not take part in the programme, they still experienced some of the effects of it and gained an outdoor, physical space that wasn't present before.

Learner Questionnaire (LQ)

The learners who completed this survey were participants in the programme. The results here relate to individual outcomes and programme processes.

Learner Questionnaire Outcomes.

An initial analysis of the data from this survey (Appendix I) showed positive results. A content approach was used to understand the descriptive statistics within the data. The results of this are presented in Table 11 below (if students did not answer, their results were not counted).

Table 11.

Quantitative Distributions per Question

Questions				**Comment**
Question 1: How do you feel about the environment?	27 answered positively about the environment (i.e. love nature)	18 answered positively, but conscious about nature (aware about pollution, that the environment is being destroyed, etc.)	Nobody answered negatively about the environment.	This shows that the general attitude toward the environment is positive, or at least conscious.
Question 2: Do you have a garden at home? If you do, what do you do in the garden?	22 do have a garden at home	17 don't have a garden at home	6 don't have a garden at home, but either have plants, or "have" a garden at another family members house, or at their neighbour's house	Those who don't have a garden refer to wanting to plant things and for solace (those who have a garden confirm this).
Question 3: Do you spend time in nature with your family? (Do you go to the park, beach, etc.?)	40 answered yes – they do spend time in nature with their family	2 answered no – they do not spend time in nature with their family	3 not much/sometimes	Environmental exposure creates more positive feelings about the environment, which perpetuates exposure to it.
Question 4: Do you speak to others about the environment? If yes, did you start doing this before or after Fynbos for the Future?	17 spoke about environment before	21 spoke about environment after	7 don't speak about the environment.	The programme had no negative effects. Participants who already spoke about environment continued more so, and those who didn't speak about it before started after the programme. The majority of learners started speaking about the environment after the programme. Seven learners remained impartial to the environment, and did not speak about it.
Question 5: Are you more involved in your community	25 involved in community environmental activities	16 not involved in community environmental activities		Learners need reinforcement to stay involved – give them seeds and plant them somewhere,

after being in Fynbos for the Future? If yes, how?				encourage community involvement.
Question 6: Do you want others to change their environmental habits?	34 want others to change their environmental habits	9 said no they don't want others to change their environmental habits	1 I don't know	The majority of learners wanting to change the environmental habits of others suggests that they are generally not satisfied with the manner in which the environment is treated and aim for collaboration in addressing this.
Question 7: Have you tried influencing others to change their environmental habits? How?	42 answered yes (but did not elaborate)	18 said no	2 I don't know	The number of learners who wanted to create change decreased from Q6-7 (when they actually had to change another's behaviour). 8 people became a no, 1 became more apathetic. A lot of students try to get others to stop (some succeed, others don't). However, a large amount of students don't even try to get others to change environmental habits for fear of embarrassment or ridicule, and the minority are apathetic.
Question 8: Did you enjoy the environmental education workshops?				PROCESS
Question 9: Are you motivated to save the environment?	37 answered yes	5 answered no		Learners feel motivated to save the environment. However, this motivation largely internal (they are willing to do the work but are not ready to motivate others).
Question 10-14				PROCESS

A thematic analysis (both inductive and deductive – based on Ajzen's (1991) TPB - on the learner questionnaire provided a deeper understanding of the results. The inductive analysis was done to identify any specific codes and consequent themes within the data itself. The deductive analysis results are explored below. A cross-analysis of the data, utilising the

TPB as a framework revealed how the themes from the initial inductive analysis could be linked to aspects of the TPB. This is shown in Table 12 and explored in Table 13.

Table 12.

Learner Questionnaire Themes

Themes (Outcome Related)	
Found in initial qualitative analysis	**Based on Theory of Planned Behaviour (Ajzen, 1985, 1991)**
(Positive) environmental attitude – *mostly positive*	Attitudes (love for environment, etc.)
Environmental interaction - Personal interaction - Sense of community/group interaction	Subjective norms (school environment, family, friends) *(What children's interactions with the environment is like)*
Environmental stewardship - Awareness - Action	Motivation and past experience with environment (related to "perceived behavioural control" in Theory of Planned Behaviour) *(How much past experience and current motivation related to perceived behavioural control)*
Environmental stewardship (awareness)	Knowledge and awareness (pick up trash, etc.)
Environmental stewardship (action)	Intention (wanting others to change, spreading word)
= Actual behaviour change (What they are actually doing, for example, what pro-environmental behaviours?)	

The following section explores the various themes found within the data collected from these participants (which can be found in Table 13).

Environmental attitude. Students responded positively about their attitudes towards the environment, emphasizing their love for nature and feelings of calm and comfort. Admiration for the natural environment and how it helps children who feel sad or in need of comfort is a large aspect of this theme. There were no negative responses toward the environment, however there were responses that elicited a general theme of concern towards it. Students are very aware and saddened by pollution, littering and the need to treat the environment better.

Environmental interaction. This theme has two sub-themes: "personal" and "group".

Personal. When students spend time in their garden alone their interactions usually include watering the garden or relaxing in it. The natural environment is largely seen as a safe space for positive experiences, and many learners love taking care of their garden. However, it should be considered that the children may have done this before FFTF; or may have had other environmental influences from their parents, family members, media or previous other programmes. Ultimately, positive behaviours towards the environment are present, which was one of the aims of the programme. Finally, children didn't have personal interactions with nature other than at home or at school. However, it is important to note that their age may influence their ability to visit parks or other natural recreational areas alone for both safety and accessibility reasons– and most recently, the covid-19 pandemic.

Group. A strong sense of community surrounding nature was predominant, with many children spending time in nature with their family (hiking, visiting the beach or outdoor parks). These learners elicit a positive reaction to the natural environment, emphasizing how much they love the time they spend in nature with their families. Further, some spend time in their gardens at home with family members, planting flowers and herbs with their grandparents, or playing in the garden with their peers. However, only very few were involved in other planting and environmental programmes with their families, illustrating that not every learner involved in such programmes will make an active contribution to the environment. Nonetheless, to influence their outlook and behaviours, environmental exposure is crucial. Further, these group interactions encourage a sense of normality about both spending time in nature and respecting it; which could be related to social norms within the TPB, as those surrounding the children positively reinforce good environmental behaviours.

Environmental stewardship. Environmental stewardship behaviour is related to perceived behavioural control in the TPB. This involves the perception of ease or difficulty with performing a specific behaviour. It is influenced by past experience and anticipated obstacles, which contribute to the intention to perform specific behaviours (Ajzen, 1991). Further, the TPB was largely influenced by Albert Bandura, who states that past behaviour is the most important source of information about behavioural control (Ajzen, 1991). In this context, learner's past experience with nature, previous environmental programmes, and current resources available to them serve as a proxy for understanding their perceived behavioural control.

Some learners were involved in pro-environmental behaviours before the programme, which may have influenced their perceived behavioural control. Thus, learners that were

previously more involved in the environment may have higher perceived behavioural control than those with no (or little) previous environmental experiences. These learners felt they could have a positive influence on the environment by picking up litter, attending clean-ups and spreading environmental awareness. Nevertheless, FFTF provided increased access and knowledge into the environmental sphere. They thereby tackled the obstacles that children may experience by not having much access to nature. This can be seen in responses whereby learners have increased knowledge and autonomy to perform pro-environmental behaviours through social interaction (see Table 13). Some learners stated that this was not present before the programme. Ultimately, environmental stewardship behaviours can be further broken down into two sub-themes, awareness and action (explored below).

Awareness. There is vast awareness about the importance of nature and the problems the environment faces. Problems that arose were: pollution; toxic fumes; littering; the state of the oceans; and the importance of the environment for human survival. A significant and recurring facet here was the recognition of the negative impact of littering. Furthermore, there is a strong (and frequent) motivation to save the planet – which were part of the programme documents, but don't however consider the learners context (explored in chapter 4). Ultimately, this does not necessarily mean that the intention to actually do so is present and further explained under "action" below.

Action. A predominant theme of the importance of the environment and wanting to save it was shown throughout the responses; which show a principal understanding that without the environment, humans would not survive. Further, there was a large sway towards trying to influence others to change their environmental habits. The main ways in which this was actioned was by speaking to others about the importance of the environment (raising awareness); telling people not to litter; and trying to keep the environment clean. As stated by the TPB, intention and action is influenced by evaluative perceptions of the behaviour and anticipated obstacles. Thus, exposure to FFTF allowed access to students who have been motivated to be positively involved in the environment. This meant that it took away various obstacles (both physical and personal) that students perceived to be there. For example, one student responded, "I mean it's always been a thing that I wanted to do [save the environment], but I've never done anything like this before Fynbos for the Future." Contrastingly, very few students responded that they didn't want others to change their environment habits. However, the reasons were that they felt it was not their place to interfere in another person's life, or they were not motivated to do so. This could have been influenced

by their own previous experiences within nature, as well as their lived reality (Moos, 1996). Ultimately, respondents largely had the intention to change their own environmental behaviours, as well as that of those around them.

Table 13.

Learner Questionnaire Theme Exploration and Relation to TPB

Theme	**Theory Component**	**Subtheme(s)**	**Data Extracts**
Environmental attitude	Attitudes	Love for environment Care for environment	"I feel the that the environment is a part of us, like it's everything that keeps us alive." "I feel the environment is a very important part of the earth and I love the environment."
Environmental interaction - personal	Subjective norms	Normalcy of having a garden at home Pride in taking care of plants and garden Sadness surrounded by no garden at home	"Yes [I do have a garden at home], when I feel down or when I want to relax, I go to lay on the grass while I listen to my calming music." "Yes [I do have a garden at home]. It's very small but I bring my rabbit outside often and I sit down and sometimes pick flowers or mint leaves to draw."
Environmental interaction – group	Subjective norms	Sense of community surrounding nature Spending time with family in nature Growing plants and herbs Garden activities with friends Influence of others	"We spend most of our time in nature mostly because we are outdoor people and I have a garden so we spend most of our time outside." "No [I don't have a garden at home]. I have the garden at school and me and my friend that we do the garden at school, we give the garden water so that the plants can have water to grow."
Environmental stewardship	Motivation & Past Experience (Perceived	Care for environmental behaviours	"Yes, I speak about the environment a lot. I started before Fynbos for the Future. I actually had a small group

	Behavioural Control)		of friends that helped me pick up plastic around the school."
Environmental stewardship – awareness	Beliefs and Motivation (Perceived Behavioural Control)	Knowledge about the environment	"I feel that my environment is very beautiful but is being destroyed by people who are polluting it." "Yes [I am motivated to save the environment], because it's part of our life cycle, it's resources are what gives us life. We need oxygen, water, food, everything from nature."
Environmental stewardship – action	Intention	Spreading the word about the environment	"Yes [I want to change people's environmental habits], because if we do not change our habits we will not survive."

To gain a deeper understanding of how all of the above relate to behaviour change within learners, the programme curriculum was explored. At the time of writing, the learners had received two workshops (out of the six originally intended) due to lack of funding and school responsiveness. These workshops focused on topics such as: droughts; knowledge on succulents and fynbos; water evaporation; and waste and recycling. The programme didn't specifically focus on the social norms or perceived behavioural control factors. However, they did focus on knowledge and attitude towards the environment – which plays a large personal role in outcome behaviours. As mentioned above, the TPB states how various factors influence behaviours. Greenpop did provide various ways of learning – by being immersed in the garden and teaching the learners verbally. The results suggest that such environmental exposure creates more positive feelings about the environment, which in turn perpetuates exposure to it. This shows how they targeted aspects that may have positively influenced children further by immersing them in their actual environmental surroundings.

The results above show various facets related to the learner's understandings and interactions with the environment. Overall, the results show a relatively similar pattern across respondents. Many of the learners already had a positive association to the environment, which in many cases was strengthened by the programme. When analysing this on a deeper level, it can be seen that the programme had a very large influence on children's knowledge,

awareness, and their need to save the environment – both by their own personal interaction as well as that of others. However, there was a drop in positive responses from wanting to save the environment to influencing others to do the same. This suggests that although the students may have the intent to change others behaviour, this is not carried through to their actions of doing so. This may correlate with the quantitative results, which show that without consistent interaction, environmental apathy may play a role. Apathy is the main obstacle to pro-environmental behaviour change (Amerigo et al., 2012). However, within the context of this evaluation factors such as disconnection between lived environmental experiences, social interactions as well as the programme resources and activities may be a larger contributing factor to this outcome.

