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Investigation of Learners' Experience with Nature:

A South African and German Perspective

(Untersuchung der Naturerfahrungen von Schülerinnen und Schülern: Eine
südafrikanische und deutsche Perspektive)

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SUMMARY

Nowadays, topics such as dealing with declining resources, or conservation of biological diversity tend to have a high priority, especially in environmental education (Michelsen 2012; Stoltenberg 2012). Derived from this, this research study tries to broaden the perspective and to compare two different geographical and cultural locations (Bremen in Germany and Durban in South Africa) to set light on the following questions:

- What is the learners' experience of nature?
- What are the learners' connectedness to nature and environmental identity?
- What are the learners' intentions to act nature-orientated and sustainable?
- What is the learners' understanding of nature?
- How do the learners' experience of nature, their connectedness to nature and their environmental identity correlate with their intention to act nature-orientated and sustainable?

In order to answer these questions, the learners' (grade eight to ten) patterns of their encounters with nature (Lude 2001; Brämer 2011), their connectedness with nature (Karlegger 2010; Kühn 2012) and environmental identity (Clayton 2003; Olivos & Aragonés 2011), as well as their understanding of nature (Kattmann 1994; Margadant-van-Arcken 1995; Kollender & Zabel 2013) are investigated. Quantitative data is collected with the help of a wide-ranging standardized questionnaire survey (Bremen n=836, Durban n=846) for which the following statistical evaluation instruments are used: reliability analysis, factor analysis, two sample t-test of mean scores, one-way ANOVA, effect size, regression analysis and Pearson two-sided correlation are conducted. The participating schools were chosen regarding their contrasting weak and strong socio-economic background (ten schools in Bremen and eleven in Durban).

Complementary qualitative semi-structured interviews are conducted from which four contrasting types are chosen and analysed. The participating learners were chosen by validating

their current level of connectedness to nature (Schultz 2001). In order to evaluate the interviews a structured content analysis (Mayring 2010) with the use of a three-level category system (lived experiences, prior knowledge, cultural background) by Klassen (2010) and additionally an expert discussion to validate the results of interpretation is conducted.

As main result, learners from Bremen and Durban have encounters with nature on a frequent and regular basis together with their family and friends. Rarely learners from Bremen engage with encounters with nature together with their school and learners from Durban just do that occasionally. Moreover, one can say that learners from Durban have a significantly higher connectedness to nature (Bremen $M=3.14$, $SD=.64$; Durban $M=3.59$, $SD=.54$), environmental identity ($M=3.15$, $SD=.71$; $M=3.69$, $SD=.65$) as well as intention to act nature-orientated ($M=3.04$, $SD=.47$; $M=3.23$, $SD=.43$) and sustainable ($M=2.87$, $SD=.90$; $M=3.67$, $SD=.97$) following a five-step Likert scale. However, an alienated and idealized understanding of nature could be identified in both sample groups. Unexpectedly, the socio-economic background of the learners did not have significant impact on the investigated constructs but the background factor city had the largest influence.

Especially young individuals' lack of encounters with nature together with their school and their understanding of nature offer diverse possibilities for curricular and didactical intervention.

ZUSAMMENFASSUNG

Themen wie schonender Umgang mit den schwindenden Ressourcen oder der Erhaltung der Biodiversität haben mittlerweile einen hohen Stellenwert insbesondere in der Umweltbildung gewonnen (Michelsen 2012; Stoltenberg 2012). Davon abgeleitet hat dieses Forschungsprojekt den Fokus auf den Vergleich zweier unterschiedlicher geographischer und kultureller Räume (Bremen in Deutschland und Durban in Südafrika) um folgende Fragen zu beantworten:

- Welche Naturerfahrungen liegen bei den Schülerinnen und Schülern vor?
- Wie hoch ist ihre Naturverbundenheit und Umweltidentität?
- Wie hoch ist ihre Intention zukünftig naturbezogen und nachhaltig zu handeln?
- Welches Naturverständnis liegt vor?
- Wie korrelieren die Bereiche Naturerfahrungen, Naturverbundenheit, Umweltidentität und die Intention naturbezogen und nachhaltig zu handeln?

Um die Forschungsfragen zu beantworten werden die Konstrukte Naturbegegnungen (Lude 2001; Brämer 2011), Naturverbundenheit (Karlegger 2010; Kühn 2012), Umweltidentität (Clayton 2003; Olivos & Aragonés 2011) und Intention naturbezogen und nachhaltig zu handeln (Kattmann 1994; Margadant-van-Arcken 1995; Kollender & Zabel 2013) von Schülerinnen und Schülern der Klassestufe acht bis zehn erhoben. Hierbei kommt eine standardisierte Fragebogenerhebung (Bremen n=836, Durban n=846) zum Einsatz, wobei Analyseinstrumente eingesetzt werden: Reliabilitätsanalyse, Faktorenanalyse, Zweistichprobentest der Mittelwerte, Einweg-ANOVA, Effektstärke, Regressionsanalyse und Pearson Korrelation. Die teilnehmenden Schulen und somit die Lernenden werden in beiden Ländern anhand kontrastierender sozioökonomischer Hintergründe (arm, reich) bestimmt (zehn Schulen in Bremen, elf in Durban).

Zusätzlich werden qualitative semi-strukturierte Interviews geführt, von denen vier kontrastierende ausgewählt und analysiert werden. Hierbei werden die Lernenden anhand ihrer aktuellen Naturverbundenheit (Schultz 2001) ausgewählt. Hinsichtlich der Evaluation der Interviews wird eine strukturierte Inhaltsanalyse in Anlehnung an Mayring (2010) durchgeführt, wobei das Drei-Stufenmodell von Klassen (2010) (erlebte Umwelt, vorheriges Wissen und vor allem der kulturelle Hintergrund) im Fokus stehen. Die Ergebnisse der Interpretation werden anhand eines Expertengesprächs validiert.

Als wichtigste Ergebnisse lässt sich zusammenfassen, dass Schülerinnen und Schüler in Bremen und Durban regelmäßig Naturbegegnungen zusammen mit ihrer Familie und ihren Freundinnen und Freunden haben. Selten haben Schülerinnen und Schüler aus Bremen Naturbegegnungen mit ihrer Schule, diejenigen in Durban gelegentlich. Darüber hinaus liegen signifikante Unterschiede in der Naturverbundenheit (Bremen $M=3.14$, $SD=.64$; Durban $M=3.59$, $SD=.54$), Umweltidentität ($M=3.15$, $SD=.71$; $M=3.69$, $SD=.65$) sowie der Intention naturbezogen ($M=3.04$, $SD=.47$; $M=3.23$, $SD=.43$) bzw. nachhaltig zu handeln ($M=2.87$, $SD=.90$; $M=3.67$, $SD=.97$) vor (fünfstufige Likert Skala). Bei beiden Gruppen konnte ein entfremdetes und idealisiertes Naturverständnis nachgewiesen werden. Ein weiteres unerwartetes Resultat ist, dass der sozioökonomische Hintergrund der Schülerinnen und Schüler keinen signifikanten Einfluss auf die erhobenen Konstrukte, die Stadtzugehörigkeit jedoch als wichtigste und signifikanteste Variable identifiziert werden kann.

Vor allem die sehr seltenen Naturbegegnungen zusammen mit der Schule und das entfremdete und idealisierte Verständnis junger Menschen von Natur und Umwelt bieten vielfältige curriculare sowie didaktische Interventionsmöglichkeiten.

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1. CHAPTER ONE- INTRODUCTION

This first chapter will provide an introductory overview of the following topics: the background of the research project (chapter 1.1), a consequential statement of the problem (chapter 1.2), c) followed by the aims of the project (chapter 1.3), and the consequential research questions (chapter 1.4) that should be answered. The last part will give a brief outline of the subsequent chapters (chapter 1.5).

1.1 Theoretical background

The topic of environmental sustainability has become a key issue of the present 21st century and is of social-ecological relevance (Ehrlich 2010; Zylstra 2014). Presently, we are confronted with many severe global challenges (e.g. increase in industrialization, pollution, depleting natural resources, drought) and it has become apparent that the natural resources need to be conserved and used sustainably for future generations (Mazor 2009; IPCC 2013; Elsheikh 2014). This would require particular action, e.g. careful use of scarce resources or the preservation of biodiversity (Hull & Gobster 2000; Hull, Roberston & Kendra 2001), which enjoy a high priority in societal-political discussions (Michelsen 2012; Tisdell 2014) and environmental education as well (von der Heyde 1997; Stoltenberg 2014). However, the existing economic growth paradigm of western societies, in which the belief of unlimited growth related to the distraction of our planet, is predominant (Chancel, Demailly, Waisman & Guivarch 2013; Schmelzer 2013). Due to the fact that our natural surroundings have a limited resilience, the aim of ecological education is to secure the foundations of human civilisation for future generations (Rauch & Steiner 2006; UNESCO 2009). This goal can only be achieved if people are motivated and qualified to show pro-environmental behaviour in everyday situations (von Borgstede & Biel 2002; Berthou 2013; Grunwald & Kopfmüller 2013).

Moreover, since the idea of sustainable development has been introduced by the United Nations (1992), it indicates how especially young people can be enabled to participate in socio-politically as well as environmentally relevant areas (Bögeholz 2006; e.g. de Haan 2007; Stoltenberg 2009). To prevent negative impacts for further generations ‘individual, societal, and structural changes on a fairly large scale will have to occur in the near future’ (Mayer & Frantz 2004: 503). These changes could be mediated through environmental education as it is meant to generate not just awareness and sensibility regarding the entire environment (Eschenhagen, Kattmann & Rodi 2008), but also appropriate actions in line with the social, political, environmental and biophysical aspects of an environment (O’ Donoghue 1993), which is also closely linked to the following point.

To take a walk in a remote area far away from the noise of the city, to jump into a puddle, or simply to listen to the twitter of birds sitting in a tree: nowadays, such experience in and with nature is no longer an inherent part of the daily life of human-beings, and have a declining role in urban regions (e.g. Hinds & Sparks 2008; Karlegger 2010; Klassen 2010; Kühn 2012). Today, especially children have less encounters with nature and the environment decades ago resulting in a lower connectedness to nature (e.g. Lude 2005; Brämer 2008; Bragg, Wood, Barton & Pretty 2013). Children and adolescents tend to spend much of their free-time with artificial and ‘non-natural world items, such as video games and computers, thus creating a generation that prefers indoor settings, drawing them further away from natural environment connections’ (Klassen 2010: 1). In some extreme cases, children even believe that vegetables and meat come from the supermarket and the deep freeze (Jugendreport Natur 2010). More particularly, such developments can be seen in urban, modern societies that lead lifestyles, in which direct contact with nature is rare, and only brought to individuals via mass media (Feldmann 2002; Karlegger 2010). Brämer (2006) came to the conclusion that adolescent in-

dividuals tend to consume television and computer activities three hours per day on average. So, we are faced with the fact that such disadvantageous relationships generate young people who frequently perform their everyday activities in sedentary positions (Karlegger 2010; Louv 2011). A good example of this is Zylstra (2014) who uses Balmford & Cowling (2006: 694) to emphasize this:

[...] a great need for interdisciplinary efforts to tackle perhaps the most pervasive underlying threat of all by reconnecting people and nature [...] even if all the other building blocks of effective conservation are in place, we will not succeed unless the general public cares, and they are unlikely to care enough if they no longer experience nature directly.

These facts indicate a situation where the development of bonds with the natural world can influence individuals to have greater *ethical* and *moral* understanding of environments as well as a connectedness to the natural world (Lude 2005; Vining, Merrick & Price 2008). Hence, regular and diversified activities in nature can be seen as an influencing variable to foster an environmentally conscious pattern of behaviour in everyday situations (Bögeholz 1999) because they evidently lead to the development of a close connection to the environment (Seel & Sichler 1993; Lude 2005; Kühn 2012). However, direct contact with nature is only *one* of many predictors that can have an impact on pro-environmental behaviour. Due to this fact, the level of an individuals' attitude towards environmental topics and the natural world is in focus, e.g. the conception of 'connectedness to nature' (Mayer & Frantz 2004: 504) and additionally the level of an individuals' 'environmental identity' (Clayton 2003: 47), that can be significantly influential towards pro-environmental behaviour patterns. Scientists emphasize that it is almost impossible to predict behaviour, but it is achievable to at least investigate an individuals' intention to act in the future (Vallerand & Rousseau 2001).

1.2 Problem statement

Currently in urban societies, youth are confronted with a diverse and wide-ranging high-technological world that provides incentives to do activities indoors and in a sedentary position (e.g. Klassen 2010; Karlegger 2010; Kühn 2012). Such circumstances can lead to permanent, progressive alienation from nature in which nature is seen as a counterpart to human-beings (e.g. Lude 2009; Brämer 2011; Kollender & Zabel 2013). Only the inclusion of nature and the environment in individuals' value system and ways of dealing with the natural surroundings allows for the genesis of nature-based attitudes, perceptions, feelings (Mayer, Frantz, Bruehlman-Senecal & Dolliver 2009) and even behaviour patterns (Zelenski, Dopko & Capaldi 2015).

1.3 Aims of the project

The reason and justification for focusing on environmental education research within a bi-national approach and the importance of future generations and learners can be found in the following statement:

The value of environmental education lies in its ability to eradicate ignorance and apathy and also to pave the way for facilitating co-operation with regard to the future sustainability of the earth and its limited resources. (Panday 2002: 1)

The aim of this research study is to investigate the experience that South African (Durban) and German (Bremen and Bremerhaven¹) grade eight to ten learners have with nature and the environment, to identify their connectedness to nature and their environmental identity, their understandings of nature and their intention to act in the future, related to specific examples of their every-day life. Moreover, the subjective norm of the learners' reference systems, family and close family members, friends, and school are investigated, as well as their concept of

¹ Note that the city of Bremerhaven is an independent administrative area within the federal state of Bremen. The cities of Bremerhaven and Bremen do not have land links, and are separated by the federal state of Lower

perceived behaviour control. This study also investigates whether South African and German learners' encounters and their experience with and their level of connectedness with the natural environment is correlated to their intention to act in a sustainable manner. In addition to this survey, the learners' a) prior knowledge regarding environmental issues and b) their cultural background is being investigated. The theoretical framework is closely linked to the theory of planned behaviour by Ajzen (1991: 185). The research methodology adopts an approach where a wide-spread quantitative questionnaire survey and a qualitative interview study in schools in Bremen/ Bremerhaven and Durban/ eThekweni is conducted. In addition context data of each school is gathered.