The negative influence of littering was widely known by the learners. This was not a standalone topic in the curriculum, which may show influences other than the programme. Further, only one response mentioned the importance of recycling. This was a topic of the second workshop, thus more responses incorporating recycling were expected. Ultimately, the results show that children have quite an extensive knowledge about the environment and concurrent challenges. Furthermore, they understand how they can influence the environment via both their own actions and by influencing those of others. Finally, the data shows that many learners who haven't changed their behaviours have the intention to do so. Therefore, when understanding how these interlinked factors work together to influence behaviour, it can be expected that the chances of this are very high – as can be seen by the numerous learners already engaging in pro-environmental behaviours.

Learner Questionnaire Process.

The results below relate to programme implementation and processes throughout the duration of the programme (rather than the outcomes analysed above).

Environmental education workshops. Although the workshops were enjoyed by the majority (n = 41), some students (n = 2) did not remember them or did not attend any workshops, which corresponds with the fact that not all workshops were implemented as planned. However, there were vastly positive reactions for the workshops that did occur – emphasizing the enjoyment of partaking in various planting activities in the garden. These workshops emphasized the need for individuals to take care of the environment, and students

embodied this at various levels, stating how they felt inspired by the environment and its importance for life.

Garden prefects. The students who were garden prefects (n = 37) loved it. It gave these learners a drive to emphasize the importance of the environment and wanting to teach others not to destroy it. It further increased their happiness towards and desire to take care of plants. Ultimately, it made these learners feel fortunate to have the responsibility of being a garden prefect. However, there were many remarks on how other children at the school don't listen, which was further illustrated by the fact that those who weren't prefects didn't know what a garden prefect was and confused it with the normal school prefects. Thus, more emphasis and explanation in relation to garden prefects would be beneficial.

Prefect usefulness. The garden prefects believe is important and useful in looking after the garden and its safety – but admit to not carrying this out all the time as other students don't listen to them. Generally, there is an assertion (from those who are and aren't garden prefects) that garden prefects are useful because they keep the garden clean and protect it. However, this overall understanding does not extend to regulating behaviour within the garden. Additionally, some students stated that the garden prefects weren't taking care of the garden because "it is damaged". This may be related to prefects not taking the role seriously, or others not listening to them. Either way, it is important to clarify the role of garden prefects – to ensure a broad understanding and less confusion amongst students.

Teacher Data

Teacher survey

This data was only collected at Mountain Road Primary school. The total sample size of teachers was n = 6. They were all a part of the teacher workshop run by Greenpop. The quantitative sections (A and B) of the survey explored both process and outcomes of the programme; whereas the qualitative section (C) explores programme outcomes.

Section A

One aim that Greenpop had was to increase environmental education through training resources and materials; as well as create the garden as a long-term space where lessons could take place in an immersive experience. The descriptive statistics in Table 14 for the teacher survey revealed varying results. The use of resources (such as posters) by teachers was relatively low, M = 1.80, SD = 0.84; as teachers did not receive any resources. The use of the garden by both teachers and students was marginally better, M = 2.67, SD = 0.61 and

$M = 1.86$, $SD = 0.25$, respectively. The main reason for low student interaction with the garden is access, as they can only enter under supervision (further explored in section B). Since Greenpop's goals were to improve attitudes and behaviours towards the environment, individual outcomes were an important indicator of programme achievement. From the teachers perspective, these indicators are positive. Students who participated in the programme have good attitudes towards the environment (($M = 3.83$, $SD = 0.75$) and speak about the environment with a relatively high frequency ($M = 3.5$, $SD = 0.84$). These results show that although use of the garden and resources is low, learner attitudes are reasonably high. This indicates that individual outcomes are promising, but could be improved through aspects of programme implementation and follow-up.

Table 14.

Mean Scores of Teacher Responses

	Mean	Std. Deviation
Use of resources by teachers	1.80	0.84
Use of garden by teachers	2.67	0.61
Student interaction with the garden	1.86	0.25
Student attitudes towards the environment	3.83	0.75
Student environmental actions	3.5	0.84

Note: The Likert anchors in the table ranged from 1 (never) to 5 (every time).

Section B

Section B explores programme delivery, school environment outcomes, individual outcomes, maintenance and prefect behaviour.

Programme delivery. All responses relating to programme delivery were positive or neutral. Teachers had very encouraging attitudes towards the implementation of the programme, the environmental workshops and the garden design.

School environment outcomes. The responses to the value of the garden were very positive – with many teachers believing the garden is a great addition to the school.

Individual outcomes. This section explores both teacher and learner outcomes. Although the programme wasn't directly aimed at the teachers, all agreed that it had positively influenced their attitude towards nature. The learner outcomes that were measured from this survey were all observational and related to the garden. Questions involved how children acted in the garden and whether or not they showed interest in it. All teacher

responses were positive, indicating that they believe the children respect the garden space and are curious about the plants and environment it provides.

Garden Maintenance. All teachers agreed that the garden is maintained well.

Garden Prefects. This was a negatively worded question that was used to corroborate what learners said about garden prefects. Two respondents disagreed – which meant that these teachers believed that garden prefects fulfilled their tasks in the garden properly. However, the other 4 responses were neutral, which indicates that these teachers did not know much about the prefect behaviour in the garden. As children also have no access to the garden without supervision, garden prefects may become irrelevant as the teacher is always there.

Section C.

The two open-ended questions in section C analysed: (1) what learners do in the garden and (2) student use of the outdoor space compared to before.

The results for section C indicated that learners enjoy being in and taking care of the garden (by watering it) – but illustrated that they only have supervised access to it.

The results for question two did not include increased garden use by the children. However, this may have been due to the irregular (and only supervised) access. Nevertheless, teachers stated how much children appreciate the garden when they are in it and are more interactive with the general environment at the school (indicating that they touch and smell the plants more and enjoy sitting under the trees outside).

Teacher Interview

The standardized open-ended interview was used to gain a deeper knowledge of the individual experiences of the programme; likes and dislikes; and what helped or hindered throughout the process. The interview was divided into sections exploring programme delivery and programme material and garden use.

Programme Delivery

The overall understanding of Greenpop's service delivery was vastly positive. The results for this part of the interview are presented in Table 15 below, followed by a narrative analysis thereof.

Table 15.

Interview Results for Service Delivery

Programme Aspect	**Delivery**	**Reason**	**Quote**
Environmental Workshop	Good.	Overall the learners enjoyed it, but there was a misunderstanding about what to do at certain phases.	"[One or two students said] I don't know what to do, I don't know what's happening."
Plant Day	Very good.	Everything ran efficiently, Greenpop had all the right tools and the learners were involved in every process.	"It went actually quite smooth because Greenpop was very prepared." "It was nice having the kids involved and now that same kids, they're very into the garden."
Garden	Very good.	The garden is very good but it's stressful because learner's who haven't been exposed to nature don't respect or take care of it.	"I'm enjoying [the garden], the only thing, it's very stressful because these kids weren't exposed to this, so they have no love for the garden or plants and so forth and they don't know the real benefits of it."
Learner outcomes	Very good.	Learners who participated in the programme show increased respect for the garden and nature. However, they don't mention environmental issues very much.	"The eco-club kids, they learnt the benefits of it now and they […] the amount of respect they have for plants now is totally different to what they had before." "…they have more respect because they'll come tell me, 'teacher they're destroying our garden' and their first thought is our garden not the garden."
Garden positioning	Neutral.	The garden is positioned where the children have access to it in the middle of the school, but this creates stress as there is a constant need for monitoring the students so that they don't damage the garden.	"… so what I am trying to say is this garden is quite stressful because the kids they just don't care, they run through the garden and on the plants." "I'm anxious when the kids are around, that's why I have to keep an eye on it all the time."
Training resources and materials	Insufficient.	Materials such as bug traps were provided, however no worksheets or posters were given to the teachers to utilize.	"No, not materials like that [worksheets or posters] we weren't [given]."

Maintenance of garden	Good.	Greenpop regularly check-in on the garden and fix anything that is broken. The learners water the garden and pick up litter in it on occasion.	"They [Greenpop] also check up on the garden and see hows it going […] and anything that's broken they will fix again."
Quality of programme	Very good.	The programme engaged the learners, which increased their enthusiasm towards participating.	"It engaged the kids a lot." "It wasn't like they just came with their group and they did everything […] so it involved the teachers and the kids."
Teacher workshop	Adequate.	Minimal information was provided, but it was sufficient enough.	"It was minimal, but it gave them all the information that was needed."
Teacher outcomes	Good.	Gained a lot of information about different types of plants.	"There was quite a few things that I learnt."

The interview elucidated that the plant days Greenpop ran at the school went smoothly and allowed for an interactive experience, enabling learners to take ownership of and feel more connected to the garden. These learners take care of the garden and attempt to stop others from damaging it – implying that some form of respect for nature was instilled through the plant day experience. However, a common aspect brought forward was the lack of respect for the garden by those who did not participate in the programme, which led to increased teacher stress levels due to the constant need for monitoring the garden.

Greenpop's communication was good as they regularly informed the schools on what was happening and provided a breakdown of the plans for the next three years. Additionally, garden information and training materials such as bug traps (mechanisms used to catch and examine bugs) were provided. Thus, the training received was deemed adequate. However, no worksheets or posters were received, which was stated as a goal in the programme documents but is discussed further under "programme material use" below. Furthermore, community outings hadn't happened yet at the time of the interview and the lack of communication about when this would happen created confusion for the teacher. However, due to the coronavirus pandemic, outings and group gatherings were put on hold. Overall, the teacher believed that programme delivery was good, but would increase the availability of resources (such as worksheets) and follow-up lessons with the learners.

Programme Material and Garden Use

Teachers weren't provided with resources such as posters or worksheets to integrate into their learning. However, members of Greenpop are planning to implement this soon. Nonetheless, this explains why the teachers didn't use resources (Table 14) as expected. The teachers do however utilise the garden in various ways: for lessons that include arts and crafts, or for environmental teaching by walking through the garden and identifying or drawing the plants. The garden provides a space where the teacher is able to get the learners' undivided attention as the children are more likely to listen when in the garden as they are very inquisitive when being taught outside. The garden adds value to the teaching environment through interactive learning and experiences.

Overall, the interview revealed that the garden was a vastly positive addition to the school. It provided a space for both teachers to provide lessons and learners to sit and talk to their friends or wait for their lifts after school. Further, there is consensus that more greenery and increased garden experiences at the school would be beneficial, but that learners should be taught to respect the garden on a larger scale. There is emphasis that the learners did not grow up respecting nature and teaching them how to nurture and take care of the garden allows them to develop a new approach to the environment and its importance whilst engaging with it first-hand. This is ultimately reiterated as the only students who speak to the teacher about the garden are those that participated in the programme. Ultimately, the programme was run very efficiently, and the involvement of the learners was vastly appreciated. To conclude, the data from initial surveys shows varying results that were further explored using the above qualitative methods.

Chapter 4: Discussion

The following chapter discusses the findings of the evaluation of Greenpop's FFTF programme. It explores findings relating to learners and teacher responses in relation to the evaluation questions (Table 2). Thus, it explores the findings (on individual, teacher and school environment level), challenges and contextual factors associated therewith.

Findings in Context

This paper has discussed the importance of contact with nature throughout human history and evolution (Grinde & Patil, 2009; Gullone, 2000). Nature contact has however, decreased within modern societies – increasing the need for and development of EE programmes (Damoah & Adu, 2020; Le Grange, 2002). Ultimately, the decrease in nature connection and the importance thereof; as well as the movement to re-connect children to nature has further increased the need to understand how programmes such as FTTF work – both globally and within South Africa (Ernst & Theimer, 2011; Le Grange, 2002).

Individual Level Findings

Learner's love for nature. The first evaluation question involved whether or not the learner's love for nature had increased after the programme. This was one of the goals of the programme, as can be seen in the programme theory. High levels of connection to nature (based on the CNI) were found in all learners. This is a great preliminary result, as higher levels of connection to nature are generally associated with higher awareness and concern for living entities (Nisbet & Zelenski, 2013). Ultimately, this illustrates a good knowledge of nature within learners who were a part of the programme. However, these high levels of connection (as measured by the CNI) were also present in the control group – on average, to a higher degree. This was unexpected – as participants of the programme were expected to have higher connections to nature post the intervention.