Basis of this research study is the idea to broaden the perspective and to take a closer view of different environments with the respect to special parameters, concerning e.g. the climatic, social, political and historical framework conditions. Another reason to focalise Durban perspective is its biodiversity hotspot ability of botanical (Forest, Grenyer, Rouget, Davies, Colwing, Faith, Balmford, Manning, Proche, van der Bank, Reeves, Hedderson, & Savolainen 2007) and marine life forms (Roberts, Andelman, Branch, Bustamante, Castilla, Dugan, Halpern, Possingham, Ruckelshaus & Warner 2002) compared with Bremen that may allow individuals to have encounters with nature permanently. Bremen also has a collaboration with its sister city of Durban with agreements regarding environmental projects as well as a network in the field of education (Rathaus Bremen Staatskanzlei Freie Hansestadt Bremen 2015). Besides other influential factors that are investigated, an overall goal of this research project is to set light on the question if the socio-economic background of the investigated groups in both countries has a significant impact on the main concepts of the approach (patterns of encounters with nature, connectedness of nature, environmental identity, intention to act in a pro-environmental manner). This can be justified by the fact that the federal state of Bremen

as well as the region of Durban have a social and economic diversity (Wundrak 2009; Die Senatorin für Arbeit, Frauen, Gesundheit, Jugend und Soziales 2010).

The results might help to gain a deeper understanding of learners' patterns of experience with nature, the development of connectedness to nature, environmental identity and the intention to act nature-orientated and sustainable in the future. Moreover, indirectly the results could be effective in means of inspiring and connecting young learners with nature right through to adulthood in both geographical areas with an educational and didactical programme for future generations. This fundamental research is conducted in order to enable a necessary 'broader intervention' to cope with 'the magnitude of the environmental problems' (Mayer & Frantz 2004: 512). Undoubtedly, on a long-term basis, research in this field should help to foster young learners' strategies on how to manage a lighter footprint on the planet and its scarce resources. A successful environmentally-related education programme which aims at developing responsibly-minded action in a globally connected world should intensify the introduction of different cultural perspectives in their decision making process about how to act in and for the environment.

Perhaps, this research is the first of its kind, using a bi-national approach as well as a wide range quantitative questionnaire survey supported by a deepening qualitative interview survey at ten schools in Bremen/ Bremerhaven and eleven in Durban/ eThekwin.

1.4 Research questions

In the following the main questions are presented, which this study sought to answer.

- What is the learners' experiences of nature?
- What are the learners' connectedness to nature and environmental identity?
- What are the learners' intentions to act nature-orientated and sustainable?
- What is the learners' understanding of nature?

- How do the learners' experience of nature, their connectedness to nature and their environmental identity correlate with their intention to act nature-orientated and sustainable?
- Why does the learners' experience of nature, their connectedness to nature and their environmental identity correlate with their intention to act nature-orientated and sustainable in the way it does?

A detailed presentation of all questions and sub questions as well as the hypothesis deduced there from are given in chapter 2.10.

1.5 Outline of chapters

Chapter two presents the theoretical framework upon which this study is based. The relevant constructs are identified, introduced and discussed, as well as previous and current research results are presented and links between the immediate fields of interest are shown (chapters 2.1 - 2.9). The last part of this chapter deals with derivation of the theoretical model which is used for the quantitative part of the research study. It can be seen as structural model giving meaning to the importance of each concept used as well as the assumed correlations and connections between them (chapters 2.10 and 2.11).

In order to take account of the fact that this study uses a comparative approach between two participating different geographical and cultural backgrounds the first part of chapter three provides a broad description, also the setting and the participants of the schools in Bremen and Durban are chosen in a contrasting way. In this chapter descriptive indications like level of urbanization, population, environmental conditions as well as the school systems of the investigated regions are considered (chapters 3.1 -3.3).

The second part gives an overview of the research design and the research design, methodology, including the approach of data collection methods, a detailed description of instruments

used to gather data, as well as data analysis techniques and quality criteria. Moreover, the standardized questionnaire will be put into focus, as well as qualitative instruments of deepening interviews are presented. The paragraph of this chapter deals with ethical consideration regarding the chosen research approach (chapters 3.4 - 3.12).

In chapter four the findings of the quantitative study are highlighted and structured in order to provide an elaborate overview of all important constructs starting with a description of the participants. Additionally, the results of the two differing exemplary schools of the sample in Bremen and Durban are emphasized (chapters 4.1 - 4.3). The main part of chapter four deals with the findings regarding the learners' experience and encounters with nature (chapters 4.5 and 4.6), the influencing factors of the family, peer group and school regarding encounters with nature (chapter 4.7), the specific types and form and the locations of encounters with nature (chapters 4.8 and 4.9), and the behavioural control of the participants to engage in activities in direct contact with nature (chapter 4.10).

The next paragraph of this chapter emphasizes the learners' level of connectedness to nature (chapter 4.11), their level environmental identity (chapter 4.12), their intention to act nature-orientated and sustainable in the future (chapter 4.13) their understanding of nature (chapter 4.15), as well as the correlation between the constructs experience of nature, connectedness to nature, environmental identity and the intention to act nature-orientated and sustainable (chapter 4.17). The last part of this chapter focuses on the results of four contrasting types of conducted interviews (chapters 4.19 - 4.21).

Chapter five provides a general discussion of the research findings as well as a consideration of the beneficial outcome and limitations of the study reviewing the findings of the understanding of nature (chapter 5.2), presenting the extension of the used model by Kattmann (1994) and by discussing knowledge in literature regarding this topic. Afterwards, the find-

ings of encounters with nature are shown (chapter 5.4), the frequency and intensity of the two groups as well as the importance of the reference systems family, friends and school are discussed. Additionally, the findings regarding the activities and locations of encounters with nature are highlighted as well as knowledge in literature will be considered. Chapter 5.6 discusses the findings of the connectedness to nature scales and chapter 5.8 the finding of the environmental identity scale. In both cases studies of other researchers, their results and conclusions are discussed to give meaning to the findings of this present study. Chapter 5.10 sets light on the intention to act in a nature-orientated and sustainable scale in which the findings are discussed and highlighted. Moreover, chapter 5.12 examines the correlations between encounters with nature, connectedness with nature, environmental identity and the intention to act nature-orientated and sustainable. Finally, the last paragraph emphasizes limitations of the study (chapter 5.16) as well as suggestions for further research (chapter 5.18).

The last chapter of this thesis tries to emphasize didactical implications for lesson-related activities and curricula standards in both cultural settings (chapter 6).

1.6 Key messages

- Environmental sustainability is a key issue of the 21th century.
- Future generations` basis of existence, at least their quality of life, is at risk caused by human beings` continuous exploitation of the natural world.
- Environmental education aims to motivate and qualify individuals to act in a pro-environmental manner.
- Meaningful encounters with nature have a declining role in urban regions, which leads to especially young individuals that do bond less with the natural environment than previous generations.
- The study is conducted in a simultaneous design with a wide ranging quantitative questionnaire survey and a qualitative interview survey focusing on grade eight to ten learners in Bremen/ Bremerhaven and Durban/ eThekwin.
- The main focus is set on the quantitative part of the research project.
- Aims of this research study are:
 - i. To understand the learners` experience and their level of connectedness with nature, as well as their degree of intention to act in pro-environmental manner.
 - ii. To investigate the potential influential factor of the socio-economic background of the investigated groups towards the described concepts.
 - iii. To broaden the perspective of this topic in an international cooperation.
 - iv. On a long-term scale to extend the knowledge basis to reconnect individuals with nature.

2. CHAPTER TWO- LITERATURE REVIEW

2.1 Introduction

The following chapter provides a review of the literature, regarding important areas of this research theme, as well as to establish gaps, issues and contradictions in the existing literature. Therefore, the clarification of the topic of sustainable development (Hauff 1987; Michelsen, 2012), in which all environmental topics are embedded in public discourse, will be discussed. The progress and boundaries are emphasized (chapter 2.2). In the following, the concepts nature and environment are considered (Hellbrück & Fischer 1999; O'Donoghue 1993) in order to give meaning and depth to these concepts (chapter 2.3). Moreover, two different approaches of understandings of nature will be examined, firstly the model by Kattmann (1994) and secondly by Margadant-van-Arcken (1995) which differ significantly in terms of content and structure (chapter 2.4). As a next step three slightly different approaches are described highlighting the patterns and dimensions of meaningful encounters with nature (Bögeholz 1999; Eschenhagen, Kattmann & Rodi 2008; Zylstra 2014). Since many research studies focus on encounters with nature, their methodology, their major findings and conclusions are examined and discussed (e.g. Jugendreport Natur 2010; Bragg, Wood, Barton & Pretty 2013) (chapter 2.5). In this context the ecological systems theory by Bronfenbrenner (1979) and the influencing factors of an individual's closest people like family, peer group and school members will be discussed (chapter 2.6). The middle section of this chapter presents a review of the connections between environmental attitudes (Eilam & Trop 2012), in particular the concepts of biophilia (Leopold 1949; Fromm 1973; Wilson & Kellert 1993) (chapter 2.7.1), connectedness to nature (Mayer & Frantz 2005) (chapter 2.7.2), environmental identity (Clayton 2003) (chapter 2.7.3), and the model of the new environmental paradigm by Dunlap, Van Liere, Kent, Mertig & Jones (2000).

Thereafter environmental awareness and environmental behaviour are considered; especially the model of ecological behaviour by Fietkau & Kessel (1981) and the theory of planned behaviour by Ajzen (1991) are examined to emphasize their usage to predict and also to explain people's intention to act nature-orientated and sustainable (chapters 2.8 and 2.9). The last paragraph highlights the theoretical model used for the quantitative research study derived from the literature review (chapter 2.10) followed by a detailed description research and sub questions and their hypotheses (chapter 2.11).

2.2 Sustainable development

Indeed, the term of sustainable development has a rather long scientific history and can be seen as the broader foundation of this present research study. Due to this fact, a brief summary of important milestones and facts will be provided. In the 1970s, the topic of environmental conservation to prevent climate change was dealt with a tight focus caused by grave ecological problems and several calamities, e.g. tanker disasters that caused huge oil slicks, or photochemical smog in the cities of London and New York (Michelsen 2012). As reported by the IPCC (Intergovernmental Panel on Climate Change) the concept of climate change can be defined as:

a change in the state of the climate that can be identified [...] by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity. (IPCC 2013)

Influenced by these circumstances, the Club of Rome, as an internationally connected think tank that deal with global political issues, published 'The Limits to Growth' helping to set a public debate by claiming that man-made societies will collapse as soon as all natural resources diminished and population explodes (Meadows, Meadows, Zahn & Milling 1972). The report influenced the approach of a political and scientific process by emphasizing the

correlation between industrial growth, the availability of natural resources and patterns of social material consumption (Michelsen 2012). Nevertheless, the suggested parallel between population growth and increasing environmental problems is not supported by the facts (Ball 2014). But, now as ever, one fundamental aim of sustainable development movement is to secure the foundations of human civilisation (Grunwald & Kopfmüller 2012).

As one of the major starting points of the progress of sustainable development, a multinational conference on the global environment in Rio de Janeiro in 1992 can be considered to initiate modifications and sustainable development that can be nationally, regionally or even locally focussed. As an overall objective, that has been approved by several countries all over the world, the following few aspects can be seen and were announced to a global and internationally connected scale: Justice, a frugal life, freedom and self-determination, the welfare of all mankind as a whole and for every single person on this planet (Michelsen 2012). Hauff (1987: 46) defines the commonly used term of sustainable development in a very simple but extremely precise way, by describing it as a development that meets ‘the needs of the present without compromising the ability of future generations to meet their own needs’. Thereby, it has to be mentioned, that an accurate classification of term ‘needs’ is certainly missing in his definition. Nevertheless, the declaration and designation of acting in sustainable manners according to Hauff’s (1987) definition are renewed at periodical intervals, e.g. in Johannesburg in 2002:

We reaffirm our pledge to place particular focus on, and give priority attention to, the fight against the worldwide conditions that pose severe threats to the sustainable development of our people, which include: chronic hunger; malnutrition; foreign occupation; armed conflict, illicit drug problems; organized crime; corruption; natural disasters; illicit arms trafficking; trafficking in persons; terrorism; intolerance and incitement to racial, ethnic, religious and other hatreds; xenophobia; and

endemic, communicable and chronic diseases, in particular HIV/AIDS, malaria and tuberculosis. (United Nations 2002: 3)

This statement emphasises to which areas the idea of sustainable development also can be related to besides educational or environmental concepts. On one hand, a very accurate list of major issues that are current and important in societies has been formulated, but on the other hand the declaration has no value if it is conceived as a non-binding memorandum of understanding. One example of this is how Bundesamt für Naturschutz (2011) summarises all ambitious nature conservation targets since 2002 (e.g. restoration of natural habitat types, or biodiversity protection) by referring to the Convention of Biological Diversity (2010). They come to the conclusion, that on a global, as well as on a national and regional scale all objectives have not been attained. Following up on this, the Millennium Goals campaign tried to promote and to survey sustainable development of eight different subjects, such as achieving primary education and ensuring environmental sustainability (United Nations 2014). The report of 2014 shows a couple of achievements that have been made during the last few years, e.g. gender parity in school enrolment at all level of education in developing regions; but the report also underlines that more effort is needed to reach the set targets in fields like the approach to decrease threatening carbon dioxide emissions (United Nations 2014). Hence, sustainable development is inextricably linked to responsibility for future generations (Kopfmüller, Brandl, Jörissen, Paetau, Banse, Coenen & Grunwald 2001). Scientists ask questions about the future development of the planet and state that the impact human-beings have on the environment has been increasing since the last two decades (Wuppertal Institut 2013). Nowadays, the topic of sustainable development is embedded in several disciplines, such as psychology, pedagogy or cultural sciences in an equivalent manner (DeHaan & Gerhold 2008). Whilst, marginal developments and changes can be seen regarding ecological, economic and social problems, a few agreeable proposals, e.g. the concept of the 'ecological footprint' were introduced in 1994. In 1997, a survey was conducted by Wackernagel & Rees

that compared the ecological footprints of 52 countries. The main results of the researchers stated that the resource consumption of many regions is one third higher than ecosystems can withstand in future. Cocks, Dold & Vetter (2012: 1) accentuate the importance of including local communities like the Xhosa culture in decision making processes like the conservation of biodiversity as they see unique ‘cultural, spiritual and emotional relationships’ with nature, which should be integrated into the Western scientific approaches of protecting the environment.