A further unexpected result is that the control group at Mountain Road Primary school scored higher than the participant group on the CNI (and that this result was significant). However, this emphasizes the importance of garden access – as the garden at Mountain Road is behind a locked gate that can only be accessed under teacher supervision – which does not happen often (explored later in this chapter). Additionally, the control groups at both Mountain Road and Cypress Primary school performed significantly better on certain

subscales of the CNI (enjoyment, oneness, responsibility; and enjoyment, respectively). Although the aforementioned schools' results were not ideal, Strandfontein Primary school results show more positive outcomes. The participant group here performed higher on both enjoyment and empathy subscales of the CNI. This was expected as Strandfontein is vastly involved in the EE of their learners and are very responsive to collaborative efforts with Greenpop (such as outing requests and refreshers every month – which did not happen at other schools). However, Strandfontein Primary school runs additional EE programmes at the school and has more than one garden, elucidating the importance of frequent, diverse (multiple) exposures and interactive experiences for positive outcomes.

The results of the highest subscale means (participant group = "empathy"; control group = "oneness") may provide evidence that the programme worked on a deeper, individual level. EE is associated with sensitivity and positive environmental behaviours – both of which are largely influenced by childhood nature experiences (Chawla & Cushing, 2007; Ernst & Theimer, 2011). This may show a positive outcome for the FFTF programme.

Further, EE programmes provide students with a unique, immersive opportunity to experience and learn (Larson et al., 2010). This has in turn shown to have a greater impact on affective development within children (Larson et al., 2010). The evidence and explanations within the research are explored further below.

Learner responsiveness to programme. Although it was difficult to come to a conclusion about this (as further exploration could not be carried out), more frequent interaction combined with more positive, encouraging experiences with teachers was associated with higher responsiveness. Further, those who had a garden at home and experienced nature with their families on weekends were more open to understanding and being immersed in the programme.

Increased positive action within learners. Learners began to speak about the environment more and pick up litter post-intervention, thus the goal was met. However, this should be related back to the TPB (Ajzen, 1991). This model states that behaviour change happens when various factors are met – relating to attitudes, subjective norms and perceived behavioural control (*Figure 3*). If perceived behavioural control is low, the chances of behavioural change are low too. This combined with lack of resources or accessibility to safe, outdoor environments shows rather positive results for the programme as learners are changing their behaviour where they feel they are able to. Ultimately, they feel more

empowered, which is the first positive step in the right direction, in relation to the programme outcome goals.

Pro-environmental behaviours (encouraging others to change their behaviours). Although these positive outcomes were widely felt by the entire participant group, it was difficult to have continuity in these positive effects as not all students were a part of the programme. Participants were regularly met with challenges when aiming to speak to other learners about the environment. This made it difficult to communicate the importance of the environment to their peers who did not participate in the programme. The overall social norms within the majority of (non-participating) students implied little respect for the garden and environment as a whole. This should be addressed using the curriculum and more school involvement via the teachers (explored further in the recommendations). Furthermore, resource constraints should be considered when exploring pro-environmental and influential behaviour outside of school. Many of the learners come from environments where they only have small gardens (or plants), or don't have a safe outdoor area to play or relax in. This is common within lower income groups and individuals living in townships in South Africa (Shields et al., 2008). In a study by Shields et al. (2008) face to face interviews were conducted with children between the ages of eight and thirteen from five Cape Town township schools. The results indicate that exposure to violence in these contexts is very high. This is common in such environments within South Africa – another study by Fouche et al. (2019) collected data from South African townships and found that children experience their environment as unsafe and needing continual protection. Therefore, children may not have the means to partake in various activities safely – unless through an organization such as Greenpop. Conclusively, appraising outdoor environments as unsafe may negatively influence perceived behavioural control (in the TPB), and thus adversely influence intention.

Qualitative analyses showed more positive outcomes for themes such as environmental attitudes, interactions and awareness. When performing the inductive analysis, these themes were found to correlate with Ajzen's (1991) TPB. This is vastly important, as Greenpop's ultimate goal is to increase environmental stewardship behaviours within these learners and eventually their peers. Thus, by focusing on these aspects of the TPB that can be seen in *Figure 4*, the results already show that they are making a difference. However, this needs to be increased to correlate with higher levels of subjective norms around nature and learner's perceived behavioural control. Enabling the learners to feel as if they can make a difference may play a large role in essentially influencing outcomes.

Overall, students had a positive attitude towards the environment as well as various interactions in nature with their families and in their own garden (if they have one). This may further help explain why connection to nature amongst all the students is relatively high, despite infrequent interactions with Greenpop. Additionally, they showed greater awareness and willingness to influence the environment in positive ways via their actions. Greenpop provided an important safe space to learn about both the environment and how personal involvement can play a role in taking care of it – another positive outcome of the programme. However, the importance of implementing and following a structured curriculum as well as considering the contextual factors should be taken into account. These contextual factors include barriers such as limited sponsors, coordination difficulties with schools and parents, and limited resources.

Teacher Level

The teacher insights provided some reasonable explanations as to why the programme did not have a positive effect in all areas. It should be reiterated however, that the survey data was only collected from one school; and the interview data from another due to the lockdown restrictions and coronavirus at the time of data collection.

Use of training resources, materials and outdoor spaces. Teachers were not given resources to utilise. This corresponds with what a Greenpop representative said, who stated that funding wasn't available and certain aspects of the curriculum hadn't been finished.

Garden use was below what was expected as teachers were not motivated to do so (using the garden minimally for lessons or outdoor activities). Thus, they did not integrate the garden into their teaching process despite all its potential benefits. This is evidenced by the fact that when gardens were (rarely) used for lessons, increased class participation and a calmer atmosphere arose. Further, the restrictions of access to the gardens without teacher supervision, in conjunction with the minimal use of the garden by teachers didn't allow the gardens to be used as intended.

Programme delivery. Teachers had a positive attitude towards programme delivery and plant days, but illuminated that these occurred with a low frequency. Further, the teacher workshop was very brief, thus insufficient information on the benefits and ways to integrate EE into teacher lessons was provided.

Garden effectiveness and student observations. The teachers in large believe that the garden is very effective in bringing about positive changes within the learners and the school environment.

Attitudes towards garden. Overall, teacher attitudes were positive, yet they did not use the garden much. This indicates that the first step of developing positive feelings towards the garden is present, but the consistent actions and behaviours of the teachers are not aligned in this regard. This can be linked back to the TPB (Ajzen, 1991) such that the attitude is present but the behaviour is not. Thus, other factors such as time constraints and workload should be considered. The teacher interview additionally elucidated that the garden creates stress due to the need for constant monitoring due to the lack of respect for the garden (by learners who did not participate in the programme). Overall, teacher insights are vastly positive, but construe a large problem within the programme: the learners don't interact with the garden frequently; garden prefects aren't respected; and most learners don't have access to the garden without supervision. Thus, more emphasis needs to be placed on teachers using the gardens, or finding ways that the students will respect it more – this is explored in the recommendations.

School Environment Level

The school environment level explores both process and outcome aspects of the programme.

Garden prefect maintenance adequacy. The results showed that garden prefects were either well-known or not known at all. Thus, garden prefects were vastly happy to have the responsibility to look after the garden, but more emphasis on the seriousness of the role should be made prominent. Again, social norms and other students not listening played a large role here, deeming more explanation and emphasis in relation to the garden prefects both necessary and beneficial.

Field trips. Not many field trips took place (due to low responsiveness from schools and parents), but those that did were experienced very positively by both learners and teachers. However, more regularity with regard to such outings would enable the achievement of more consistent outcomes. Ultimately, various constraints (such as coronavirus, lockdown restrictions, financial aspects and safety measures) should be considered.

Educational workshops. Although students had positive responses towards these workshops, few did not remember partaking in them. However, teachers stated they were well run by Greenpop – which is a positive result in relation to the programme goals. It does explicate the need for more frequent workshops in order to achieve the overall intended positive effect.

Planting days. Although plants days were experienced positively by all that partook, no official attendance register was taken which is concerning as it does not allow for consistency in measures from baseline to post-test.

Use and usefulness of garden space. The general school environment was largely improved by the garden as indicated by the encouraging attitudes of learners and teachers towards both the implementation and design of the garden. Learners who did not partake in the programme also had positive attitudes towards the garden, illustrating that the goal of influencing other people within the school environment was met. When learners do have access to the garden they relax with friends, do their homework, eat their lunch or have a place to wait for their lifts after school. Thus, the garden provides an outdoor space where they can experience nature.

Exploring further

Results over time. The repeated measures test indicated that learners' interaction with nature decreased over time. Again, this was an unexpected result – however, this could be explained by considering certain factors. Firstly, there wasn't as much interaction between Greenpop and the learners as was originally intended. The main reasons for this being both lack of sponsors and thus finance for the environmental outings; as well as difficulty organising with teachers and parents – especially at Mountain Road and Cypress primary school. Research in EE states that such interaction is necessary (Ballantyne & Packer, 2009); and the results from Strandfontein Primary School show that this inference can be applied within this context. Secondly, the combination of restricted garden access and infrequent use by teachers meant the garden was not used as intended, ultimately decreasing the learners' connection to nature.

The above decrease in interaction with nature may further explain the conflicting results found within this evaluation. EE research suggests that experiences *within* nature are vastly important in developing children's knowledge, attitudes, responsibility, and action (Ballantyne & Packer, 2009). The purpose of this evaluation was to understand whether the

FFTF programme was influencing learner's knowledge, attitudes and subsequent behaviours. Thus, the abovementioned constraints and thus less interaction than intended, in combination with Ajzen's (1991) TPB may help explain why the programme results were not as expected.

Research Process Challenges

Although research aims to be as precise as possible, there may be various reasons for unexpected results. In this evaluation, one reason may have been diffusion of treatment. This means that an exchange between participant and control group individuals occurs, which could have occurred in various ways. Participants and control group individuals were from the same schools (and grades), and thus communicated with each other regularly. This may have affected the ability to collect accurate information. For future programmes, Greenpop should consider taking social interactions and complexities into account. One way to do this would be to include participant reports on their view within the social context, including their own life contexts and what is meaningful to them (Moos, 1996). Another way to do this would be to use observers to further explore interactions (Moos, 1996). However, given the resource constraints this may be a difficult option to pursue. Ultimately, approaching the environment as a dynamic system with various dimensions and the related developmental history may help provide for meaningful outcomes in the context in which the programme is implemented.

A further reason for the unexpected results between the participant and control group individuals may be compensatory rivalry (Leighton, 2010). In this sample, students who didn't participate in the programme may have become competitive with their peers and may have felt the need to score higher than their counterparts in the participant groups, thus inflating their results. This inflation of the results may therefore not accurately represent the findings. In this context, many of the learners may have thought they were being "tested" in the classroom setting; which may have played a large role here.

Finally, instrumentation (which is changes in the instrument, observers or scorers) may have played a large role in the unexpected results as various individuals carried out data collection in different settings over time (Leighton, 2010; Slack & Draugalis, 2001). In the pre-test round, Greenpop staff members collected the information from the students; whereas the some of the post-test sessions were completed by teachers in different, uncontrolled settings. This may have largely influenced results, depending on how these data collection sessions were carried out.

This section has shown that although some of the results were unexpected, there could be various reasons relating to the research and implementation process that should be considered as reasonable explanations therefore. Ultimately, the results within this evaluation are vastly mixed – with some negative results for the programme outcome. Although many threats to internal validity have been mentioned above, there are various other reasons that need to be considered to gain a whole picture of the challenges to implementing EE programmes (especially within a South African context).