2.3 Terminology: Nature and environment

The term ‘nature’ is normally used in connection with two specific areas: natural sciences and the preservation of nature and the environment. Natural sciences have a big influence on our century because they characterise present, modern circumstances and shape our daily life even in school environments (Lindner 2014). Nature has been defined in different ways. Nature includes all inorganically (inanimate nature) and organic appearances (animated nature), that are able to sustain without the assistance of human-beings (Hellbrück & Fischer 1999). Simons simply defines nature as ‘our nonhuman surroundings’ (1993: 11). A very important issue that has to be stressed, while analyzing these two definitions is that both approaches contain an implicit dichotomous point of view. On one side, you can find inanimate matter and animate beings, and on the other side, you can find human-beings as the climax of creation that are being totally detached from their natural world. This specific perception of nature as a construct of two different dimensions can lead to an actual psychological and physical separation between human-beings and the natural world (Hinds & Sparks 2008). On the contrary, Stelzig (2004) provides a possible way to define the term ‘environment’ that integrates the dimension of nature and the ‘biosphere’ (forests, deserts, lakes) and the dimension of the anthropogenic environment (buildings, aeroplanes). To stress this topic and to emphasize the

overlapping concepts of nature and the environment, the following figure 1 by O’Donoghue (1993: 32) is shown, who addresses the topic of misled and confused usage of both terms.

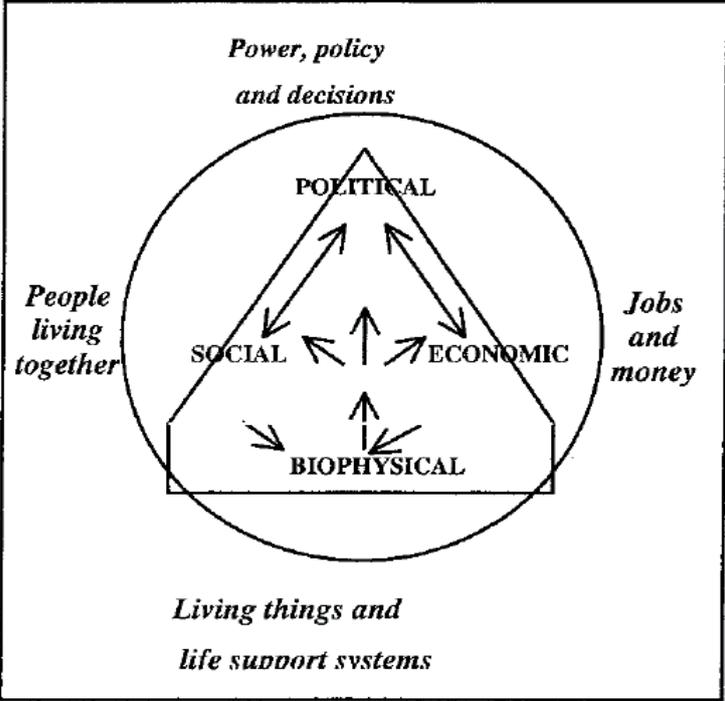


Figure 1 The terminology of nature and the environment by O’Donoghue (1993: 32).

In this case, O’Donoghue emphasises common characteristics of both expressions by entitling nature as the ‘biophysical’ section of the major construct environment besides political, social, and economic areas. As discussed by Panday (2002: 6) a broadening of the limited ‘understanding of the concept environment’ to a multifaceted idea can be shown. O’Donoghue (2001) also refers to the different point of views regarding the environment starting from a frame of reference to (as human-beings) exist *in* the environment, to a standpoint to gain knowledge *about* the environment, to the status quo of acting *for* the environment. Besides this fact, it is important to mention, that on one hand the term environment is used in a very negative connotation because associations with environmental issues might arise easily. On the other hand, the term nature is used in a very positive way because it is aesthetically connoted and can be idealized (Lude 2001; Brämer 2008; Kühn 2012).

2.4 Understandings of nature

The presumptions mentioned before lead to explanatory models that try to categorize understandings of nature. At least two different frameworks can be identified and will be discussed in the following.

A very influential impact on the debate regarding the understandings of nature is the approach of Kattmann (1994). It can be also found in Held's (2000) book about relationships and connections between human-beings and nature. Different from Margadant-Van-Arcken's (1995) model Kattmann (1994) provides an even more precise subdivision of seven different levels of an individual's perception on nature. In addition to this, Held's (2000) tries to interrelate the different ways of perceiving nature with the actual encounters, while stating that these two areas correlate to one and each other in a highly significant manner. In the following, the seven different levels are listed and discussed (Kattmann 1994):

- i. *'Required nature'*: Human-beings define nature as a basis of their own existence regarding the origin of natural resources, e.g. as a foundation of food supply or construction material. Another benefit is the idea to harness nature as a recreation area and for relaxation time. In conclusion, human-beings depend on the qualities and goods of nature; furthermore, they should share even more interest in conservation of nature on a long-term scale.
- ii. *'Beloved nature'*: The central idea of this part is that there is an ever-present emotional connection to nature caused by intimate encounters with living organisms, which are directly linked to the caring for a garden or a species-appropriate contact with domestic animals. Such an affective understanding of nature can lead to a respectful way of dealing with all kinds of living species and rank human-beings as one part of a big web of the natural world.
- iii. *'Honoured nature'*: This part of the theory is mainly influenced by religious thoughts and procedures, e.g. worshipping the alleged inspirited and subsequently lionised natu-

ral surroundings. This slightly esoteric perspective can lead to the intention to act in a pro-environmental way and to show resource-conservation behaviours.

- iv. *'Experienced nature'*: This extremely dichotomously minted approach understands nature as an unknown and threatening wilderness, in which animals live that can cause distasteful feelings. In contrary to the mentioned beloved nature, in this context human-beings are seen as inactive observers and are not interfering with the processes of nature, caused by the lack of room to manoeuvre. On top of this, Held closely links this experienced understanding of nature to an empathetic and sensual manner of dealing with it, leading to a close connection to the required nature ideas as well.
- v. *'Ruled nature'*: Through presumed scientific achievements, such as industrialized economic processes a modern age of information, human-beings see themselves to be in the position to control and to harness nature for their benefits. In particular, this approach leads to severe irreversible consequences by bringing nature out of balance and exploiting natural resources to the extreme.
- vi. *'Threatened nature'*: All things considered, it follows from the point mentioned before that modern societies start to realise mankind's' destructive course of dealing with the natural world. In this case, Held indicated a couple of anthropogenic influenced problems, e.g. greenhouse effect or the steadily extinction of animal and plant species. Due to the far-reaching consequences of human interference with natural eco-systems, it is clearly evident that man acts contrary to all the participles on the basis of which nature normally proceeds. Hence, Held defines humans as nature's biggest opponent.
- vii. *'Lived nature'*: This type of nature represents the combination of the natural surroundings and the inner nature of human-beings. In this case, exposure to nature can also be seen as an encounter with someone's inner self and the emotional condition.

To summarise: Kattmann (1994) emphasises that these different types of outlook of nature cannot be identified clearly; multilayered combinations of understandings of nature can rather

be found. But still Kattmann's model will be used to clarify the participant's individual perception of the natural world.

According to Eschenhagen et al. (2006), another way how individuals can perceive their natural surroundings is highlighted by Margadant-van-Arcken's (1995) model of understandings of nature which only is subdivided in three areas:

- i. Firstly, a rather limited view of nature in which nature is seen as an '*untouched self-regulating system*' excluding human-beings is discussed. As mentioned before, this perception of nature is influenced by the dichotomous interactions between nature and human-beings.
- ii. Secondly, the author refers to a distinctly romantic view of nature that promotes an '*idyllic idealized nature*'. Examples for such an understanding of nature are colourful pictures of the Indian Summer or beautiful sunsets that people have on their desktop as a background picture.
- iii. Thirdly, an '*integrated comprehensive view of nature*' can be identified, that functions as integration between biotic and abiotic natural surroundings including human-beings. Especially, the last enumerated way of perceiving nature seems to be the broadest one, and could lead to a profound and a reflected dealing with environmental and ecological issues.

A few researchers have focused on the investigation of understandings of nature (e.g. Rajeski 1982; Trommer 1990; Margadant-van Arcken 2000; Krömker & Simon 2005). Pohl (2003: 7) sums their study results up, in emphasizing that very frequently the participants define nature as living organisms ('trees, plants, flowers, animals'), landscape features ('waters, clouds, and sun'), as well as aesthetic and relaxation-related features ('peaceful, fresh air, bird's twitter') and excludes human-beings.

Gebhard (1997; 2011) relates to a model that includes four different types of understanding and perceiving nature: *'good nature'*, *'inspired nature'*, *'scientific and technical nature'* and *'threatened nature'*. In collaboration with Harada (2005), Gebhard investigated the understandings of nature of primary school children in Germany and Japan. The main differences between the participants could be found regarding their consideration of the natural concepts. Japanese children have a very deep connectedness with nature caused by a profound devotion of nature and their Buddhist religiousness, while German children rather have a polarized inconsistent concept of nature and see nature as a projection surface of their personal needs. Besides all that, several similarities could be identified: Both groups of participants define nature as a source of fascination, curiosity and reverence. Nature also can foster as deep sense of a gentle and careful handling of the natural surroundings. Such positive effects by an emotional connection with living beings can especially be seen in encounters with animals. Ultimately, both groups define human-beings as having a dominating role towards nature. However, a negative connotation regarding nature under threat is permanently subconscious.

Identically, Brämer (2008; 2011) came to the conclusion that German adolescents have an idealized perception of nature and are alienated from their natural surroundings. These results are underlined by similar results by Kollender & Zabel (2013) who investigated the concepts and understandings of nature of German and Peruvian adolescents. Once more, a very dichotomously coined concept of nature could be confirmed in both participating groups. Kollender & Zabel (2013) came to the conclusion, that the described concept influences the extent of interference with implementation of pro-environmental behaviour, e.g. achieving an ecologically safe treatment of fossil resources. The declared objective should be, especially for emerging generations, to establish the point of view that human-beings have a double role: to have an active part and simultaneously to be counterpart of nature (Sander 2002). Eschenhagen, Kattmann & Rodi (2008) suggest seeing human-beings as potential interferers as well as positive designers of the natural surroundings.

A very noticeable research regarding the perception of South African learners of the ages 13 and 14 was conducted by Adams & Savahl (2015). In their quantitative exploratory study, the researchers interviewed 32 learners and came to the conclusion that the participants' perspective on nature is very closely linked to the individuals' 'socio-economic circumstances' (Adams & Savahl 2015: 207). An example is the perception that nature is characterized as a rather dangerous counterpart of humans which is caused by the physical violence occurring in the learners' communities. Other most frequently mentioned perceptions of nature with respect to Kattmann's (1994) definition were the '*threatened nature*', '*ruled nature*' and '*beloved nature*' with a dichotomous tendency (Adams & Savahl 2015).

In conclusion, for this research study the concept of Kattmann (1994) will be used to analyse the open questions in the questionnaire because it has a comprehensive approach and is more detailed than Margadant-van-Arcken's (1995) model. Margadant-van-Arcken's model will be used to categorize the perception of the participants' naturalness of depicted natural surroundings.

2.5 Encounters with nature

Literature on the topic of encounters with nature indicates different but very similar terms are used: meaningful nature experience, experience of nature, direct contact with nature, or relationship with nature. All these terms more or less stand for an intensive devotion by human-beings with other living-beings and/or sceneries (Eschenhagen, Kattmann & Rodi 2008) or a specific dealing of human-beings with their living environment (Bögeholz 1999). In this study encounters with nature are understood to be 'non-ordinary experiences with/in nature that are particularly profound, significant, affective and difficult to wholly describe' (Morse 2011 in Zylstra 2014: 74). Hence, in this study encounters with nature are defined as unstructured activities in or within or with naturalistic areas and its natural phenomena for the purpose of immediate experience. Eventually, such encounters can be perceived with or without an inten-

sive reflection of the experience. Besides, an immediate contact encounters with nature are characterized as ‘multisensory, affective and pre-scientific’ experience (Mayer & Bayrhuber 1994: 4); hence, encounters with nature can be multi-layered and where humans/ people use their senses.

Benefits of encounters with nature

Research literature on contact with nature indicates that it can have a positive impact on an individuals’ entire developing process (Kellert 2002). Kellert & Derr (1998: 56) accurately sum up the potential of impacts and benefits of encounters with nature on individuals by concluding: ‘[...]prolonged and challenging immersion in the outdoors, especially in relatively pristine settings, can exert a powerful physical, emotional, intellectual, and moral-spiritual influence on young people.’ For example, encounters with nature foster a person’s psychological and physical well-being, more specifically during the childhood stages of human-beings (Zeidler 2009). Children’s encounters with nature may have a positive impact on their cognitive, emotional, social and motor skill development (Health Council 2004). Different studies show that there is a positive link between the proportions of nature in a residential area with the level of self-assessed mental health. In addition, individuals that live in areas with a high abundance of green space tend to have a lower rate of health problems and illnesses (e.g. de Vries, Verheij, Groenewegen & Spreeuwenberg 2003; Maas, Verheij, Groenewegen, de Vries & Spreeuwenberg 2006). Furthermore, research reveals that a positive correlation exists between people’s direct exposure to nature and a reduction in their levels of stress (Wells & Evans 2003). A very famous example was Nelson Mandela who cultivated a garden at the backyard of Pollsmoor prison, which contributed towards his state of relaxation by saying: ‘I cultivated a garden that became one of my happiest diversions. It was my way of escaping from the monolithic concrete world that surrounded us’ (Mandela 1994: 691). Individuals that garden on a regular basis tend to be more satisfied than others (Waliczek, Zajicek & Line-

bereer (2005), the level of contentment and tranquillity (Kaplan & Kaplan 1989), as well as a connection of the amount or extent of occasions spent in nature with the development of connectedness with nature (Raudsepp 2005; Nisbet, Zelenski & Murphy 2009) can be shown. Even rather short direct encounters with nature like walks in forests or visiting urban parks enable individuals to produce positive recovering and happy feelings and can reduce aggression and anxiety (Hartig 1991; Cackowski & Nasar 2003; Abraham 2007).