Contextual Factors and Challenges

Students' Background. An inadequate understanding of the influence of EE on children from different genders, ages and ethnic backgrounds is a major concern (Larson et al., 2010). Investigation into gender influences have mainly focused on adults, thus there is not sufficient information to draw any conclusions in this regard (Larson et al., 2010). In terms of age, studies have shown that environmental concern usually increases at the age of ten, but that indicators relating to environmental attitudes and intentions is higher in younger age groups (Kahn, 1999; Larson et al., 2010; Leeming et al., 1995). However, different contexts should be considered here. This introduces the next concern: race and ethnicity. Few studies and programmes have considered race and ethnicity as mediating variables (Larson et al., 2010). However, there is vast evidence to describe that minority children from low-income neighbourhoods have fewer opportunities to access nature in a safe environment (Larson et al., 2010). This is associated with decreased chances for positive reinforcement of environmental concerns and behaviours. This may increase the difficulty with which to alter their perspective and consequent environmental behaviours (Larson et al., 2010). This is pertinent to the results of this research, as the participating learners and schools are considered to be in lower socioeconomic groups and areas. Thus, there needs to be more emphasis on context consideration, consistent involvement and immersion in the natural environment on a regular basis in order to achieve the best results in environmental knowledge and behaviours. Further, considering home language should be of great importance, as this may influence not only the learners ability to understand the programme better, but also their enjoyment and willingness to partake in a more active manner. The surveys, workshops and interactions that Greenpop had with the learners was all performed in English – which may have made it difficult to ensure that the knowledge was being received

in the intended way. Additionally, this may have affected survey results – as the questions may not have been fully understood.

Additionally, Wasik and Hindman (2010) state that there is an early literacy achievement gap in children from lower-income households. However, not all children from these households have identical experiences. To the best of my knowledge at the time of writing, there are no studies in South Africa that offer national language proficiency data in more than one language – especially in younger populations (Posel & Zeller, 2011). However, in a study by Posel and Zeller (2011) that utilized data from the National Income Dynamics Survey (a nationally representative household survey in South Africa), results show that self-assessed reading and writing abilities within individuals is considerably higher in their home language than in English. Thus, it is crucial for EE programmes to first gain a deeper understanding of both literacy and subsequent environmental literacy abilities within individuals in context. Ultimately, this is extremely important for Greenpop to review, considering that the participants of their programmes may have a different home language to English.

Teacher buy-in. Teachers – when given the right means – are very influential in educating their learners about EE (Sukma et al., 2020). Thus, the low motivation and knowledge for how to integrate the garden into lessons may have played a large role in programme outcomes. As previously stated by Rickinson (2001), role modelling and outdoor experiences are a large part of success in EE programmes – which teachers have the ability to facilitate for learners. Thus, putting more emphasis on the teachers within the programme may have vast benefits. Damoah and Adu (2020) state that the South African government should develop clear goals with guidelines of how teachers can integrate EE within their lessons. However, since this is not readily available to all teachers, Greenpop's intervention may bridge the gap.

An important aspect to consider is teachers' own environmental literacy – as this influences the outcomes of environmental learning within students and future generations (Damoah & Adu, 2020; Loubser et al., 2001). Teachers at different schools may have different views, understandings and knowledge about EE (Damoah & Adu, 2020). Therefore, the lack of guidelines for how to practically integrate EE into their respective subjects may negatively influence the follow through and results as teachers can play an influential role in learner behaviour within the environment (Damoah & Adu, 2020). Ultimately, Damoah and Adu (2020) state that uniformity and curriculum compliance are necessary for effective EE

outcomes. However, since teachers are already under-resourced in South Africa, implementing this on a large-scale may not be practically possible (Damoah & Adu, 2020). Nevertheless, Greenpop may play a large influential role here by providing teachers with resources through their programme implementation.

Follow up and consistent interaction. In a systematic review of EE, various programme characteristics are shown to influence positive outcomes in EE (Rickinson, 2001). These are: role modelling, direct experiences in the outdoors, collaborative group discussion, long duration and finally, preparation and follow-up work (Rickinson, 2001). Furthermore, young children benefit from approaches that utilize the natural environment in an integrated, frequent manner (Larson et al., 2010). Although Greenpop has workshops, direct experiences in the outdoors, group interactions and a teacher workshop – the consistency and frequency of all of these elements can be improved and related back to individuals surrounding context, ultimately positively influencing the outcomes of the programme. If done correctly, applying contextual factors and learning topics to the implementation of the programme and its follow-up sessions, may provide the necessary factor required to increase both motivation and environmental literacy outcomes.

Broader cultural and contextual aspects

One broader aspect that needs to be considered is traditional knowledge systems and EE (Le Grange, 2002). Involving students and teachers in focus groups or discussions can provide further meaningful information on the context surrounding the environment (Le Grange, 2002; Maila & Loubser, 2003). This may be a large factor in transforming the hegemonic ideologies that are so common in Western society life (Le Grange, 2002). This ultimately means that the spread of Western ideas may result in the eradication of ideas of nature by other cultures and within other contexts. However, society can learn a lot from traditional skills when managing complex environmental systems (Maila & Loubser, 2003). This is vastly important to consider in this programme, as the context of the participants in the evaluation are vastly different from Western societies. This again ties in with understanding the environmental literacy of individuals, as well as their understandings and uses of the environment – and reflectively coming up with a way to integrate this for the best outcomes within these contexts in future (it is important to note that indigenous knowledge systems aren't able to be applied universally (Maila & Loubser, 2003). However, this may be a benefit as it can be applied in this context, and will therefore enable Greenpop to address

unique challenges first). This can be done utilising place-based education whereby an explicit connection between the school and community in which it resides is utilised (Powers, 2004). Place-based education is beneficial, as it not only considers the surrounding environment, but it also enables students to see the relevance of what they are learning, ultimately leading to more engagement in the learning process (Powers, 2004). In this case, this can be related back to resource access and service-delivery, learner and teacher environmental backgrounds, and the everyday problems that learners specifically handle in their everyday lives. In conclusion, it would be important for Greenpop to consider this in future.

Ultimately, Greenpop is certainly playing their part, however more research into specific contexts and learning within these contexts needs to be completed in order to gain a greater understanding of how such programmes may be designed and implemented.

Chapter 5: Recommendations, Limitations and Conclusions

Recommendations

The purpose of this evaluation was to assess the FFTF programme implemented by Greenpop in order to provide information for the improvement of programme performance. The recommendations below are based on findings from the evaluation and already established research within the EE setting.

1. It is important to understand the environmental literacy of both students and teachers. This evaluation has shown the importance of understanding individuals' baseline knowledge of the environment as it would help shape the curriculum starting point and intervention types necessary. Implementing a "pre-programme" questionnaire could be a good way of gaining further insights into the environmental literacy of learners, allowing for adjustments if necessary. Furthermore, utilising place-based education techniques that integrate the school and community into the learning environment could substantially increase learner outcomes – especially in relation to their own understandings and ultimately the overall context. This would be especially pertinent in "increasing active community engagement" and "inspiring active citizenship" as seen in the programme theory (Figure 1). Ultimately, reaching the programme goal of increased love of and ownership of environment, as well as increasing environmental stewardship behaviours (Figure 1) will be more effectively achieved by altering programme activities to consider the context more.
2. It is important to consider the home language and background of the students. At times it may be useful to provide workshops in both English and Afrikaans to provide a space for increased understanding throughout the programme and more insightful responses. Further, utilising historical knowledge from South Africa specifically may help Greenpop develop more relevant curriculum content, as well as related activities.
3. Greenpop should aim for more frequent interaction with the learners at each school as well as ensuring increased accessibility to the gardens. Positive results were found in learners who had interactive experiences within nature regularly. This could be achieved by creating a specific schedule of when interactions would happen and how, over a period of 6 months. This would incorporate teacher and

principal involvement in the planning process in advance. Outings and interactions could thus be planned well in advance and be more collaborative in understanding and attaining mutual goals.

4. Parents play a large role in EE programme success (Duvall & Zint, 2007). Thus, Greenpop should consider creating activities or conversational pieces that can incorporate parents into the learning process.
5. Increasing learner's perceived behavioural control over their influence on the environment may play a large role. This related back to the TPB (Ajzen, 1991) and in this context would involve teaching the learner's that they themselves can contribute in a very important way. Reiterating that saving the environment doesn't mean needing to have access to all of the resources (such as a garden at home to water) or being in nature everyday – it can be picking up a piece of litter or having a conversation about it with someone else – not currently emphasized in the programme.
6. Facilitating school assemblies that involve all the learners in the respective schools may play a very influential role as many participants stated that it was difficult to speak about the environment or encourage others to change their behaviours if they hadn't participated in the programme. This was reiterated by the teacher, who stated that the garden created more stress due to little care and reckless behaviour by the students. Running bi-yearly environmentally-focused assemblies would be an effective way to create a better sense of environmental care and interest for all learner's – not only participants of the programme. This could focus on information surrounding local cultural heritage and diversity, in conjunction with practical ways to be more environmentally conscious and sustainable within both their school and other outdoor environments.
7. Teacher workshops should be implemented on a larger and more in-depth scale. This would include increased teacher involvement, access to resources and a good knowledge base to interact with the learner's in a pro-environmental manner and how to integrate this into their respective subjects. This may further encourage teachers to utilise the garden space for lessons (an aim of the programme, see Figure 1). These workshops should aim to increase teacher buy-in so they feel more motivated and have the resources to integrate EE into their teaching. If teachers do this, it will enable further reach to the rest of the learner's at the

school – ultimately promoting more pro-environmental behaviours on a larger scale.

8. Ensuring that learners have access to the gardens (not only when accompanied by a teacher) would allow them to receive the full benefits of the garden experience. Having such experiential learning is vastly important as the more involved they are in the environment, the more concerned they are likely to become (White, 2004). The gardens should also include (where possible) water, indigenous vegetation, bushes, flowers, a diversity of colours, textures and materials, as well as natural sitting places and areas that provide shade (White, 2004). This would further encourage positive outcomes of the programme for all learners alike. Finally, this access combined with the previous two recommendations would ideally result in more access to the garden and less disrespect thereto. Ultimately decreasing teacher stress and increasing pro-environmental behaviours.
9. Curriculum adaptation, finalisation and resource delivery should be focused on. The curriculum should be relevant to the both South African context and each individual learner's context and direct environmental contact. Thus, reflective sessions with learners and/or teachers may help craft a suitable curriculum. White (2004) stated that teaching premature abstraction – topics such as rainforest destruction and ozone holes – may create disassociation and biophobia, as it creates anxiety. Therefore, a well-crafted curriculum that can be delivered and utilized is necessary.
10. Finally, re-evaluating current programme activities and resources and refining them based on the TPB and other evidence may have large benefits, as well as focusing on contextually-specific activities based upon participants personal and social experiences in relation to their environment. Focusing on and customising other similar and successful programme characteristics, such as those including teacher engagement, guided inquiry, and reflection sessions – explored in a review by Stern et al. (2014) within this evaluation is suggested. Ultimately, ensuring (where possible) greater consistency with planned outings, field trips and workshops is necessary to increase programme success.

Limitations

There were various limitations to the study. Firstly, baseline data for the control group was not collected deeming a full pre-post, two group design unfeasible. The control group learners attended the same schools, which may have had a large, confounding influence on the results. There was also a lack of standardization across testing, as some tests were carried out by the evaluator, some by Greenpop and others by teachers – which meant that testing settings may have had an influence on the results. Further, proper registers of participant and control learners were not kept at all of the schools, making it difficult to know which part of the programme certain learners received. Finally, a large limitation was not being able to complete all of the data collection due to the coronavirus pandemic and lockdown restrictions (especially the closing of schools). Thus, certain teacher surveys and interviews with learners, parents and teachers were not completed – which may have provided a greater understanding of programme implementation and outcomes.

Conclusion

In conclusion, EE is a vastly complex network, with a multitude of factors to consider. However, this evaluation provides a better understanding of implementing EE programmes within this context. It considers a wide range of factors from both previous studies and insights throughout the evaluation period. The ultimate aim of the FFTF programme was to increase learners' love and ownership of the environment, also expressed as environmental stewardship behaviours. Various measures were used to make sense of the outcomes and understand what did or did not work. This programme aimed to influence various factors on various levels, which made it complex. However, this evaluation provided a programme theory, which is both an essential starting point and strategy to follow throughout the programme planning and implementation phase. Thus, this should be utilised for guidance on the future of the programme.

Greenpop is playing an important role in combatting an extensive global problem that is steadily capturing the world's attention. However, there is a long way to go before real change is seen, but that would not be possible with EE programmes such as this one – aimed at both current and future generations. Increased environmental awareness and action, if done correctly, can play an important role in influencing individuals from all walks of life. Thus, those who may view the natural environment as inconsequential because they have other problems – such as job security, food supply and safety – may be illuminated on the negative effects of environmental decline; or those inclined to apathy towards the natural environment

may begin to re-evaluate the enormity of the problem. Ultimately, educating individuals in ways that relate to their own context and view of the world may decrease the perceived disconnect and show them that they are indeed a product of their environment; which is to say that the prosperity of one depends on the prosperity of another. Given the state of the environment and decreasing human connection to it, programmes such as this are invaluable and should remain a priority.

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Appendices

Appendix A: Connectedness to Nature Scale

Information Sheet and Consent Form – Parent Consent for Child Participating in Research

Hello, my name is Nicole Burgmer and I am conducting research towards a Masters degree. I am researching the effects of the Fynbos for the Future programme implemented by Greenpop at your child's school and would like to obtain your permission to have your child participate in this research. Please read the following information carefully before you decide whether or not to give your permission.

What is this project about?

Fynbos for the Future was implemented at your child's school by Greenpop. Some aims to the programme are to plant fynbos gardens, instil a love for nature in learner's, create environmental stewards and inspire biophilia (which is a love of nature). This research looks at if and how the programme has been related to these aims.

Purpose of the research

I am interested to see whether or not the programme activities were related to the aims of the programme, and if and how your child's knowledge, attitudes and behaviours towards nature have changed as a result of participation in the programme. I would further like to understand how and why the programme may have influenced your child – and gain an understanding of their experiences within the programme.

Participation

Please note that your child's participation is voluntary. If your child chooses not to participate, there will be no negative consequences. If your child chooses to participate (with your permission) but would like to withdraw at any time, there will also be no negative consequences. However, I would be very grateful for your child's participation.

What is expected of your child?

Your child will be asked to fill out a few surveys relating to the Fynbos for the Future programme. These surveys will ask questions relating to nature, the environment, and their

own understandings and experiences thereof. There are no costs involved for participating in the study.

Benefits to participant

There are no direct benefits to the participant.

Risk of harm to participants.

There are no anticipated risks for participating in this interview.

Confidentiality

All information gathered during participation in this research will be kept confidential and no data will be linked directly to your child's identity. This data will be stored on a laptop that has security software and is password-protected. No access to the data will be given to anybody not directly involved in this research.

Sharing and the use of data

The data collected here will be used to provide Greenpop with information on their Fynbos for the Future programme. It will further be used within the research for my dissertation. Although no direct feedback will be provided to you, I am able to share the final dissertation with you, once the final version has been submitted to and approved by all parties involved. (If you would like to receive these results, please provide me with your email address: _____).

Signing below will allow your child to participate in the study during school hours without your presence.

Parent Signature:

I, the parent or guardian of _____, a minor _____ years of age, **permit** his/her participation in the research named above being conducted by Nicole Burgmer for her Masters degree at the University of Cape Town.

Signature of parent/guardian: _____

Name of parent/guardian: _____

Date: _____

Child Signature:

I, _____, agree to participate in the research named above and understand my participation is voluntary and I don't have to continue if I do not want to (I may withdraw at any time).

Signature of child: _____

Name of child: _____

Date: _____

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I like to hear different sounds in nature					
I like to see wildflowers in nature					
When I feel sad, I like to go outside and enjoy nature					
Being in the natural environment makes me feel peaceful					
I like to garden					
Collecting rocks and shells is fun					
Being outdoors makes me happy					
I feel sad when animals are hurt					
I like to see wild animals living in a clean environment					
I enjoy touching animals and plants					
Taking care of animals is important to me					
Humans are part of the natural world					
People cannot live without plants and animals					
My actions will make the natural world different					
Picking up trash on the ground can help the environment					
People do not have the right to change the natural environment					

Appendix B: Social and Psychological Impact Scale (SPIS)

Fynbos for the Future

Social & Psychological Impact Assessment

Key Constructs:

1. Children's contact with nature
2. Children's biophilia
3. Children's biophobia
4. Environmental stewardship

Section A - Measuring Contact with Nature:

Operationalisation: Contact with nature is defined as time spent on interactions with the natural world. A scale to measure contact with nature can be developed in the following way:

1. Students from Mountain Road are asked to write freely about all of the activities they have experienced with wild plants and animals.

2. From that, we develop a list of 15 most common activities.

3. That list is turned into a set of Likert-scale questions which assess how frequently children come into contact with nature.
For example:
"I observe insects pollinating plants." Often Sometimes Never
"I plant veggies, plants, or trees." Often Sometimes Never

See next page for assessment questionnaire.

NAME: _____

GRADE: _____

AGE: _____

SECTION A

How often do you do the following activities? Tick your answers.

Often Sometimes Never

1. Pick flowers ▢ ▢ ▢

2. Climb trees ▢ ▢ ▢

3. Catch insects ▢ ▢ ▢

4. Visit nature reserves ▢ ▢ ▢

5. Smell plants & flowers ☐ ☐ ☐

6. Grow seeds ☐ ☐ ☐

7. Plant trees ☐ ☐ ☐

8. Watch insects ☐ ☐ ☐

9. Play in the garden ☐ ☐ ☐

10. Pick wild fruit to eat ☐ ☐ ☐

11. Walk in the park ☐ ☐ ☐

12. Watch birds & animals ☐ ☐ ☐

13. Draw plants & animals ☐ ☐ ☐

14. Feed wild animals ☐ ☐ ☐

15. Have a picnic ☐ ☐ ☐

What else do you do outside? _____

Section B - Measuring Biophilia & Biophobia:

BIOPHILIA:

Operationalisation: Biophilia is defined as a love of, connection to, and respect for nature. Biophilia is assessed in terms of 3 types of manifestation: behavioural (actions), cognitive (thoughts or beliefs) and affective (feelings).

Content Areas

		Content Areas		
		A. Love	B. Connection	C. Respect
Manifestations	1. Behavioural	A1	B1	C1
	2. Cognitive	A2	B2	C2
	3. Affective	A3	B3	C3

QUESTIONS:

LOVE - I love nature

A1: I would donate my money to protect animals. (1)
A1: I like to watch TV shows about animals. (7)
A2: I think trees are beautiful. (13)
A2: I believe that fynbos is special. (19)
A3: I love plants. (25)
A3: I love animals. (31)

CONNECTION - I am part of nature

B1: I treat animals as I want to be treated (21)
B1: I would rather play in nature than play inside (27)
B2: I think that people are part of nature (15)
B2: I believe that humans are animals too (33)
B3: I feel happy when I am with animals (3)
B3: I feel at home when I am in nature (9)

RESPECT - I respect nature
C1: If I saw someone hurting an animal, I would tell them to stop. (23)
C1: I would like to work with animals or plants when I grow up. (17)
C2: I think that people should protect the environment. (5)
C2: I believe that littering is wrong. (29)
C3: I feel happy to have a garden at my school. (11)
C3: I feel grateful for the jobs animals do (34)

BIOPHOBIA:

Operationalisation: Biophobia is as a fear of, hatred of, and disconnection with nature. Biophobia is assessed in terms of 3 types of manifestation: behavioural (actions), cognitive (thoughts or beliefs) and affective (feelings).

Content Areas

		Content Areas		
		D. Fear	E. Hatred	F. Disconnection
Manifestations	1. Behavioural	A1	B1	C1
	2. Cognitive	A2	B2	C2
	3. Affective	A3	B3	C3

QUESTIONS:

FEAR - I fear nature

D1: I avoid playing outside. (18)
D1: When I see a bird, I run away. (24)
D2: I think all animals are dangerous. (30)
D2: I believe that spiders want to bite me. (36)
D3: I am scared of being in a forest. (6)
D3: I feel afraid when I see a bee. (12)

HATRED - I hate nature

E1: When I find insects in my house, I kill them. (14)
E1: Sometimes, I hurt animals. (26)
E2: I think that snakes are evil. (2)
E2: I don't think people should protect the environment. (8)
E3: I hate wild animals. (35)
E3: When I have to be in the garden, I feel angry. (20)

DISCONNECTION - I am separate from nature

F1: I don't really play at the park. (4)

F1: I often throw rubbish on the ground. (10)

F2: I think that people are more important than animals. (22)

F2: I believe that people don't need nature. (28)

F3: I don't really care what happens to wild animals like rhinos. (16)

F3: I don't think plants are useful. (32)

See next page for assessment questionnaire.

***Note: Environmental stewardship is measured through behavioural manifestations of biophilia.**

SECTION B

For the following statements, please **circle** whether **you agree**, **you're not sure,** or **you disagree**. There are no right or wrong answers, so try to answer honestly.

1. I would donate my money to protect animals.

Yes, I agree. I'm not sure. No, I disagree.

2. I think that snakes are evil.

Yes, I agree. I'm not sure. No, I disagree.

3. I feel happy when I am with animals.

Yes, I agree. I'm not sure. No, I disagree.

4. I don't really play at the park.

Yes, I agree. I'm not sure. No, I disagree.

5. I think that people should protect the environment.

Yes, I agree. I'm not sure. No, I disagree.

6. I am scared of being in a forest.

Yes, I agree. I'm not sure. No, I disagree.

7. I like to watch TV shows about animals.

Yes, I agree. I'm not sure. No, I disagree.

8. I don't think people should protect the environment.

Yes, I agree. I'm not sure. No, I disagree.

9. I feel at home when I am in nature.

Yes, I agree. I'm not sure. No, I disagree.

10. I often throw rubbish on the ground.

Yes, I agree. I'm not sure. No, I disagree.

11. I feel happy to have a garden at my school.

Yes, I agree. I'm not sure. No, I disagree.

12. I feel afraid when I see a bee.

Yes, I agree. I'm not sure. No, I disagree.

13. I think trees are beautiful.

Yes, I agree. I'm not sure. No, I disagree.

14. When I find insects in my house, I kill them.

Yes, I agree. I'm not sure. No, I disagree.

15. I think that people are part of nature.

Yes, I agree. I'm not sure. No, I disagree.

16. I don't really care what happens to wild animals like rhinos.

Yes, I agree. I'm not sure. No, I disagree.

17. I would like to work with animals or plants when I grow up.

Yes, I agree. I'm not sure. No, I disagree.

18. I avoid playing outside.

Yes, I agree. I'm not sure. No, I disagree.

19. I believe that fynbos is special.

Yes, I agree. I'm not sure. No, I disagree.

20. When I have to be in the garden, I feel angry.

Yes, I agree. I'm not sure. No, I disagree.

21. I treat animals as I want to be treated.

Yes, I agree. I'm not sure. No, I disagree.

22. I think that people are more important than animals.

Yes, I agree. I'm not sure. No, I disagree.

23. If I saw someone hurting an animal, I would tell them to stop.

Yes, I agree. I'm not sure. No, I disagree.

24. When I see a bird, I run away.

Yes, I agree. I'm not sure. No, I disagree.

25. I love plants.

Yes, I agree. I'm not sure. No, I disagree.

26. Sometimes, I hurt animals.

Yes, I agree. I'm not sure. No, I disagree.

27. I would rather play in nature than play inside.

Yes, I agree. I'm not sure. No, I disagree.

28. I believe that people don't need nature.

Yes, I agree. I'm not sure. No, I disagree.

29. I believe that littering is wrong.

Yes, I agree. I'm not sure. No, I disagree.

30. I think all animals are dangerous.

Yes, I agree. I'm not sure. No, I disagree.

31. I love animals.

Yes, I agree. I'm not sure. No, I disagree.

32. I don't think plants are useful.

Yes, I agree. I'm not sure. No, I disagree.

33. I believe that humans are animals too.

Yes, I agree. I'm not sure. No, I disagree.

35. I hate wild animals.

Yes, I agree. I'm not sure. No, I disagree.

36. I believe that spiders want to bite me.

Yes, I agree. I'm not sure. No, I disagree.

Appendix C: School Environment Survey

Information Sheet and Consent Form – Parent Consent for Child Participating in Research

Hello, my name is Nicole Burgmer and I am conducting research towards a Masters degree. I am researching the effects of the Fynbos for the Future programme implemented by Greenpop at your child's school and would like to obtain your permission to have your child participate in this research. Please read the following information carefully before you decide whether or not to give your permission.