Certain associated persons of the 'microsystem' (family and close members of the family, peer groups, and school) (Bronfenbrenner 1979) can have a significant, relevant influence on the type, intensity and even frequency of encounters with nature (Niesporek & Lude 2009; Karlegger 2010). Furthermore, scientists do claim that the extent and diversity of activities in direct contact with the natural world can be regarded as close connectedness to nature. (Lude 2001; Kellert 2002; Menzel & Bögeholz 2009; Zeidler 2009). Therefore, numerous different facets of encounters with nature can be identified. In the following Lude's (2001) dimensions, as well as Bögeholz (2008) categorization of encounters with nature will be discussed.

Analysing several studies regarding patterns of encounters with nature of the years between 2001 and 2009 (Lude 2001; Rost, Gresele & Martens 2001; Remes 2005; Niesporek, 2009), Lude applies his model of at least thirteen 'dimensions'. To sum it up, the highest frequented encounters with nature concerning children and adolescents between the ages of twelve and 18 are closely connected to the 'social dimension'. This experience is strongly linked to the development of close relationships by caring for animals. Straight after this, the facet of medially provided encounters with nature via different audio-visual media plays a slightly subordinated role, as well as the adventurous facet, that is closely connected to physical challenges (Lude 2001; Remes 2005; Niesporek 2009).

Bögeholz (2008) refers to three different categories of encounters with nature in which the first category is closely linked to nature exploring experiences, e.g. practising exercise in

nature. The second category is very similar to the first one; it also includes a nature exploring approach, but to some extent it has an instrumental context like gardening or collecting herbs. The last category includes aesthetic and social encounters with nature, e.g. the accommodation and care of animals (Eschenhagen, Kattmann & Rodi 2008). Regardless of which of the described approaches is selected, the intensity and frequency of encounters with nature is significantly related to the social dimension of the 'microsystem' (family, peers, school) (Lude & Bogner 2001; Niesporek & Lude 2009; Rost et al. 2000). Bragg et al. (2013) come straight to the point by referring to the multi-layered opportunities that natural surroundings can provide opportunities especially for young people:

Natural environments are varied and changeable and so provide excellent opportunities for free explorative play and this type of unstructured play has been found to give greater opportunities for decision-making while at the same time promoting creative, diverse and imaginative play, which are all seen as important elements of a child's personal and cognitive development. (Bragg, Wood, Barton & Pretty 2013: 5).

Relating to Jugendreport Natur (2010) almost 40% of all learners state that they do not engage in activities with nature during school lessons. An important core issue can be based on the following assumption: The more children and adolescents are exposed to nature, the more often they show pro-environmental behaviour in everyday situations (Bögeholz 1999).

To have a positive relationship and bond with nature it seems that it is absolutely necessary to firstly gather various unstructured, playful and timeless (Young 2011) exploration of nature and the environment, plants, animals, natural beings in general, and secondly to gather structured, purposeful, and time-constrained activities (Young 2012). Encounters with nature can be seen as the basic component in order to have an emotional connection to nature and the environment, which are requirements for individuals to be open-minded to nature and envi-

ronmental issues. These factors are the motivational basis for the generation of an intention to act in a sustainable manner. In addition to that, it is quite obvious that certain behaviour is dependent on individual's social and economic possibilities (Kals, Schumacher & Montanda 1998; Bixler et al. 2002, Lude 2005).

2.6 Bronfenbrenner's ecological paradigm

There are a couple of findings regarding the significant impact of social contact. Bronfenbrenner's (1979) ecological systems theory of development tries to explain how human-beings develop pro-environmental behaviour by being affected by their social relationships and their surrounding environment. While discussing the development of human-beings, Vasta (2002: 222) related to the definition of Bronfenbrenner by quoting, that the model describes

[...] the process through which the growing person acquires a more extended differentiated and valid conception of the ecological environment, and becomes motivated and able to engage in activities that reveal the properties of, sustain, or re-structure that environment at levels of similar or greater complexity in form and content. (Bronfenbrenner 1979: 27)

By locating the individual in the focus of monitoring, at least four different influential systems can be identified in the ecological systems model by Bronfenbrenner (1979): 'microsystem', 'mesosystem', 'exosystem' and 'macrosystem' (see figure 2 by Dunn, Masyn, Yudron, Jones & Subramanian (2012: 5).

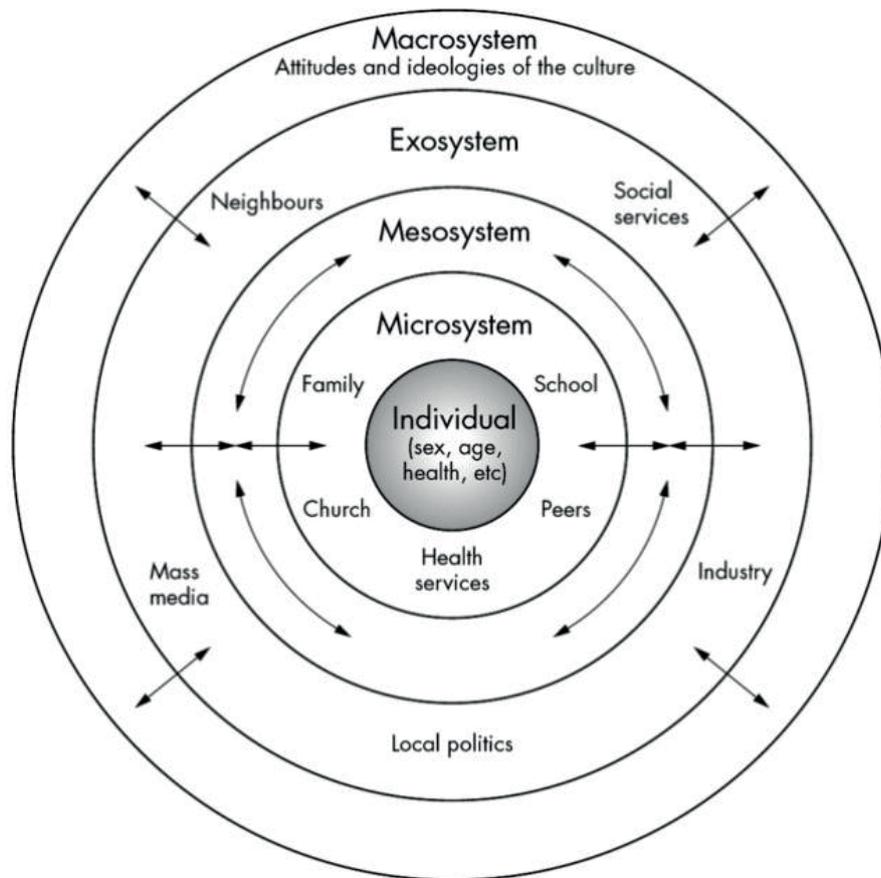


Figure 2 Bronfenbrenner's ecological systems model (1979) in Dunn, Masyn, Yudron, Jones & Subramanian (2012: 5).

The microsystem is the immediate environment of very close people, in which an individual has direct contact with other individuals. First of all, family or very close family members can be seen as a group of individuals that has significant influence on a person. Secondly, friends and other peer groups, and thirdly, individuals that are related to school can be listed. Relationships in this construct of an individuals' social network are featured by a double sided opportunity to influence other individuals and to be influenced by them as well (Christensen 2010). In addition to it, Bronfenbrenner sums it up while he is referring to all important aspects of the microsystem by saying that it is

pattern of activities, social roles, and interpersonal relations experienced by the developing in a given face-to-face setting with particular physical, social, and symbolic features that invite, permit, or inhibit engagement in sustained progressively

more complex interaction with, and activity in, the immediate environment. (Bronfenbrenner 1995: 39)

The next level of the model theory is the mesosystem that ‘comprises the linkages and processes taking place between two or more settings containing the developing person’ (Bronfenbrenner 1995: 40). An example of such relations and connections are interactions between family and peer group experiences in everyday situations. A child might react to family members in the same way as it would act while having a conversation with friends.

The exosystem includes a linkage between the social environment and situations that occur in total different contexts. ‘This includes decisions that have [a] bearing on the person, but in which they have no participation in the decision-making process.’ (Christensen 2010: 102). In the decision-making process, this system includes developments having an impact on the individual without being part of the decision making process. Fair, Kuhn, Mahotra & Shapiro (2013) describe the exogenous influence on individual’s attitudes in a case study in connection with floodings in Pakistan in 2010 and 2011. The severe shock caused by the devastating floods changed people’s attitudes regarding decisions to vote and indicates the possible impact of the exosystem. Referring to another example, Cameron & Shah (2011) come to the conclusion that natural disasters like earthquakes and floods can change people’s extent to show risk taking behaviours by analysing data of rural Indonesian people.

The macrosystem stands for cultural specificities of a society that has an impact on the individuals’ life such as cultural values, socioeconomic status or a political system. Obviously, the special features of the macrosystem do have a major influence on the development of young individuals while growing up, as well as in other parts of their lives.

Obviously, the ‘microsystem’ and the ‘macrosystem’ might have the biggest impact on an individual’s behaviour. In this study the influence based on an individual’s experience with associated individuals of the ‘microsystem’ is being focussed. Status groups of the ‘microsys-

tem' have a significant influence on almost all areas of an individual's life. First of all, the importance of social contexts could be shown in various recent studies (e.g. Kals, Schumacher & Montanda 1998; Karlegger 2010; Kühn 2012). Villacorta, Kostner & Lokes (2003) came to the conclusion that family and peer groups have a high level of impact on environmental attitudes. For Langenheine & Lehmann (1986) parental influence is the most important factor to have an impact on environmental awareness, especially during early childhood while being exposed to nature and caring for animals and plants, like cultivating a garden and reaping the benefits of nature. The OECD survey of 2006 named 'Green at Fifteen' tried to analyse average percentages for sources where students mainly learnt about environmental issues. Scientists came to the conclusion that school is the biggest influential factor for learning about issues like nuclear waste, air pollution or extinction of plants and animals. Friends and family seem to have a rather mediocre influence on topics like energy shortage or clearing of forests for other land use. The study results also indicate that besides individuals of the 'microsystem' TV, radio, newspaper or magazines as well as internet or books are sources where young individuals learn about environmental issues.

Summarising the above, in this study only Bronfenbrenner's (1979) microsystem is used; in this case the larger structure of individuals' social and cultural environment: family, peer group, school. Bronfenbrenner's (1979) microsystem of close family members, peer group as well as individuals of the school is defined as the most important groups having an influence on the learner's encounters with nature.

2.7 Environmental attitudes

For decades the relationship between attitudes and behaviour has been a matter of debate (e.g. Kollmuss & Agyeman 2002; Eilam & Trop 2012). To understand the genesis of environmental attitudes and the close interaction with pro-environmental behaviour, it is important to clarify and to give meaning to the term attitude and behaviour. In their article, Eilam & Trop

(2012: 2212) refer to three different definitions of attitudes. To sum it up, attitudes are a mixture of ‘motivational, emotional, perceptual and cognitive processes’, ‘learned predispositions’ and an individual’s ‘overall evaluation’ with respect to a given issue or object. Eagly & Chaiken (1993: 1) define attitudes as the ‘psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour’. On the other hand Hogg & Vaughan (2005: 150) define attitude as ‘a relatively enduring organization of beliefs, feelings, and behavioral tendencies towards socially significant objects, groups, events or symbols’. It is quite obvious that both definitions focus on and are closely connected to specific objects. Other scientists like Klee & Berck (1993) and Lude (2001) are very precise in categorizing different parts of attitudes by adding a reciprocal sequence to the genesis of specific attitudes. The model includes three different components starting with ‘cognitive’ attitude components in which an individual starts reflecting regarding specific objects or situations. This stage is followed by an ‘affective’ component in which the individual starts to feel concerned and develops an emotional connection to the specific object or situation. Last but not least, this model includes a ‘connotative’ element that can lead to intentions to act and even to actual lifestyles and daily patterns of acting.

The socio-cognitive model by Pratkanis (1989) also has three different categories, but is defined differently. Pratkanis’ model (1989) starts with a conscious debate regarding a specific object or situation (e.g. constant consumption of plastic bags), followed by an evaluation (plastic bags last extremely long and can damage eco-systems). The next step of this on-going procedure of reflective thinking is sustained by the constructs of assessment competences acquiring the ability to reproduce a broader integrated knowledge network (negative environmental effects, shameless greed). Schultz (2000: 393) emphasizes that attitudes can be developed and supported by ‘egoistic, altruistic, and biospheric’ environmental concerns that can promote eco-friendly lifestyles.

In order to influence environmental attitudes and to some degree positively affect pro-environmental behaviour, Lude (2001) focuses on a classical three step. First of all, people have to gather positive experience with nature to strengthen the sense of perception and to recognize the natural surroundings. Secondly, ecological education in schools or other educational institutes shall provide awareness regarding environmental issues and maintain positive stance on the environment. In this case, the focus should be set on mediating networked thinking to foster evaluation skills and to change attitudes towards the environment. Lude (2001) underlines that in this way ‘cognitive, affective and connotative valuation issues’ are in the spotlight. To sum it up, this phase could be entitled *creating a reflected awareness*. Thirdly, this methodical approach is output-orientated particularly, as Lude reflects on the highly-probable impact of environmentally responsible behaviour.

In order to entrench sustainability values not only on a short-term scale but to change attitudes in an individual’s daily life, it is very important to include all different, or at least as many facets of people’s lives as possible; starting from existing value systems to the sensibility and engagement towards objects and situations (Stelzig 2004). Moreover, the attitude towards objects and situations is a part of the interaction between encounters with nature and environmentally appropriate behaviour and therefore, can be seen as a potential parameter to predict a certain intention to act. However, DeHaan & Kuckartz (1997) accentuate that environmental attitudes are just a very weak predictor regarding environmental protection because a severe gap between attitudes and behaviours can be recognised. In addition to this, mere transfer of knowledge about objects and situations will not enable individuals to show environmentally appropriate behaviours. This particular point of view is also highlighted in recent studies, e.g. in Karlegger’s (2010: 14) inquiry stating that sustainable learning processes only can be achieved through the inclusion of ‘cultural characteristics and experiences’ as well as points of view and change of behaviours on a long-term scale.

Moreover, a gender-specific difference in environmental attitudes can be measured. Zelezny, Chua & Aldrich (2000) researched environmental attitudes on gender by analysing research papers between the years 1988 to 1998. As one of their main findings the researchers emphasize that female participants report significantly stronger environmental attitudes than male participants do.

2.7.1 Biophilia hypothesis

In 1949 Leopold started to discuss the close interaction between the well-being of an individual and the well-being of nature by stating that the entire natural surrounding with its plants and animals has an extremely close relationship with human-beings. Even almost 70 years after Leopold had discussed his point of view; his thoughts still have a profound relevance: ‘We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect’ (Leopold 1949: viii). Such destructive developments can still be seen in almost every society all around the world. His statement is an accurate description of what currently is in place summing up how human-beings and their communities have to show responsibility regarding environmental protection. It is very important to mention that in the present age of a complex and rapidly growing level of global economic growth, it is very difficult to consider all consequences regarding a specific behaviour. Therefore, social interpersonal actions between individuals, the ability to take others’ perspectives, and selflessness are needed. For thousands and thousands of years, generations of human-beings lived like hunters and gatherers being incredibly closely connected with nature. Since the beginning of the industrialisation and urbanisation of societies in the middle of the 19th century, human-beings started to move away from nature (Mayer & Frantz 2005). Fromm (1973: 365) defined biophilia as ‘the passionate love of life and of all that is alive’ and its biological vitality can be found in every single individual. An individual’s longing for a deep connection with other life forms, animals, plants, other hu-

man-beings, or even sceneries is considered to be a firm component of the biophilia hypotheses (Wilson & Kellert 1993). Furthermore, Kellert (1997) stresses the influencing factor of biophilia in the development of a human-being regarding emotional, cognitive and physical orientation towards life and nature.

Mayer & Frantz (2005: 505) also emphasize that ‘one consequence of industrialisation and urbanisation is that we characteristically spend increasing amounts of time indoors in our leisure and work life’. Moreover, Wilson’s biophilia hypothesis (1984) tries to explain the attraction that nature has for human-beings by referring to felt relationship with all living matter as a biologically predetermined disposition (Karlegger 2010). This tendency is caused by a close attachment to nature of the ancestors from which modern human-beings emancipated themselves (Kellert & Wilson 1993). Wilson (1984: 350) states that the love for nature is ‘the connections that human beings subconsciously seek with the rest of life’ and is an innate tendency to focus on life and life-like processes. Significantly the level at which a person is attracted to the environment can differ from individual to individual.

2.7.2 Connectedness to nature

Following up on Leopold’s (1949) and Wilson’s (1984) point of view, the concept of connectedness to nature can be seen as that, which deals with the development of close relationships of human-beings with their natural world, the interconnectedness of both sides, and human-being’s deep feelings of belonging to nature (Mayer & Frantz 2004). ‘An emotional connection to nature characterizes the extent to which people have affective relationships to the natural world’ (Raudsepp 2005: 83). Schultz (2002: 679). defines connectedness to nature as ‘the extent to which an individual includes nature within his/ her cognitive representation of self’ Mayer & Frantz (2005) come straight to the point, in saying that connectedness to nature offers you the ability to predict lifestyle patterns, ecological behaviour and even curriculum decisions among learners. In his approach to explore meaningful experience in nature, Zylstra

(2014: 39) refers to connectedness to nature simply but very accurately as ‘the call to reconnect with nature’. These positively experienced bonds with nature according to Kals, Schumacher & Montanda (1998) have effects on human-beings pattern of encounters with nature, shapes attitudes regarding environmental issues and forms pro-environmental behaviour and to deal with nature (Karlegger 2010). Besides these significant tendencies of connectedness to nature, it also provides a pleasant feeling while being exposed to nature and a negative reaction is experienced while seeing destruction of nature (Raudsepp 2005). To be connected to nature is not a superficial tie, but an emotional understanding of nature and it is more than a simple aesthetic sensation (Nisbet, Zelenski & Murphy 2009). In addition to this, this relationship and connectedness between human-beings and nature can be seen as a fundamental need of being part of a bigger natural network (Mayer, Frantz Bruehlman-Seneceel & Dolliver 2009). Human-beings are depending on nature in order to survive. Connectedness to nature is an individual matter and in syntheses of literature can be described in the following as

‘a stable state of consciousness comprising symbiotic cognitive, affective and experiential traits that reflect, through consistent [sic!] attitudes and behaviours, a sustained awareness of the interrelatedness between one’s self and the rest of nature.’ (Zylstra 2014: 48)

Connectedness to nature is a reason as well as an outcome to have encounters with nature (Hefler, Zeidler & Cervinka 2009). The intention to have frequent and intensive encounters with nature is significantly higher if an individual feels a close connectedness to nature (Hinds & Sparks 2008).

Individuals that have a strong connection to their natural world tend to spend significantly longer periods of time with encounters with nature (Cervinka, Zeidler, Karlegger & Hefler 2009; Mayer & Frantz 2004). There are several possibilities to foster the level of connected-

ness to nature, e.g. by participating in nature-related activities and gaining positive emotions through encounters with nature. In this case, Raudsepp (2005) and Nisbet, Zelenski & Murphy (2009) refer to activities like sitting next to a river or taking a walk in a remote area. Encounters with nature especially during childhood have a big impact on fostering a sustainable connectedness to nature (Kellert & Derr 1998). The findings from the conducted research suggest that besides differences between the level of encounters with nature as well as connectedness to nature can be identified in rural and urban areas (Hinds & Sparks 2008).

Zylstra (2014: 49) according to Young (2013) provides a very detailed description of the ‘conceptual framework of the key components comprising CWN²’. With the commitment in the middle of the figure, Zylstra (2014) defines several categories influencing the ‘mind-body-spirit-willpower’ of connectedness to nature. In his model, Zylstra (2014) underlines the importance of education, in this case to gather environmental knowledge, which is a key instrument to understand nature, as well as to engage in outdoor activities. This experience in nature is mostly unstructured playful timeless activity. As described in literature such nature-based actions do have a significant influence on an individual’s degree of connectedness to nature. Only, through ‘strategic mentoring’, individuals are able to serve the ‘social-ecological community’, meaning caring, dedicated people of the microsystem; they can be seen as a catalyst for pro-environmental nature-based commitment.

A factual connection between a individual’s connectedness to nature and an actual pro-environmental behaviour could not be underlined so far (Karlegger 2010). For changing attitudes on a long-term scale a long list of different aspects of an individual has to be included, e.g. necessities, sensibility, engagement and moral concepts (Stelzig 2004). Therefore, the concept of connectedness to nature includes an emotional component that is based on the feel-

² There are numerous written references that use the term ‘connectedness to nature’; e.g. Hefler, Zeidler & Cervinka (2009), Liefländer, Fröhlich, Bogner & Scultz (2013), and Zylstra (2014) use the term ‘connectedness with nature’. The two terms can be seen as a synonym.

ing of freedom, feelings to be carefree, feeling of wellness and calmness while having encounters with nature (Kals, Schumacher & Montanda 1998). For this reason individual differences with regard to the extent of connectedness to nature can be measured (Schultz 2000; Hinds & Sparks 2009).

Developing a close connectedness to nature is very important: The level of connectedness significantly influences frequency and intensity of encounters with nature and fosters a positive effect of nature to human-beings. A positive experienced relationship with nature shapes the attitude towards nature and the environment and can even influence the level of pro-environmental behaviour (Eschenhagen, Kattmann & Rodi 2008). At least two different factors regarding the connectedness to nature can be identified: On one hand an emotional component and on the other hand a self-identification with nature, realizing being part of nature and not being detached from it.

The concept of connectedness to nature has been operationalized in the ‘connectedness to nature scale’ (Mayer & Frantz 2004: 505), which is often being used in environmental and psychological studies globally. Connectedness to nature shows significant correlations consistently with the ‘inclusion of nature in self’ scale (Schultz 2001: 330) and ecological attitudes and environmental identity in a test-retest design (Olivos, Aragonés & Aemerigo 2011) as the majority of samples in this meta-analysis came from Canada and the USA: ‘The relationship between nature connectedness and happiness appears to be positive and significant. In general, individuals who are more connected to nature tend to be happier’ (Capaldi, Dopko & Zelenski 2014: 10), and more equable.

It can be summarized as the ‘core attributes for connectedness with nature’ as discussed by Zylstra (2014: 54). In order to emphasize the conceptual depth of the term connectedness to nature, Zylstra (2014: 54) concisely distils the eleven main features that can be found in litera-

ture. In the following section, these main features and authors are presented because each one has a slightly different analytical approach:

- i. *'Inclusiveness'*: Describes the level of an individual's cognitive inclusion of nature in the self-concept as found e.g. in Schultz (2001) and Nisbet, Zelenski & Murphy (2009).
- ii. *'Relatedness'*: A deep emotional perception that the individual is part of a bigger 'life-web' and a kinship with the natural environment caused by the hereditary drive of human-beings to love and closeness to nature, which e.g. can be found in Leopold (1949), Kellert & Wilson (1993), and Louv (2011).
- iii. *'Belonging'*: An individual's linkage with a certain location, an important place in the community, or in terms of a special scenery, providing a feeling of 'being in the right place' as e.g. seen in Clayton (2003), Nisbet, Zelenski & Murphy (2009), and Rogers & Bragg (2012).
- iv. *'Interconnectedness'*: An individual's recognition that all human-beings can be seen as a component of the ecosystems, which is supplemented by the feeling of positive reinforcement, while protecting nature, e.g. to be found in Booth (1999), and Hoot & Friedmann (2011).
- v. *'Wholeness'*: This category defines connectedness to nature as an individual's longing for unity and essential oneness with the environment, as well as on a 'universal' scale. To some extent, this approach has a spiritual aspect, which can be found in Capra (1996), or Dutcher, Finley, Luloff & Johnson (2007).
- vi. *'Inquisitiveness'*: This approach describes an individual's internal basis or intrinsic motivation for dealing with nature and learning about the environment which can be seen as a 'naturalist intelligence' (e.g. Kals, Schumacher & Montanda 1999, and Hayes 2009).

- vii. *'Aliveness'*: The status in which the natural world positively affects an individual's ecological awareness by perceiving nature as a source of life and pleasure. This slightly spiritual or religious approach can be found in Cohen (1997), and Young, Haas & McGown (2010).
- viii. *'Thankfulness'*: Can be seen as a sincere appreciation and authentic 'gratitude' for the complex work of nature from which human-beings benefit every single day as found in Young, Haas & McGown (2010).
- ix. *'Interaction/ Participation'*: On one hand, by frequently being engaged in diverse outdoor activities and being exposed to the natural environment, the individuals' level of connectedness to nature can rise. On the other hand, internally embedded attraction to the natural world can lead to regular direct contact with nature, which e.g. can be seen in Kals, Schumacher & Montanda (1999), and Nisbet, Zelenski & Murphy (2009).
- x. *'Happiness'*: Being closely connected with nature can significantly foster individuals' level of happiness as seen in Nisbet, Zelenski & Murphy (2011), and Zelenski & Nisbet (2012).
- xi. *'Continuity'*: The concept of connectedness to nature can be seen as a lifelong development process, in which the extent can be shaped by being exposed to nature, as well as being in 'alternate contexts', that can e.g. be found in Schultz et al. (2004), and Nisbet, Zelenski & Murphy (2009).

As the latest results, the study of Zelenski, Dopko & Capaldi (2015) verifies a correlation between connectedness to nature and pro-environmental behaviour by using different types of film sequences of nature and abstract representation like architecture. Individuals that were exposed to nature videos showed a significantly higher level of intentional environmentally sustainable behaviour and were able to work in a co-operative style with other participants as well.

2.7.3 Environmental identity

Another concept that deals with emotional relations with the natural surroundings is the environmental identity. First of all, environmental identity can be defined as

[...] an environmental identity is one part of the way in which people form their self-concept: a sense of connection to some part of the nonhuman natural environment, based on history, emotional attachment, and/or similarity, that affects the way in which we perceive and act toward the world; a belief that the environment is important to us and an important part of who we are. (Clayton 2003: 45)

Coming from the theoretical background of social identity research, an individual can ‘categorize, classify, or name itself in particular ways in relations to other social categories or classifications’ (Stets & Burke 2000: 224). In this case, the category or classification can be considered as the natural environment that surrounds the individuals through which a certain level of identification can develop and an environmental identity can be shaped. This identity is based on culturally shaped bonds to our non-human natural surroundings, which similar to the connectedness to nature is strongly linked to the human-being’s history and their emotional ties with nature (Karlegger 2010). Environmental identity leads to an awareness regarding environmental issues, as well as the way human-beings act towards the world (Clayton 2003). Very similar to the connectedness to nature, environmental identity is featured by the fact that its level of moulding is a lifelong process of identity development. This identity is more likely to be influenced by close individuals of the ‘microsystem’ (Clayton 2003; Hinds & Sparks 2009).

Compared with the connectedness to nature conception, the environmental identity has a broader approach because it is focused on at least four different aspects of wholeness and bonding with the natural world. At least four different factors can be identified in the concept of environmental identity, in which the first one deals with interactions with nature (encounters). The second part focuses on the self-identification with nature while questioning if the

individual feels to be part of nature. This is followed by pro-environmental ideology which is a part of the construct that deals with environmentally appropriate behaviour as a part of the moral code of an individual.

Positive feeling towards nature is the centre of attention in the fourth part of environmental identity (Clayton 2003; Fritsche 2011). The concept is used in many different research fields, e.g. in Winter & Chavez' (2008) approach with 459 participants in a sequential two study approach. By using the environmental identity scale, the researchers could illustrate a linkage between the level of environmental identity and individuals' references in choosing public recreation areas. Clayton (2012) emphasizes the connection between identity and intended environmental behaviour, in order to focus research on this topic. Furthermore, Clayton (2012) highlights the potential benefit of such research outcomes to discover ways to foster a strong environmental identity of societies. Furthermore, Clayton & Opatow (2003: 2) describe the field of environment and identity as a 'wide variety of subdisciplines'.