What is this project about?

Fynbos for the Future was implemented at your child's school by Greenpop. Some aims to the programme are to plant fynbos gardens, instil a love for nature in learner's, create environmental stewards and inspire biophilia (which is a love of nature). This research looks at if and how the programme has been related to these aims.

Purpose of the research

I am interested to see whether or not the programme activities were related to the aims of the programme, and if and how your child's knowledge, attitudes and behaviours towards nature have changed as a result of the programme. I would further like to understand how and why the programme may have influenced your child – even if they did not directly participate in the programme.

Participation

Please note that your child's participation is voluntary. If your child chooses not to participate, there will be no negative consequences. If your child chooses to participate (with your permission) but would like to withdraw at any time, there will also be no negative consequences. However, I would be very grateful for your child's participation.

What is expected of your child?

Your child will be asked to fill out a few surveys relating to the Fynbos for the Future programme. These surveys will ask questions relating to nature, the environment, and their own understandings and experiences thereof. There are no costs involved for participating in the study.

Benefits to participant

There are no direct benefits to the participant.

Risk of harm to participants.

There are no anticipated risks for participating in this interview.

Confidentiality

All information gathered during participation in this research will be kept confidential and no data will be linked directly to your child's identity. This data will be stored on a laptop that has security software and is password-protected. No access to the data will be given to anybody not directly involved in this research.

Sharing and the use of data

The data collected here will be used to provide Greenpop with information on their Fynbos for the Future programme. It will further be used within the research for my dissertation. Although no direct feedback will be provided to you, I am able to share the final dissertation with you, once the final version has been submitted to and approved by all parties involved. (If you would like to receive these results, please provide me with your email address: _____).

Signing below will allow your child to participate in the study during school hours without your presence.

Parent Signature:

I, the parent or guardian of _____, a minor _____ years of age, **permit** his/her participation in the research named above being conducted by Nicole Burgmer for her Masters degree at the University of Cape Town.

Signature of parent/guardian: _____

Name of parent/guardian: _____

Date: _____

Child Signature:

I, _____, agree to participate in the research named above and understand my participation is voluntary and I don't have to continue if I do not want to (I may withdraw at any time).

Signature of child: _____

Name of child: _____

Date: _____

Please circle the appropriate answer:

I am a student	I am a staff member Please specify: _____

Name: _____

Date: _____

School: _____

Grade: _____

Age: _____

This questionnaire asks about what you think of the garden, and what it has done for the school.

	Agree	Neither agree nor disagree	Disagree
I use the garden that was planted by Greenpop			
I really enjoy spending time in the garden			
I think the garden has made my school life more enjoyable			
I think the garden has positively influenced the school environment			
The garden has made me more aware of environmental challenges			

I feel like the garden has made me like nature more			

In your own words, can you describe what you think that garden has done for:

You as an individual:

_____

_____

_____

_____

The school as a whole:

_____

_____

_____

_____

Thank you for taking the time to fill out this questionnaire.

Appendix D: Learner Questionnaire

Information Sheet and Consent Form – Parent Consent for Child Participating in Research

Hello, my name is Nicole Burgmer and I am conducting research towards a Masters degree. I am researching the effects of the Fynbos for the Future programme implemented by Greenpop at your child's school and would like to obtain your permission to have your child participate in this research. Please read the following information carefully before you decide whether or not to give your permission.

What is this project about?

Fynbos for the Future was implemented at your child's school by Greenpop. Some aims to the programme are to plant fynbos gardens, instil a love for nature in learner's, create environmental stewards and inspire biophilia (which is a love of nature). This research looks at if and how the programme has been related to these aims.

Purpose of the research

I am interested to see whether or not the programme activities were related to the aims of the programme, and if and how your child's knowledge, attitudes and behaviours towards nature have changed as a result of participation in the programme. I would further like to understand how and why the programme may have influenced your child – and gain an understanding of their experiences within the programme.

Participation

Please note that your child's participation is voluntary. If your child chooses not to participate, there will be no negative consequences. If your child chooses to participate (with your permission) but would like to withdraw at any time, there will also be no negative consequences. However, I would be very grateful for your child's participation.

What is expected of your child?

Your child will be asked to fill out a few surveys relating to the Fynbos for the Future programme. These surveys will ask questions relating to nature, the environment, and their own understandings and experiences thereof. There are no costs involved for participating in the study.

Benefits to participant

There are no direct benefits to the participant.

Risk of harm to participants.

There are no anticipated risks for participating in this interview.

Confidentiality

All information gathered during participation in this research will be kept confidential and no data will be linked directly to your child's identity. This data will be stored on a laptop that has security software and is password-protected. No access to the data will be given to anybody not directly involved in this research.

Sharing and the use of data

The data collected here will be used to provide Greenpop with information on their Fynbos for the Future programme. It will further be used within the research for my dissertation. Although no direct feedback will be provided to you, I am able to share the final dissertation with you, once the final version has been submitted to and approved by all parties involved. (If you would like to receive these results, please provide me with your email address: _____).

Signing below will allow your child to participate in the study during school hours without your presence.

Parent Signature:

I, the parent or guardian of _____, a minor _____ years of age, **permit** his/her participation in the research named above being conducted by Nicole Burgmer for her Masters degree at the University of Cape Town.

Signature of parent/guardian: _____

Name of parent/guardian: _____

Date: _____

Child Signature:

I, _____, agree to participate in the research named above and understand my participation is voluntary and I don't have to continue if I do not want to (I may withdraw at any time).

Signature of child: _____

Name of child: _____

Date: _____

Name: _____

Grade: _____

School: _____

Date of birth (year, month, day): _____/_____/_____

How do you feel about the environment?

_____

_____

_____

_____

Do you have a garden at home? If you do, what do you do in the garden?

_____

_____

_____

_____

Do you spend time in nature with your family? (Do you go to the park, beach, etc.?)

_____

_____

_____

_____

Do you speak to others about the environment? If yes, did you start doing this before or after Fynbos for the Future?

_____

_____

_____

_____

Are you more involved in your community after being in Fynbos for the Future? If yes, how?

_____

_____

_____

_____

Do you want others to change their environmental habits?

_____

_____

_____

_____

Have you tried influencing others to change their environmental habits? How?

_____

_____

_____

_____

Did you enjoy the environmental education workshops?

_____

_____

_____

_____

Are you motivated to save the environment?

_____

_____

_____

_____

Are you a garden prefect? YES / NO (Please circle the appropriate answer)

If yes:

How do you feel about being a garden prefect?

_____

_____

_____

_____

Do you make sure others don't damage the garden?

_____

_____

_____

_____

If no:

Do you feel like the garden prefects are useful? Why/why not?

_____

_____

_____

_____

Do you think garden prefects help to make sure others behave in the garden?

_____

_____

_____

_____

Appendix E: Teacher survey and observational tool

Information Sheet and Consent Form - Teacher

Hello, my name is Nicole Burgmer and I am conducting research towards a Masters degree. I am researching the effects of the Fynbos for the Future programme implemented by Greenpop at your school and would like to invite you to participate in the project.

What is this project about?

Fynbos for the Future was implemented at your child's school by Greenpop. Some aims to the programme are to plant fynbos gardens, instil a love for nature in learner's, create environmental stewards and inspire biophilia (which is a love of nature). This research looks at if and how the programme has been related to these aims.

Purpose of the research

I am interested to see whether or not the programme activities were related to the aims of the programme and how it affected you and the school environment (in addition to the learners who participated in the programme). I further would like to understand what worked and what didn't, as well as how and why certain changes may have occurred. I am therefore interviewing you, as you completed the survey that I handed out to teachers at the school, and your attitude towards the fynbos gardens was very positive. I ultimately aim to understand how you feel about the Fynbos for the Future programme.

Participation

Please note that participation is entirely voluntary. If you choose not to participate, there will be no negative consequences. If you choose to participate but would like to withdraw at any time, you may do so without negative consequences. However, I would be very grateful if you would assist me by allowing me to interview you. The interview will be recorded, by signing this document you agree to this.

What is expected of you?

This survey asks questions relating to your opinions on the Fynbos for the Future programme, as well as what you have observed and noticed about learners' interactions with the garden space. It should take between 10 and 20 minutes to complete.

Benefits to participant

There are no direct benefits to the participant.

Risk of harm to participants.

There are no anticipated risks for participating in this interview.

Confidentiality

All information gathered during participation in this research will be kept confidential and no data will be linked directly to your identity. This data will be stored on a laptop that has security software and is password-protected. No access to the data will be given to anybody not directly involved in this research.

Sharing and the use of data

The data collected here will be used to provide Greenpop with information on their Fynbos for the Future programme. It will further be used within the research for my dissertation. Although no direct feedback will be provided to you, I am able to share the final dissertation with you, once the final version has been submitted to and approved by all parties involved. (If you would like to receive these results, please provide me with your email address: _____).

I, _____, agree to participate in the research named above being conducted by Nicole Burgmer for her Masters degree at the University of Cape Town. I understand my participation is voluntary and I may withdraw at any time.

Signature of participant: _____

Name of participant: _____

Date: _____

Name: _____

Date: _____

School: _____

This questionnaire consists of 3 sections.

Section A explores your usage of Fynbos for the Future materials and garden. It further explores children's interaction with the garden (Some of these questions rely on observation of the garden, and how learners interact with it. For this reason, please ensure that you are able to observe the garden whilst answering this section).

Section B consists of questions relating to your attitudes and experiences, as well as the maintenance of the garden.

Section C consists of questions relating to student use of the garden.

Section A:

Please tick the option that you think is best suited.

	Every time	Almost every time	Occasionally/ Sometimes	Almost never	Never
I have used the training resources and materials (i.e. posters) provided by Greenpop					
I have utilized the outdoor space (garden) that was planted through Fynbos for the Future					
I give lessons in the garden					
Students play in the gardens often					
Students eat their lunch in the garden					
Students sit and talk to their friends in the garden					
Students sit in the garden before school in the mornings					
Students play in the garden after school					

Students spend time alone in the garden					
Students who participated in the programme speak about the environment more					
Students who participated in the programme demonstrate better attitudes towards the environment					

Section B

This section contains statements relating to the attitudes towards the Fynbos for the Future, and maintenance of the garden, please tick the option that you think is best suited.

	Agree	Neutral	Disagree
I am happy with the delivery of services by Greenpop			
The gardens add value to the school			
The gardens are a great addition to the school environment			
The garden has changed my attitude towards nature			
I enjoyed participating in the environmental workshop			
The environmental workshop was delivered well			
The environmental workshop influenced my attitude towards nature			
The garden is designed well (there are appropriate pathways, seating, and spaces for children to play)			
The garden is maintained well (it is watered, kept neat, there is no litter)			
Children respect the garden space (they don't pull plants out, they don't damage the space, they don't litter)			
Garden prefects do not fulfil their task of making sure the garden is used properly			
Children show interest in the garden (observe and touch the plants, etc.)			

Section C

This section is open-ended, please answer as accurately and with as much detail as possible.

From what you have observed, what do learners mostly do in the garden? Please explain.

_____

_____

_____

_____

_____

_____

_____

In your opinion, do students use the outdoor space more than they previously did? (i.e. Do they spend more time outside, rather than inside, etc.). How?

_____

_____

_____

_____

_____

_____

_____

Thank you for taking time to answer this questionnaire.

Appendix F: Teacher Interview Schedule and Transcript

My name is Nicole and I am doing my Master's in Programme Evaluation at the University of Cape Town. My dissertation is on the Fynbos for the Future programme implemented at the school. You completed the survey that I handed out to the teachers at the school, and your attitude towards the fynbos gardens was very positive. I am conducting this interview to gain a better understanding of how you feel about the Fynbos for the Future programme. This interview should take around 20 minutes.

Participant Background

- What were your experiences of nature growing up?
- Were you aware of, and concerned about environmental issues before the programme was implemented at the school?

Programme delivery

- How did you feel about the training you received from Greenpop regarding the curriculum and use of the garden space?
- How did you experience the educational workshops?
- Were you happy with the quality of the programme? Why? Why not?
- Do you feel that the service delivery of the programme was adequate? Is there anything you would change?