2.7.4 New environmental paradigm

A concept that is frequently used in research to survey environmental concern of individuals as well as in environmental education is the new environmental paradigm which was developed by Dunlap, Van Liere, Kent, Mertig & Jones (2000). Besides connectedness to nature and environmental identity the concept of new environmental paradigm is used regularly in several research studies, e.g. in before-and-after studies of the effects of some intervention or activity, such as the impact of educational programs on the environmental world view (Anderson 2012). Similar to connectedness to nature and environmental identity, the conception of this paradigm tries to determine individuals' ideas and conceptions regarding a relationship with the nature world (Schultz, Shriver, Tabanico & Khazian 2004). Dunlap, Van Liere, Mertig & Jones (2000) broadly focus on individuals' worldviews and on their belief

regarding the present global environmental crisis. For this study, emotional connections as attitude components are emphasized.

2.8 Environmental awareness

Langeheine & Lehmann (1986) or Kuchartz, Rädiker & Rheingans-Heintze (2006) state that the term of environmental awareness includes environmental attitudes as well as actual environmental behaviour. For Eschenhagen, Kattmann & Rodi (2008) environmental awareness is a mixture between attitudes and an individual's system of values regarding nature and the environment, knowledge of ecological damage, destruction of the environment and knowledge of environment protection. All in all, the concept of environmental awareness has an extensive approach because it contains different level factors that have an impact on factual pro-environmental behaviour.

Ajzen & Fishbein (2005) come to the conclusion that attitudes as well as behaviour have diverse levels of abstraction by stating that individual attitudes are just one above several predictors regarding pro-environmental behaviour. Once again, scientists like Rajcecki (1982) emphasize that mere knowledge mediation of environmentally relevant issues is having a significant influence on behaviour patterns on a long-term scale. Individuals that appreciate their natural surroundings and care about it rather tend to show environmentally conscious behaviour (Frantz, Mayer, Norton & Rock 2005; Nisbet, Zelenski & Murphy 2009). Evidentially, actual behaviour is closely connected to experience, emotions and the ability of network thinking. Relating to Naturbewusstsein survey (Bundesministerium für Naturschutz 2012) the biggest part of German respondents (86%) are quite aware that nature preservation is a major core responsibility of politics. Studies like Naturbewusstsein (2011) emphasize that 95% of German citizens believe that the protection of climate, nature and the environment is an important concern, which could be seen as a foundation for environmental practice. In 2007, the Human Sciences Research Council surveyed 3164 South African people's consciousness con-

cerning climate change, emphasizing the significance of this topic for African countries in stating:

In Africa, climate change is far from abstract – it is already determining the course of people’s lives. Extreme weather events and greater unpredictability in weather patterns are having serious consequences for people who rely on land, lakes and seas to feed themselves and to earn a living. (Human Sciences Research Council 2010: 1)

As a main result 27% of all the 3164 participants aged sixteen years and more responded that they had not heard about the topic climate change before with a slight difference between the age groups.

2.9 Environmental behaviour

A model for analysing and explaining behaviour is the model by Aizen (1991) which describes different sources that can lead to a certain intention or certain behaviour. Relating to Graf (2007) one of the most important aspects of research in biology education is the clarification and prediction of future behaviour patterns. First of all, it is very difficult to define the term behaviour because neither psychological nor sociological research has suggested a proper definition. In trying to interpret the term Eilam & Trop (2012: 2212) define behaviour ‘as any active responsiveness to current environmental issues, believed to be pro-environmental by the person performing the response’. In this case, behaviour is defined as any action being taken voluntarily without external control, extreme pressure or adequate incentives regarding environmental behaviour. Kollumuss & Agyeman (2002: 240). draw up a very precise definition on pro-environmental behaviour as it ‘consciously seeks to minimize the negative impact of one’s actions on the natural and built world (e.g. minimize resource and energy consumption, use of non-toxic substances, reduce waste production)’

In order to operationalize the analysis of future behaviour and its influencing factors, a useful and popular model is described and introduced as the theory of reasoned action by Ajzen & Fishbein (1980), which is further developed in the theory of planned behaviour (Ajzen 1991: 185) (figure 3).

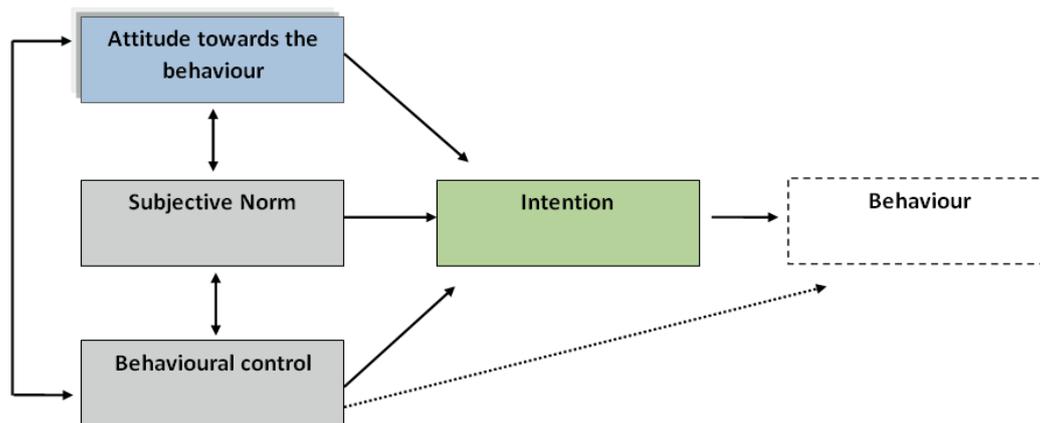


Figure 3 The theory of planned behaviour adapted by Ajzen (1991: 185).³

In this case the reduced version of the theory is presented in which only the first theoretical level is illustrated: ‘Attitude towards the behaviour’, ‘subjective norms’, ‘perceived behavioural control’, the ‘intention’ to act in a certain manner, and the actual ‘behaviour’ (Ajzen 1991: 185). Hence, the theory describes different aspects and influential factors that determine an individual’s actual behaviour. The second theoretical level of behavioural beliefs, normative beliefs, and control beliefs is not shown in the graph, due to the fact, that both theoretical levels together are rather elaborate and therefore not being easy to be operationalized at the same time. Attitudes, aspects of a perceived subjective norm of close persons as well as perceived behavioural control and their causal links between one and each other are centred (Conner & Armitage 1998). The theory of planned behaviour offers the researcher the possibility to focus the subject of investigation not on the actual behaviour but on the intention, so

³ In order to ensure continuity in this text, the original American version of his theory was changed into British English; in this case the words behaviour and behavioural.

a ‘subjective probability that he or she will engage in a given behavior’ (Committee on Communication for Behavior Change in the 21st Century 2002: 31). In this theory the intention to act and the actual behaviour are divided; there is a huge gap between attitudes, well-meant intentions and certain behaviours. Nevertheless ‘intentions are assumed to capture the motivational factors that influence a behavior’ (Ajzen 1991: 181). Furthermore, another absolute necessity to use the theory in an appropriate way is the fact that ‘valid samples of behavior’ (Ajzen 1991: 181) have to be used as possible behaviour patterns.

Moreover, Ajzen (1991) describes previous empirical findings that were gathered with the help of the theory of planned behaviour to predict the willingness of individuals to donate money to a non-governmental organisation. The study emphasized the linkage between mere intentions and implemented behaviours. Furthermore, Ajzen refers to different researchers (e.g. Canary & Seibold 1984; Sheppard, Hartwick & Warshaw 1988) that investigated behavioural choices in ‘laboratory games to actions’ (Ajzen 1991: 186), which were focussing on the topics of life-planning decisions or drug consumption. Moss (2008) refers to Bagozzi, Moore & Leone (2004) who researched individuals’ diet choices and to Cooke & Sheeran (2004) who investigated the decision to vote for a particular political party. In addition, the theory of planned behaviour has been applied in several studies to investigate environmental behavioural intentions (Greaves, Zibarras & Stride 2013; Niaura 2013).

In this part the theoretical model by Fietkau & Kessel (1987) of influential factors on pro-environmental behaviour will be introduced and discussed. The figure below shows Fietkau & Kessel’s (1987) model of ecological behaviour, in which the most important factors that have an impact on pro-environmental behaviours are shown (see figure 4).

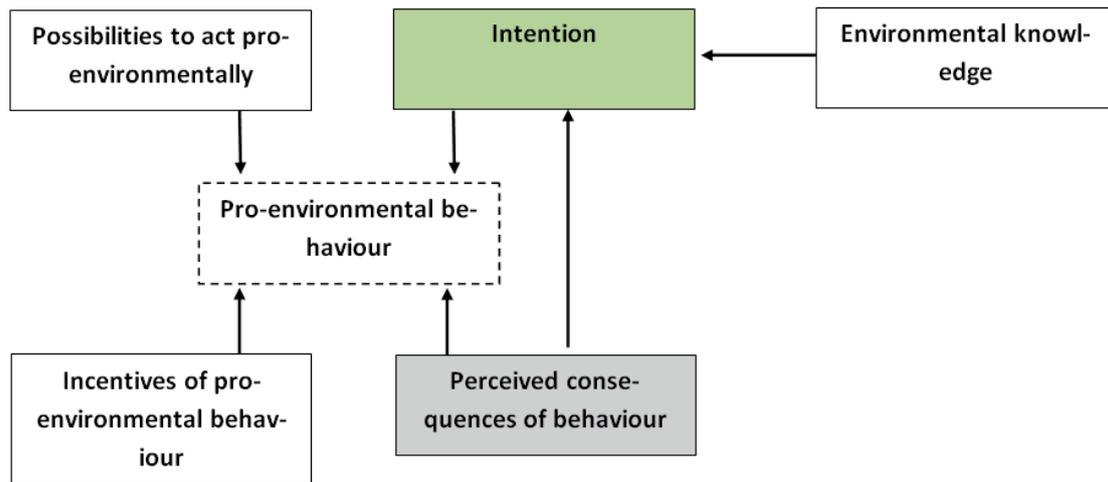


Figure 4 Model of ecological behaviour adapted by Fietkau & Kessel (1987: 312).

Pro-environmental behaviour can be influenced by environmental knowledge that not only has an indirect connection but has a direct influence on environmental attitudes and values. Kollmuss & Agyemans (2002: 246) describe the factor of possibilities to act pro-environmentally as ‘external, infrastructural and economic’. This factor can have a significant impact on actual behaviour, especially if we take a closer look at different cultures. An individual might have certain attitudes regarding pro-environmental behaviour but e.g. a poor infrastructure regarding public transport might affect pro-environmental behaviour negatively or even positively. Incentives for pro-environmental behaviour include internal factors, such as an individual’s low socio-economic status that might increase pro-environmental behaviour. The last factor of the model includes instances of socialization that is very close people of the ‘microsystem’ (Bronfenbrenner 1979). Getting a positive feedback by your family or close members of the family, your friends and peer groups or even teachers at school can have a highly significant effect and can help to encourage pro-environmental behaviour. Kollmuss & Agyemans (2002) call this factor the satisfaction of doing the right thing, and discuss that this extrinsic influence on an individual’s motivation can be regarded both as a social and economic factor. Obviously, the factors of Fietkau & Kessel’s (1987) model that are in ques-

tion can differ from one society to another society but the model offers you the opportunity to include ‘own, special influencing points’ (Kitzmüller 2009: 2).

To sum it up, the theory of planned behaviour (Ajzen 1991) is used in this research study because the theoretical theory by Fietkau & Kessel (1987) is extremely comprehensive; it includes environmental knowledge or incentives of pro-environmental behaviour and centres pro-environmental behaviour which will not be surveyed in this study. The theory of planned behaviour by Ajzen (1991) has been kept relatively general and simple, therefore it offers many possibilities of application and other external areas can be added. Furthermore, Moss (2008) describes the theory of planned behaviour as a very useful tool that can lead to helpful predictions of individuals’ intentions and behaviour, as long as important variations and adaptations to the main research topic are made. Hence, these are the most important reasons why the theoretical research model of the quantitative study is related or at least informed by the theory of planned behaviour.

2.10 Theoretical research model: Quantitative study

The presented constructs and theories lead to the development of a theoretical model for categorizing the research interests (see figure 5 below).

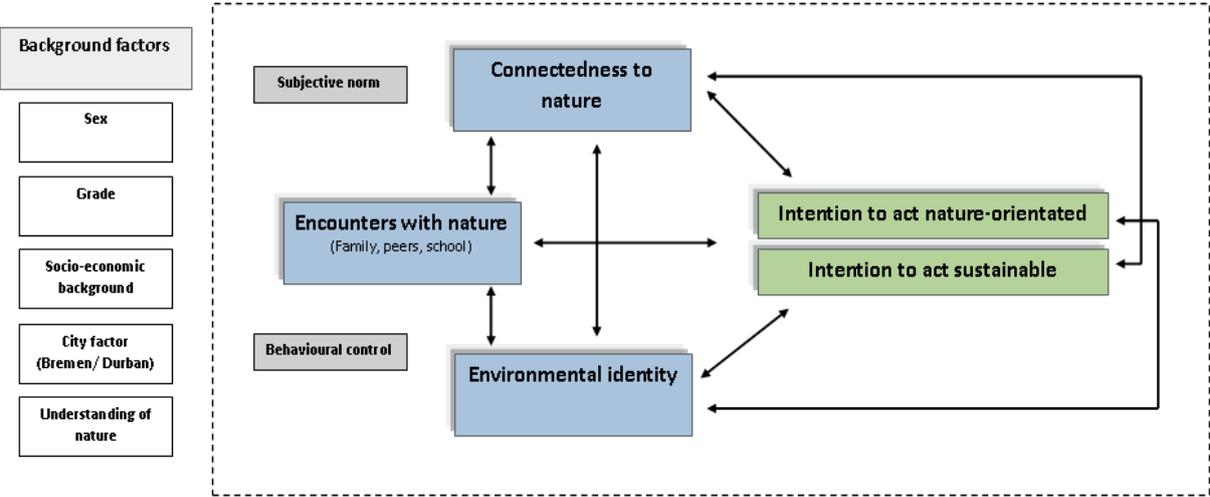


Figure 5 The theoretical model for the quantitative study (own visual material).

The theoretical model for the quantitative study is subdivided into three different areas: firstly background factors, secondly, attitude components, namely encounters with nature, connectedness to nature and environmental identity, and thirdly, intentions to act in a pro-environmental manner. The intentions are separated into the intention to act nature-orientated and the intention to act sustainably. Furthermore, encounters with nature can be shaped by the reference systems of the microsystem (family, peer group, and school), as well as the participant's perceived behavioural control. The middle section of the model can be seen as the most important concepts of the study, which are linked with arrows and can reciprocally determine themselves. The encounters with nature can lead to a certain level of connectedness to nature and environmental identity. It can be assumed that both concepts, connectedness to nature and environmental identity, can influence themselves mutually, as well as the intention to act in a nature-orientated and sustainable way is capable of having a linkage to all the other concepts.

As a fundamental idea of the theoretical model, the following assumption can be seen: emotional experience with nature and emotional bonds with the natural world are the basis for pro-environmental intentions to act in the future. Hence, a crucial precondition to be open-minded and liberal concerning nature and environmental subjects during adolescence and adulthood can be seen in early fundamental childhood experience regarding encounters with nature. Indeed, encounters with nature can be seen as an ongoing influential factor that might have an immense impact on the level of emotional attachment to nature or the environment. All in all, encounters with nature, connectedness to nature and environmental identity can be seen as the motivational basis for intentional nature-orientated and sustainable behaviour. As a rule, the intentions to act are defined as the most relevant behavioural assumption of the model.

Numerous background factors can be identified: the participants' sex, grade, as mentioned before the socio-economic background, the city factor (Bremen/ Durban), as well as their un-

derstanding of nature. Nevertheless, the extent being intended to act in future can seriously be influenced by an individual's present or prospective socio-economic circumstances and among others highlighted in considering the background factors. Based on the assumption that the socio-economic background might have an impact to the main concepts, this factor is added for a further investigation. Finally, another background factor is the individual's perception of nature, which is not included in the path model.

2.11 Research questions, sub questions and hypotheses

According to the described and discussed theoretical framework, concepts and theories the main research questions, sub questions as well as the hypotheses are highlighted.

1. What are the learners' experience of nature?

- How frequently and intensively do they have encounters with nature?
- What influence do the reference systems family, peer group, and school have on the pattern of encounters with nature?
- What types and forms of encounters with nature can be identified?
- Where do they engage in activities in direct contact with nature?

Hypothesis 1: South African and German learners from Durban and Bremen do not spent time in direct contact with nature on a frequent and regular basis [Karlegger 2010; Klassen 2010].

2. What is the learners' connectedness to nature?

Hypothesis 2: South African and German learners from Durban and Bremen have a low level of connectedness to nature [Mayer & Frantz 2004; Karlegger 2010].

3. What is the learners' environmental identity?

Hypothesis 3: South African and German learners from Durban and Bremen have a low level of environmental identity [Clayton & Opatow 2003; Oskamp & Schultz 2005].

4. What are the learners' intentions to act nature-orientated and sustainable?

Hypothesis 4: South African and German learners from Durban and Bremen have a low level of nature orientated and sustainable intentions to act in the future.

5. What is the learners' understanding of nature?

Hypothesis 5: South African and German learners from Durban and Bremen have an alienated and idealized understanding of nature [Brämer 2011; Kollender & Zabel 2013].

6. How do the learners' experience with nature, their connectedness to nature and their environmental identity correlate with their intention to act nature-orientated and sustainable?

Hypothesis 6: The more frequent and regular South African and German participants from Durban and Bremen have encounters with nature, the higher is their level of connectedness with nature [Hinds & Sparks 2008; Cervinka et al. 2009].

Hypothesis 7: The more frequent and regular South African and German learners from Durban and Bremen have encounters with nature, the higher is their level of environmental identity [Clayton 2003; Menzel & Bögeholz 2009].

Hypothesis 8: A positive and significant correlation between the connectedness to nature and the environmental identity can be identified. [Kals et al. 1998; Clayton 2003; Raudsepp 2005]

Hypothesis 9: A positive significant correlation between the constructs 1. encounters with nature, 2. connectedness to nature, 3. environmental identity and 4. the intention to act nature-orientated and sustainable can be identified.

Note that this research study is conducted to fill the gap in literature regarding a comparative approach to investigate the perspectives of the main constructs described. Therefore to a certain extent this survey has an explorative approach.

2.12 Key messages

The key messages of the literature review of chapter two are the following:

- The described grave environmental challenges have attracted the attention of educational and psychological researchers.
- The analysis of the used terminology nature underlines that it is possible to distinguish between specific objects (trees, plants, animals) and an idealized image of nature. A dichotomy between human-beings and their natural surroundings can be identified.
- The term environment sums up all surroundings of a living organism, such as biotic and abiotic features.

Five main theoretical constructs can be identified:

- A couple of similar terms are used to describe meaningful encounters with nature. In this study encounters with nature *are defined as the extent of unstructured, playful, as well as structured, purposeful engagements in various outdoor activities and the degree of confrontation with the living environment*. Meaningful encounters with nature are considered to be a very important influencing factor on all other areas, but a rather rarely performed behaviour, especially in urban areas.
- *The extent of being attracted by the natural world, the drive to be exposed to natural surroundings and the intensity of an individual's emotional bond with all living things* is discussed in the concept of connectedness to nature.
- Environmental identity can be defined as an individual's self-identification with the natural world. Furthermore, it is an emotional state of feeling of relatedness, a wholeness or even simply happiness concerning the environment.
- Connectedness to nature and environmental identity are embedded in every individual's self-concept, and they have a source in human-beings' habits and lifestyle long before industrialization and modernisation of western societies.

- The understandings of nature, *the way in which individuals perceive their natural world*, can be multilayered: A wide-range between an integrated, a dichotomous or even an idealized and romantic perception of nature can be identified.
- The theory of planned behaviour by Ajzen (1991) is kept relatively general and simple (Bauer 2004), therefore there are many possibilities of application and other external areas can be added.
- Besides a few background factors the concepts of encounters with nature, connectedness to nature and environmental identity are defined as the motivational basis for intended nature-orientated and sustainable behaviour.
- The intentions to act nature-orientated and sustainable can be seen as most relevant behavioural assumptions.
- Led by the assumption that individuals' present or prospective socio-economic circumstances can influence the main constructs gravely, the socio-economic background is of special research interest in this study.
- Kattmann's (1994) model is used for this analysis of the open questions and Margadant-Van-Arcken's (1995) model for the categorization of the depicted of natural surroundings regarding the understanding of nature.

3. CHAPTER THREE- METHODOLOGY AND RESEARCH DESIGN

3.1 Introduction

Chapter three is subdivided into two different parts. The purpose of the first part is to underline the partially different backgrounds regarding the setting and the participants in Bremen and Durban, which includes the level of urbanization, the population demographics, green space, access to open water and biodiversity, as well as socio-economic approaches to identity different surroundings, and a brief overview of the school system in both areas (chapter 3.2). Moreover, the important feature of the development stage of the adolescence of individuals in connection with attitudes and behaviour is shown (chapter 3.2.6). Furthermore, the selection for the quantitative and qualitative parts of the study will be discussed (chapters 3.2.7 and 3.2.8).

The second part provides a brief overview of the research design (chapter 3.4), research tools and instruments used for data collection (chapter 3.5) and the chronological sequence of data collection (chapters 3.6). To achieve this, a detailed overview of all measurement instruments used for the standardized questionnaire are presented and discussed, as well as an appreciation of the authorships is expressed (chapter 3.7). Thereafter the statistical and content-related evaluation process of the standardized questionnaire is presented in order to achieve quality criteria (chapter 3.8 and 3.9).

The third part deals with the semi-structured interview (chapter 3.10), in particular the developed semi-structured schedule, as well as a description of all used and adapted tools, instruments and quality criteria. The last part of this chapter focuses on ethical considerations in quantitative and qualitative research (chapter 3.11).

3.2 Setting and participants

In the following, the overall setting of the research study is presented in order to give a brief introduction to the population of the two countries (Germany and South Africa) and cities

(Bremen and Durban), the degree of the urbanization, the distribution of green space of both areas and the structure of the school systems in the two cities.

3.2.1 Urbanization

In order to illustrate the status of urbanization degree in both target regions, the latest statistics are provided. In Germany, 74% of all inhabitants lived in urban areas in 2012 (United Nations 2015). A similar degree of urbanization can be seen in South Africa, where the proportion of people living in urban areas in 2011 was 62% (Turok 2012). Large differences can be identified regarding the extent and level of urbanization in the different countries, caused by multi-layered framework conditions of diverse societies. According to the United Nations Statistics Division (2015), these circumstances can be summarised by stating:

Because of national differences in the characteristics which distinguish urban from rural areas, the distinction between urban and rural population is not amenable to a single definition applicable to all countries. (United Nations Statistics 2015: <http://unstats.un.org/unsd/demographic/sconcerns/densurb/densurbmethods.htm>)

For such reasons in this study, both investigated areas are defined as urban areas.

3.2.2 Population

In 2011, the total population of Germany was 80.5 million and an average population density of 229 inhabitants per square kilometre (Statista 2015) can be found. Relating to Census of 2011, the total population of the federal state of Bremen (including the city Bremerhaven) was 657.965 with an average population density of 1562 inhabitants per square kilometre. In 2013, the total population of South Africa was 53.7 million and an average population density of 44 inhabitants per square kilometre (Statista 2015) can be found. Relating to KwaZulu-Natal Department of Health (2015), the total population of Durban Metro/ eThekwinini was 3.2 million with an average population density of 2294 inhabitants per square kilometre. Indeed, the

region of Durban can be seen as a metropolitan region with almost five times more people living in the city.

3.2.3 Green space, access to open water, and biodiversity

In order to reflect the assumption that Bremen and Durban have different basic requirements regarding green space and biodiversity and derived from that other possibilities to have encounters with nature, the amount of green space in both areas and the outstanding importance of variety of species in the region of Durban are being stressed. The term green space can be defined as a ‘network of green elements, [that is] a physical infrastructure playing a role in water management, in the urban micro-climate and in biodiversity’ (Attwell 2005: 16). Such closeness to nature, but largely artificial green spaces can be considered to be destinations for various activities in direct contact with nature in urban areas where their proportional areas are taken into consideration.

Bremen

In Germany, the amount of green space was reduced by approximately 875.000 hectares between 1900 and 2009. The same trend can also be seen in the federal state of Lower Saxony (Niedersachsen) and Bremen⁴ as the quantity of green space decreased by 6.54% between 2003 and 2012 (Bundesamt für Naturschutz 2014). Bremen and Bremerhaven have different parks, gardens, and other green spaces in the city. Bremen has the Bürgerpark and the Weserdeich, and Bremerhaven has large parks like the Bürgerpark and Speckenbütteler Park directly located at the North Sea. All in all, the proportion of green space in the federal state of Bremen is 2.352 hectares in 2013 (Umweltbetrieb Bremen 2015). In order to provide impressions of the city of Bremen and Bremerhaven, the pictures below are shown. Figure 6 demonstrates

⁴ Note that the status of the federal state of Bremen is an enclave surrounded by the federal state of Niedersachsen.

the River Weser as the main feature of the city of Bremen, and figure 7 shows the port area of Bremerhaven as its major characteristic.



Figure 6 The River Weser as a main feature of the city of Bremen (Klickbrett 2015).



Figure 7 The port area as the major feature of the city of Bremerhaven (Bremerhaven.de 2015).

Durban

Durban is situated on the eastern seaboard of South Africa within the province of KwaZulu-Natal. The Conservation Biology Department (2004: 5) describes Durban as having a broad range of ‘open space types’ like grasslands and forests, in which ‘corridors’ habitats can be found, that allow the ‘flow of genetic material and links to other sources of biodiversity’. Furthermore, in contrast to Bremen, the region of Durban is introduced as a contrasting factor regarding the diversity index of the region. Durban is described as a region of high diversity of marine (Roberts et al. 2002) and botanical (Forest et al. 2007) life forms. Moreover, Durban has a wide spread open space system and is a biological hot spot, which is illustrated in figure 8.

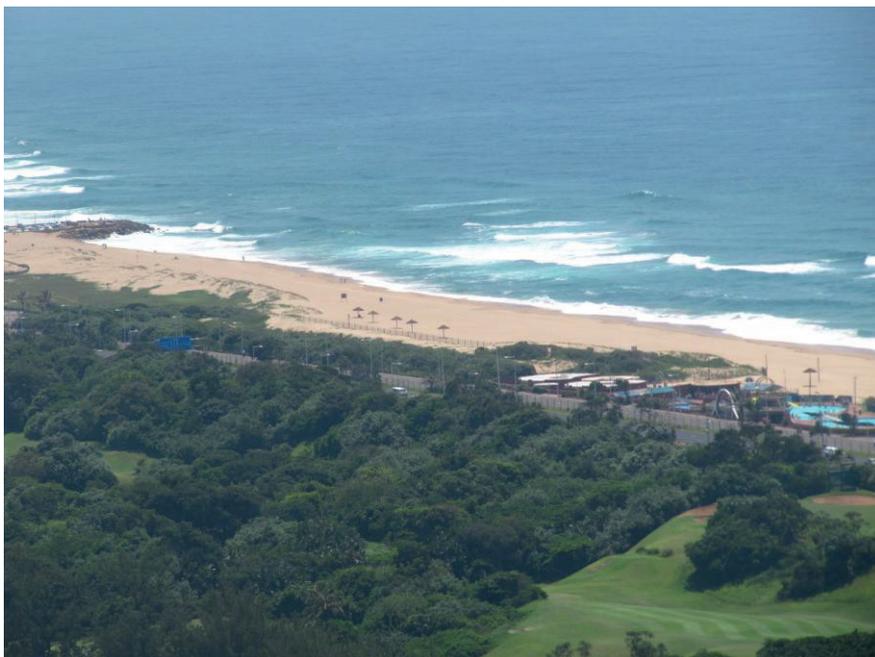


Figure 8 The coastline of Durban as main feature of the city in 2013 (own visual material).