Use of materials and attitudes towards programme

- How do you feel about the materials (such as posters) that were provided to you? Do you feel that they are useful?
- How do you use the materials provided in your lessons?
- How do you use the gardens at the school? How do you integrate them into the learning environment?
- Do you feel that the gardens add value your own teaching environment?
- What do you think the learners gained from the programme?
- How do you feel about the garden?

Thank you so much for taking the time to participate in this interview. If you have any further questions or comments, please don't hesitate to contact me via email at nicolenadineb@gmail.com.

Telephonic Interview Transcript:

Teacher at one of the schools involved in the Fynbos for the Future programme in discussion with researcher (Nicole Burgmer) on 26 June 2020.

Teacher	Hello.
Interviewer	Hi, good morning, how are you?
Teacher	Good and yourself?
Interviewer	Good thank you, is now a good time to talk?
Teacher	Yes, it is.
Interviewer	Ok. How are you doing?
Teacher	I'm good and you? Are you far with all your things? I'm just going to go to go to my class.
Interviewer	Ok, no I am all good. Just trying to get everything together for my submission.
Teacher	Shame, I can imagine
Interviewer	Yeah
Teacher	And you're reshuffling everything that you planned in the first place.
Interviewer	Yeah exactly, it's a little bit chaotic but ya, how is everything at the school?
Teacher	Uhm… everything's fine. A bit calm, we arranged our planning of how we going to accept the kids and things like that.
Interviewer	Ok.
Teacher	It's just that you know you come to work every day anxious, not knowing.
Interviewer	Yeah, I can imagine. Definitely… Can you hear me?

[call interrupted by lack of reception]

[call restarted -1:31]

Teacher	Sorry, I don't know what happened.
Interviewer	No problem.
Teacher	Um, but like I said everything is going according to our plans, we planned for when the kids come back and you know the spacing and so forth. So, it's just for when they come back to see what happens, but you know coming to work every day anxious, you actually not knowing what's happening.
Interviewer	Yes, of course, of course.

Teacher Ya.

Interviewer When do the kids come back?

Teacher The sixth of July.

Interviewer Ok, so it's relatively soon.

Teacher Ha, ya it's like two weeks, haha.

Interviewer Ya. Ok, um ok so this shouldn't take too long, around twenty to thirty minutes maximum, um.

Teacher Ok.

Interviewer So as you know I am doing my dissertation on the programme by Greenpop, um and this is just to kind of get a better understanding of the programme and how it was implemented just from a different perspective so it's going to be anonymous. So, Greenpop won't know who gave these answers.

Teacher Haha, ok.

Interviewer Obviously they will know it was a teacher at a school, but they won't know who.

Teacher Ok, no problem.

Interviewer Ok, so I just need to ask you… hello?

[signal cut out – 2.52]

Interviewer So, I just need to ask you…

Teacher The signal cut out.

Interviewer Ok, uh, I just need to ask you if you consent to participate in this interview?

Teacher Can you say that again?

Interviewer Uh, do you give your consent to participate in this interview?

Teacher Yes, yes.

Interviewer Ok, great thank you. Ok, so the questions are put together in three separate groups [clears throat], so the one, the first group is just to know a little bit more about you and your background. Um.

Teacher Okay?

Interviewer So, I am just going to get started if that's cool.

Teacher Ok, not so interesting haha, but ok.

Interviewer Haha, um, just what were your experiences of nature growing up?

Teacher Well, we moved around a lot, alright. And uh, I think we only settled down in our own place when I was about a teenager, right.

Interviewer Ok.

Teacher Later in our years, but uh, before that, before that when we moved around, my father always used to find a place with greenery, I think that became a part of us. We would never take a place where there's no garden or so forth, you understand?

Interviewer Ok, yes.

Teacher So, where I am concerned it plays a big major role in the way you see things, you understand?

Interviewer Definitely, yeah, and having access to that I think is very important.

Teacher Exactly. So yeah, uh, we, uh, every weekend we would go out and um explore the gardens and stuff like that, so I was exposed a lot and so to greenery.

Interviewer That's amazing. So when you were growing up, were you aware of and concerned about any environmental issues?

Teacher Well, littering for me was always a big thing and it never stops, it keeps going.

Interviewer Yeah.

Teacher So, I always used to have drives like that, um especially growing up in schools and a nice thing is I went to a white school so it was quite easy to get people to listen, haha.

Interviewer Ok, ha, ya.

Teacher Haha, yeah. So, like when the eco-brick came out, something I've always been doing, but not maybe in that aspect with the bottle, but we did other forms of things, but littering is a very big thing for me in um the economy.

Interviewer Yeah, ok.

Teacher Like, I can remember, um, we went to, to Cairo as a family, we like went overseas and went to Cairo and uh, I couldn't adjust to the lifestyle over there. We went only for a week, but it was so terrible the pollution and, and um the buildings are so dark already because of the dirt and I, I, I, think, I don't think I would be able to survive over there, ha.

Interviewer Ha, ya, well at least you're here haha.

Teacher Yeah.

Interviewer So, do you still spend any leisure time in gardens now and if so, what, can you describe what effect this has on you.

Teacher Sorry, can you repeat that again.

Interviewer Yeah, do you experience leisure time in gardens now and if so can you describe what effect it has on you.

Teacher Yeah, um, like, where I stay now, um it's in a security complex, so uh we, all the places look the same and then our garden, not our garden but the back part of our place started looking very bad because we couldn't use water and so forth, then um, the green went to yellow and then it started irritating me because I couldn't handle it. So, I started my own garden at home, planting herbs, and uh well we use our water, like um, we recycle water. Um, so our dishwasher water and our washing, doing our washing water, um, we use that for the plants and I think out of everybody in our complex, we have the most green part of it, but I mean I find it essential because I can't see myself sitting all the time in the house. I have to sit outside and I have to have some kind of space where I can just, you know go into a other zone, so.

Interviewer Of course, ok.

Teacher Yeah and we take my son a lot, we go uh to these biodiversity gardens like uh, urban park and uh, Kirstenbosch and we do hikes every now and again, quite a lot, but you know Kirstenbosch and Tygerburg. Just to get my son into it, yeah, if you understand what I mean.

Interviewer Ok, how old is he now?

Teacher He's ten.

Interviewer Ok.

Teacher Yeah, so that's why we started with Greenpops here at the school because I started speaking to [Principles name], telling him there's nothing that attracts the kids, there's nothing in that aspect to teach them about the different types of plants and so forth, and then he told me about Greenpops, that uh, they used to, uh they had a teacher before used to work through Greenpops and that they got things and so forth, so I said ok, let me get in contact with them and find out what we can do haha.

Interviewer Ok, amazing. That actually leads onto the next set of um, questions, so now it's speaking about the actual programme and the delivery of it.

Teacher Ok.

Interviewer Um, so were you involved in the plant day that was organized by Greenpop?

Teacher I was yes, I.

Interviewer What did you, what did you think of it?

Teacher The plants days, well it went actually quite smooth because Greenpops was very prepared.

Interviewer Ok.

Teacher They had all the tools and everything that was needed, um, it didn't also take long because they had their process and how they do the things and the involvement of the kids helped a lot because they had their guys, but the kids, you know, their, it took a lot of um, um, manwork, labour.

Interviewer Yeah.

Teacher Yeah, so for me it was nice. It was nice having the kids involved and now that same kids, they're very into the garden. You know, we can't control the other kids in the school that just thinks nothing about the garden.

Interviewer Ya.

Teacher But the kids that's involved in the garden, the kids that's part of the eco-club, they very uh, cautious and they always uh, they're out patrols, they're our prefects because the keep an eye on the gardens. So that's good, and it's instilled something in them.

Interviewer That's amazing. So, do you think they enjoyed the overall, kind of, workshop asl well, or the day?

Teacher It seemed to me like they did because they always asking me can they have another one.

Interviewer Haha, that's amazing.

Teacher Haha, I think they did ya.

Interviewer And the educational workshop, how did you find that, like the information and the delivery of that?

Teacher The one we went to in Nunu, Nxunu, haha I don't know how to say it. Yeah, they got a bit bored at times, but um, the, the whole, how can I say, the whole trip, the the the the the walk and exploring and everything kept them quite busy and enthusiastic, but you had the one or two that was like, ok, I don't

know what to do, I don't know what's happening, but overall they all enjoyed it, they're looking forward to another one.

Interviewer Awesome, and um, the actual garden, what do you think of the garden that was planted?

Teacher Well um. I am enjoying it, the only thing, it's very stressful because the kids are, it's like these kids, they weren't exposed to this, so they have no love for the garden or plants and so forth and they don't know the real benefits of it, right?

Interviewer Yeah.

Teacher So, uh, the eco-club kids, they learnt the befits of it now and they, you know the amount of respect they have for plants now is totally different to what they had before.

Interviewer Yeah.

Teacher So, what I am trying to say is this garden is quite stressful because the kids they just don't care, they run through the garden and on the plants, so my only thing is um, I regret not putting it at the back where the kids have no access to it, even though the reason for putting it here is so they can see it more often and be more uh, aware of it, but I think the more out of sight would have been better for them [laughs].

Interviewer Yeah.

Teacher But, um, yeah other than that I love stepping out of my class and seeing it. Before it was just these patches of sand, like dry sand and it was just very frustrating looking at that.

Interviewer I can imagine, um, ok, were you given any training resources and materials by Greenpop, and if you were how do you use them?

Teacher Sorry

Interviewer Were you given any training resources and materials by Greenpop?

Teacher Um, well Greenpop has always kept us up to date on what's happening, you see we had the, the, the Inunu workshop thing then they had whilst they were doing the workshops, they also had plant days and then they explained to us and they also had the bug trap for the kids and then there was a follow-up on that as well. So, yes we had the resources and the kids are still doing those

type of things, like uh, if we get together as the eco-club, then uh, then, how can I say, we will use those type of information that was given.

Interviewer Mhm.

Teacher Greenpops has given us a breakdown of how to follow over the three years, so the follow up workshops and things that will happen. Greenpops also come in and they also check up on the garden and see hows it going or anything that's broken they will fix again, so that's also nice.

Interviewer Ok, so you feel that the training you received from them was quite adequate.

Teacher Yeah, it was quite adequate, I mean for the um, for what we have received from them, yeah.

Interviewer Ok, and um, were you happy with the quality of the programme?

Teacher Yes, we were.

Interviewer Can you explain a little bit why.

Teacher Um, well, you see, it engaged the kids a lot and also they brought kids from another school also, to give them some kind of information of what's happening and um, for me, the involvement of the kids, that I enjoyed a lot, from myself because it got them more enthusiastic, it wasn't like they just came with their group and they did everything and we just fall in place, so it was, it involved the whole school, the teachers and the kids. There was a workshop that Greenpops gave for the teachers as well.

Interviewer How did you, did you find that workshop for the teachers helpful?

Teacher It was helpful yes, because some teachers didn't know what was really happening and what, um, how they could use it and so forth, so it was quite um, it was minimal, but it gave them all the information that was needed.

Interviewer Ok, that's amazing – and in that workshop, did they give any, sorry – you go.

Teacher Also they, the Amphitheatre was such a great idea. So, we do many lessons and classes during those areas during summer at least [laughs], so it's especially for our, how can I say, for our little ones. The bigger children use it for their science and so forth, whereas we use it for creative arts and you know, languages and so forth because you know the things –

Interviewer Ok, that's really good to hear. Were you going to add onto that sorry?

Teacher No, no, no it's fine.

Interviewer Do you, so do you ultimately feel that Greenpop made a clear topic about that they were engaging you on?

Teacher Yes, yes. They have, the only thing is that they have mentioned that they going to go out to the communities –

Interviewer Mhm.

Teacher To make them aware of that, it's just that hasn't featured yet, um, so I was wondering if that was going to take place, um because I think once they go out into the community, the kids that come to the school in the community will also be more well informed of what's happening with the plants and how plants are the benefits of it and so forth.

Interviewer Definitely.

Teacher Yeah, that's the only, the only part of this whole process that hasn't featured yet. But everything yeah.

Interviewer Ok, that's good to know. Ok, so, oh, what do you feel that you gained from the programme?

Teacher Well, I always loved plants and looking at them and all that, but I never really learnt about this, the different type of plants and so forth, so there was quite a few things that I learnt. Especially when [Principal's name] was here, he gave me like what to do, because he's like a plant fundi, haha, but yeah, I also uh, gained some information and it was quite useful.

Interviewer Ok, great. Um, is there anything that you would change about the programme?

Teacher [silence] Um, what I would change, well I don't know actually, I would actually have more um worksheet follow ups, you know like lessons on their garden pursey for the kids to do like maybe monthly or something like that. Um, then they know that Greenpops is still involved, but other than that I don't have any, I think it's for everybody a learning curve. So, where they see fault they do it differently at another school.

Interviewer Yeah, ok, amazing.

Teacher Yeah.

Interviewer Ok, so we're on the last kind of, um, grouping of the questions now which is just about the materials and attitudes of the programme, so the first question is were you provided with any materials from Greenpop, like posters or anything like that?

Teacher Um, actually no, not materials like that we weren't.

Interviewer Ok, um, and do you integrate the garden into your teaching?

Teacher Sorry?

Interviewer Do you integrate the garden into your teaching?

Teacher Yes, I do. I think it use it most than all the others, haha, so I take the kids out to the amphitheatre firstly and we'll do our lessons there, like mostly reading and arts and crafts. Other lessons I do inside class. Also, I take them into the garden and show them the different types of plants that there is, so we will have a walkthrough, but in stages. Um, but that's it basically, the only thing I can do, like sometimes we will just look at a plant and see the different qualities of the plant and draw it, so they can see the different shapes of the plants, that they're all similar in lots of aspects.

Interviewer Ok, so do you, do you think that the children respond well to being taught in the garden?

Teacher Sorry?

Interviewer Do you think that the children respond well to being taught in the garden?

Teacher Um, I do, because in the classroom you don't always have their undivided attention, but when they're outside they see everything but they listen to you, so it's less talking in the garden. It's more focused on what I'm saying also and they're very, how can I say, inquisitive about what you're going to tell them.

Interviewer Ok, that's good to hear.

Teacher Haha, yes.

Interviewer So, do you feel overall that it adds value to your teaching environment?

Teacher It definitely does, because for me the environment plays a big role in um, your learning process, so I mean for children to be all the time in their classroom, that's a bit stuffy. Once you take them outside, it's a total different environment. So, for me in the garden, they will see something totally different compared to when just sitting on the tar, you understand? It's more, it brings something creative in a sense where if you give them a lesson, um, you can draw what you see, look at what's there and draw what you see. If the garden wasn't there, all they could draw was like sand and tar authentically, but now they have lots of things, like different colours to focus on. So, yeah.

Interviewer Ok, and overall do you feel as though the school would gain from an even richer garden experience?

Teacher Sorry?

Interviewer Overall, do you feel as if the school would gain from an even richer garden experience, so more gardens, more greenery?

Teacher Um, I honestly do, it's just that with these kids they need to be taught how to respect a garden. But overall, if they're all going to put their hand into it and help, I think they are going to have a little bit of respect towards it, if you understand what I mean.

Interviewer Definitely, ok, yeah. So basically, would you feel, how would you feel is the learners were equipped with the knowledge and the know-how to grow things at the school?

Teacher Sorry, can you say that again?

Interviewer How would you feel is the learners were equipped with the knowledge and the know-how to nurture and grow things at the school?

Teacher How do I feel like the kids are working with it?

Interviewer No, no, no, how would you feel if they were given that knowledge that you're speaking about, in order to grow things in their own garden.

Teacher Um, it would definitely impact their learning, um, and how can I say, the way they see things in life because at this stage they only see like the one, the one was they've been taught, but not respecting nature and so forth, and if they have the opportunity to learn that and, and, um experience it, they would show a different side, which I can say I experience with the eco-club kids. Before, the way they saw things was totally different to how they react to the garden now after learning what they've been taught and after, um, putting their hands in it and planting it themselves, and they have more respect because they'll come tell me, "teacher they're destroying our garden" and their first thought is "our garden" not "the garden", which I think is also, you understand.

Interviewer Yeah, that's amazing, definitely. Ok, so you've seen an attitude and behaviour change in the students that participated basically?

Teacher Yes, definitely.

Interviewer Ok, that's good to hear. Um, and overall, I know you said that a lot of kids don't respect the garden, but overall do you see a lot of learners spending time in the garden?

Teacher Sorry?

Interviewer Do you see a lot of learners spending time in the garden?

Teacher Do I see, I can't hear you.

Interviewer That's fine, do you see a lot of learnings spending time in the garden?

Teacher Yes, the section in the quad they go in there a lot, especially during break and after school.

Interviewer Ok, and generally –

Teacher Yeah, it's just you need to teach them how to respect it.

Interviewer Yeah, so what do they do in the garden when they're in it?

Teacher Well basically some of them sit during break time they sit and they just have discussions, after school you'll see some of them sitting there waiting for their lifts and start doing homework, and um, just relaxing in the garden basically.

Interviewer Ok, and their general interaction with the garden, other than like not respecting it? What do you, do you get anything more from it?

Teacher In the sense where?

Interviewer So, like, with their interaction,s what do you think about their actual interactions with the garden?

Teacher Well to be honest, the eco-club kids are the only ones that's very enthusiastic about it, so they would ask me and they would come tell you, oh I saw this flower and they would come and tell you different changes in the garden, and so sometimes just go and water the garden out of their own, whereas other kids have no involvement at all actually.

Interviewer Ok, so you've seen a change in the learners that participated in the programme with speaking about the garden more?

Teacher Yes, yeah.

Interviewer Ok, that's amazing, and the environmental issues, do the learners, do they speak about that at all?

Teacher Sorry?

Interviewer Do they speak about the environmental issues at all, the learners who participated?

Teacher Yes, yes they do.

Interviewer Ok, do they mention anything about it on their own?

Teacher Well, not really, not not not really, haha.

Interviewer Ok.

Teacher You have to ask questions for them to interact with that and yeah.

Interviewer And are the learners involved in the maintenance of the garden at all?

Teacher Yeah like the watering of the garden, keeping it tidy, they'll pick up papers and um, basically that and yeah the, you know the the the the the fencing on the side, if it's broken they will help the people, you know, but it together.

Interviewer Yeah.

Teacher So, yeah they are haha.

Interviewer Ok, and uh we're almost there, just one, two more questions, um how do you feel about the garden?

Teacher Well like I said I'm quite happy with the garden because before it was nothing, so now it's looking quite good. Like I said before, I was, not before, actually still, I'm anxious, I'm anxious when the kids are around, that's why I have to keep an eye on it all the time. Um, other than that it's like nice to look out of your class and walk out of your class and see this greenery, otherwise there's like nothing, you know?

Interviewer Yeah, definitely. Ok, um so, just one last time, is there anything, how do you feel about the programme? What is the thing that you liked the most about it?

Teacher Um… well the engagement with the kids at that time, that's what the most out of it was that they involve the kids and they don't just do it out of their own and we don't just um, just put it there and tell them, "look here this is your garden", and they were involved in it and the involvement that all counts as nice, and you know the surveys and the interactions, so they always say how they feel.

Interviewer Ok, amazing.

Teacher Yeah.

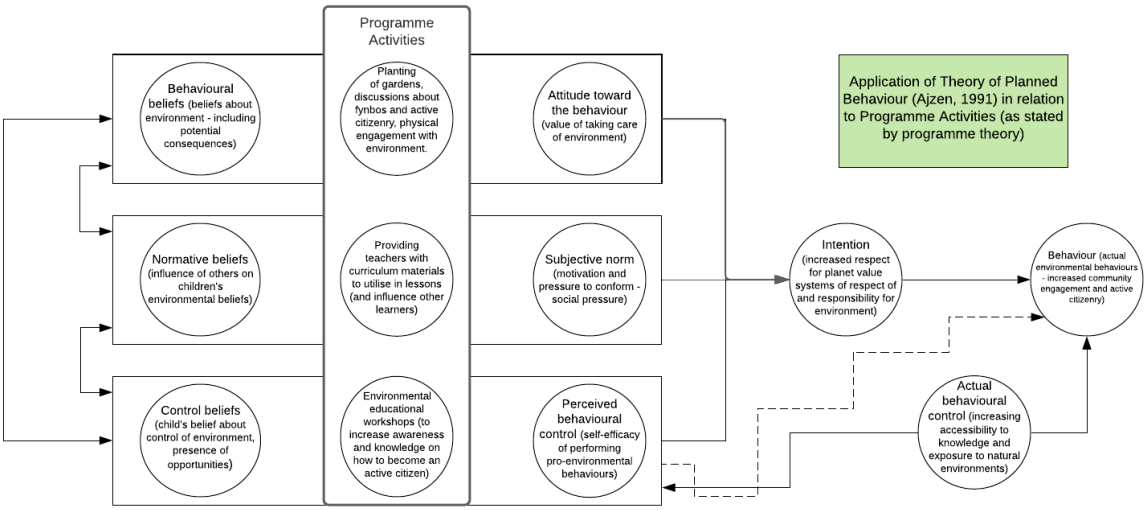
Interviewer Thank you so much, that, that was really very, very helpful, I got a lot of information -

Teacher Pleasure.

Interviewer That I needed.

Teacher	Are you sure? [laughs]
Interviewer	Yes, I am, definitely. So, thank you so much for your time.
Teacher	I'm glad I could help.
Interviewer	If you have any questions just send me a message, yeah.
Teacher	Ok, no problem.
Interviewer	Thank you so much.
Teacher	Thank you, Nicole.
Interviewer	Have a good day, bye.
Teacher	Bye, bye.

Appendix G: Integration of Fynbos for the Future programme activities and Ajzen's (1991) Theory of Planned Behaviour



Appendix H:

The analysis with only a complete set of data (n = 30) on every part of the survey yielded insignificant results for every part of the survey. The same analyses as above (repeated measures t-test) were run for each subsection of the scale. The results are below.

Section A – Contact with Nature

The repeated measures t-test indicated that learner's mean contact with nature at baseline (M = 2.26, SE = 0.05) was only slightly higher than at post-test (M = 2.21, SE = 0.07). This difference, 0.05, 95% CI [-0.12, 0.22] however, was not significant $t(29) = 0.63$, $p > .05$, and represented a small effect size, $d = 0.19$.

Biophilia, Biophobia and Environmental Stewardship

The results of the repeated measures t-tests for all three categories are displayed in Table 1.

Table 1.

Repeated Measures t-test on subscales of SPIS

Subscale	**Mean Baseline**	**Mean Post-Test**	**95% CI (lower, upper)**	**t-statistic (degrees of freedom)**	**Significance (p)**	**Effect size (Cohen's *d*)**
Biophilia	2.68 (*SD* = 0.19)	2.66 (*SD* = 0.21)	-0.07, 0.11	0.41 (29)	0.688	0.09
Biophobia	2.40 (*SD* = 0.28)	2.45 (*SD* = 0.29)	-0.15, 0.06	-0.85 (29)	0.403	0.15
Environmental Stewardship	2.66 (*SD* = 0.30)	0.54 (*SD* = 0.32)	-0.04, 0.27	1.52 (29)	0.138	0.39

Appendix I:

Positive Environmental Attitude	**Environmental Stewardship** - **Awareness** - **Action**	**Environmental Interaction** - **Personal interaction**

			- **Sense of community**
	Awareness	**Action**	
Love environment	Don't litter	Speaking about environment (those who speak about environment vs. those who don't)	**Personal Interaction:** relax in nature, plant fruits and vegetables, water the garden
Nature is beautiful, calming, peaceful, special, important	Pick up trash	Spreading word about environment	Environment is a tool for social bonding, sports activities, family time in nature (parks, beaches)
Nature makes me happy	Help protect environment	Toxic fumes of factories	
Safe space	Sad when people destroy environment	Global warming	
	Pollution (factory smoke)	Everyone deserves a clean environment	
	Reuse bathwater for plants	Won't survive without it	
	Want to save the environment	Turtles and ocean a mess	
	Recycle	Give people interesting facts	
	Have positive impact on environment		
	Want to change habits of others		

	Actually trying to change environmental behaviours of others		
	Community involvement (i.e. eco-clubs, clean-ups)		
	Posters & public speaking about changing environment		