3.2.4 Socio-economic indicator

In order to analyse and emphasize the dissimilar socio-economic surroundings in both areas, methodical approaches to identify rather weak or strong areas the report ‘Sozialindikatoren’ of the municipality of Bremen and the quintile system to support schools with their day-to-day-tasks are discussed.

In the following discussion, the sample selection of contrasting schools is justified and the description of selection criteria will be provided. In their approach of promoting people's health with the help of green space development in cities, Hornberg, Buinge & Pauli (2011: 13) emphasise the important indication of disadvantageous and underprivileged life situations ('benachteiligten und benachteiligenden Lebenslagen'), within the research topic of environmental justice. Hornberg, Buinge & Pauli (2011) conclude that such frameworks deeply minimize the individuals' possibilities and limits of social involvement. As part of this study, limiting factors can be the different financial resources of the participants' parental homes, e.g. to engage in expensive excursions as well as holiday trips, which can lead to direct contact with nature and outdoor activities in nature.

Bremen

The study uses the approach to identify contrasting residential areas within Bremen and Bremerhaven to uncover schools that are located in these areas. The report indicates the following features considering residential areas like Gröpelingen, Vahr, Woltmershausen and Walle are

[...] sowohl bezüglich der äußeren Bedingungen in einer kritischen Lage [...] (überproportionaler Anteil an Migrantinnen und Migranten, bildungsferne Elternhäuser, schwierige sozioökonomische Lage)[und] als auch im Inneren Krisensymptome zeigen (schwache Lernergebnisse, eine hohe Zahl von Schülerinnen und Schüler, die die Schule ohne Abschluss verlassen). (Die Senatorin für Arbeit, Frauen, Gesundheit, Jugend und Soziales 2010: 211)

Summing it up, we can say that the report defines these districts to be in a critical situation caused by a disproportionate number of people with immigrant background and educationally disadvantaged backgrounds, as well as unfavourable socio-economic situations. Such circumstances lead to weak learning outcomes and to a high proportion of learners that leaving school without qualifications. In regard to the above mentioned schools, we can say that they

are in a socio-economic weak status in which Gröpelingen can be seen as the weakest district of all mentioned in the report. On the contrary the districts of Findorff, Lehesterdeich, Horn, Habenhausen and Schwachhausen have schools which are located in a high socio-economic environment, in which Schwachhausen is in third place of all districts.

As the report does not provide detailed information about the area of Bremerhaven, another paper was used ('Bericht zur wirkungsorientierten Planung und Steuerung der Kinder- und Jugendhilfe in der Seestadt Bremerhaven' by Amt für Jugend, Familie und Frauen Bremerhaven 2009), that projects similar criteria:

Mit Hilfe des Indexwertes für soziale Belastung kann gezeigt werden, welche Ortsteile Bremerhavens durch eine - im intrakommunalen Vergleich - Konzentration von Belastungen und Problemlagen gekennzeichnet sind. (Amt für Jugend, Familie und Frauen Bremerhaven 2009: 52)

Very similar to the other paper, this report focuses on economic or social burden of districts within Bremerhaven, but uses slightly different criteria. The district of Geestemünde Nord is defined to have a below average index value of 0.29, which is equivalent to a rather low socio-economic status.

Durban

To provide background of the national quintile system of South Africa, it is very important to underline, that all public schools are divided into five quintiles or groups according to the allocation of financial resources. Quintile 1 schools can be defined as the poorest, and the least poor schools are in quintile 5. In addition to this:

Each national quintile contains 20% of all learners, with Quintile one representing the poorest 20% and Quintile five the wealthiest 20%. However, provincial inequalities mean that these quintiles are unevenly distributed across the province. (Czerniewicz & Brown 2014: 12)

Relating to the Minister of Education in the Western Cape (2013) the rankings are determined according to infrastructural factors and an assessment of the quality of the community around the school, so the 'amount of funding that it receives each year' is determined. This approach of the national school nutrition programme is income-orientated, and focuses on schools with a poor socio-economic status 'primarily those in rural, farm schools and schools in informal settlements' (KwaZulu-Natal Department of Education 2012: 40). That is the reason why only quintile three, quintile four, and quintile five schools can be found in Durban, which also means that the largest proportion of learners are fee-paying.

3.2.5 School systems and natural sciences/ biology

Both regions, Bremen and Durban do have forms of school organization and basic ideas to structure the school subject of natural sciences and biology.

The German school system

In Germany, all 16 federal states have their own educational system with specific refinements. In general, the German tripartite educational system starts with a four-year primary school after followed by two different school types: Oberschule and Gymnasium. Learners attending at the Oberschule enjoy collaborative learning till grade 10, in which they are taught in different levels of requirements. At the Gymnasium learners can acquire subject-specific theoretical knowledge and extended general education, preparing them for studies and occupational training ending with Abitur examination (Senatorin für Bildung und Wissenschaft 2015).

Natural Sciences and biology in Bremen

Since 2004, science subjects are characterized by an outcome-orientated curriculum (KMK 2004), which focuses on the learners' options for action, problem solving strategies (de Haan 2007), as well as ethical assessment competences shall be strengthened (Barkmann & Bögeholz 2003; Eggert & Bögeholz 2006; Mittelsten Scheid & Hößle 2007).

Science and technology have a great influence on all parts of society, in which the Natural Sciences education at schools shall provide key competences: ‘Der naturwissenschaftliche Unterricht befähigt die Lernenden, ihre natürliche und technische Umwelt aus einer naturwissenschaftlichen Perspektive zu erschließen‘ (Senatorin für Bildung und Wissenschaft 2010: 7), which means that, Natural Science education focuses on enabling learners to allow access to the natural world, as well as to the complex technical world. Natural Sciences follow a phenomena-orientated, activity-based, and learner-centred approach.

The South African school system

Schools in South Africa and Durban are organized in a three-tier system of education and are closely connected to the British school system. Education starts with the primary school from grade 1 to grade 7, followed by the secondary school from grade 8 to 9 (compulsory) and grade 10 to 12 (non-compulsory). As a general rule, learners wear school uniforms, and many schools offer comprehensive, coeducational teaching. In South Africa the level of facilities and equipment, as well as the range of subjects differs according to the rural and urban schools.

The idea of social reconstruction ideology (Mnguni 2013) of the South African educational system emphasizes the importance to foster the learners` ability to perceive and to interpret current social issues. Furthermore, this approach is compatible with the past, present day and future sustainability of a society (Schiro 2008). Probably this critical perspective is caused by the past days of Apartheid and is synthesized in the Revised National Curriculum Statement:

A prosperous, truly united, democratic and internationally competitive country with literate, creative and critical citizens living productive, self-fulfilled lives in a country free of violence, discrimination and prejudice. (Revised National Curriculum Statement 2002: 4)

The South African society has set itself huge goals on a very different levels, which are summed up in the Millennium Development Goals (United Nations Development Programme 2013), that aims to transforming the South African country in every situation of life; e.g. goals to accomplish are to achieve universal primary education, or to ensure environmental sustainability.

Natural Sciences in South Africa

Relating to the Revised National Curriculum Statement of grade 7-9, the time allocation for Natural Sciences on percentage of time is 13%, in which the outcome-based educational approach ‘strives to enable all learners to achieve to their maximum ability’ (Department of Education 2005: 11), focusing on the learner-centred and activity-based education. For Natural Sciences three particular outcomes are outlined:

- i. Through scientific investigations the learner shall be enabled to solve problems.
- ii. The learner is guided to interpret and apply his scientific knowledge.
- iii. The learner shall be enabled to understand linkages between ‘science and technology, society and the environment.’ (Department of Education 2005: 14)

Educational researchers claim ‘to promote science and technology as means of improving livings standards’ as well as to take South Africa’s society forward by fostering young peoples’ ‘enthusiasm’ for these subjects (James, Naidoo & Benson 2008: 2).

3.2.6 Adolescence, attitudes and behaviour

The age of the participants is an important factor. In consideration to choosing a particular age of the participants used in the study, two different aspects that have a linkage to encounters with nature and the development of emotional bonding and world views are provided. The adolescence is defined as a 10 year phase of life, in which very important development-related

changes occur, in which three age ranges can be identified (Steinberg 1993): (1) Early adolescence is between eleven and 14, (2) middle adolescence between 15 and 17, and (3) late adolescence between 18 and 21. Adolescence is marked by grave personal changes, as well as physical and psychological modifications (Havighurst 1953). Within the list of development tasks, at least two are connected to the main theme of the study, namely the development of and the individual's world view, and the development of an individual's future perspective (Dreher & Dreher 2008).

3.2.7 Sample size of the quantitative study

An optimal sample size can be economical and may provide clear statistical results. In order to achieve that it is very important to calculate a correct number of participating learners that fill in the questionnaire. On one hand, the sample size shall not be too small, but on the other hand it should not be too big. For the main study a clustered sampling method is used, in which on the basis of a detailed individual review generalizing statements can be deducted (Mossig 2012). This approach is possible because population of all learners from grade eight to ten in both countries has already been clustered in various groups (districts, schools, grade level, and classes). Following this up, the minimum sample size that may provide significant results for a defined population can be calculated (Mossig 2012). The total number of learners in Bremen and Bremerhaven in grade eight to ten is 14.815 learners (Senatorin für Bildung 2013). In figure 9 the calculation of the minimum sample size for schools in Bremen is presented⁵. As shown, in Bremen the total minimum sample size can be defined as $n=375$ and in Durban $n=382$ participants⁶. In both countries this sample size is doubled. Due to this approach, an appropriate, achievable, and correct sample size can be identified.

⁵ A detailed description of calculating the minimum sample size for quantitative research can be found in von der Lippe (2011), or in Mossig (2012: 21), where the mathematical formula and the variables are underlined.

⁶ Note that for the calculation of the minimum sample size in Durban, the number of learners in the Umlazi district were used Department of Basic Education (2011: 20).

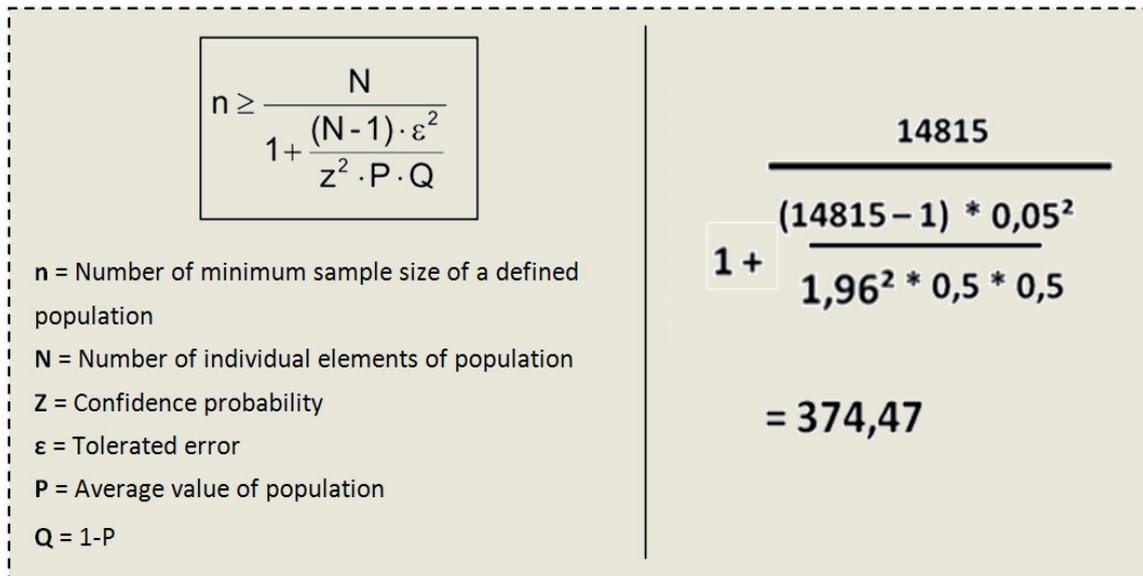


Figure 9 Example of calculating the minimum sample size for Bremen related to Mossig (2012).

3.2.8 Sample size of the qualitative study

As described, the main focus is set on the quantitative questionnaire survey; the sample size for the deepening qualitative study is conducted on a smaller scale. In this approach extreme groups of participants regarding their connectedness to nature evaluation are developed. Data that is gathered within a more or less homogeneous sample may be interpreted incorrectly because given answers might be identical or very similar, and just a small range or border regions can be collected. Hence, a sample must not be too homogeneous to ensure comparability of data (Witt 2001). In both countries the sample size is ten participants (five females, five males, as well as five with a rather low connectedness to nature, five with a high connectedness to nature). It is assumed that no theory-relevant topics can be found after repeated conduction of the interviews. The qualitative interviews are conducted to deepen the insight of certain relevant segments like the learners' lived experience with nature, their prior knowledge about nature and their cultural background.

3.3 Key messages

- Germany (74%) and South Africa (62%) have a comparable level of urbanization.
- Both target regions have a high degree of population density (Bremen 1562 and Durban 2294 inhabitants per square kilometre)
- The region of Durban is defined as an ecological hotspot, justified by a kilometre long coastline, a diverse marine and botanical biodiversity.
- All 16 federal states in Germany organize their school system independently, which leads to a broad range of organisational forms. After primary school Bremen has two different type of educational systems (Oberschule and Gymnasium) which end with the equivalent qualification (Abitur). In particular, science subjects focus on learners' options for action, problem solving strategies, and ethical assessment competence.
- South Africa's nine provinces have one nationwide school system. There are public and private school offerings and some of them have different curricular. After primary education, school careers can end up the qualification of matriculation. Learners should be encouraged to become creative and critical citizens and aiming to implement the Millennium Development Goals.
- Within Bremen social indicators of the residential areas and in Durban the quintile system of school fundings are used to identify ten schools for sample selection.
- The participating learners are in grade 8-10.
- Minimum sample size for quantitative study is 375 learners in Bremen and 389 in Durban; both numbers are more than double.
- Ten learners are interviewed in each target group. The criteria for selection are contrasting types in the level of connectedness to nature.
- All participating learners in the research study have their rights and needs which have to be respected and protected at all times.

3.4 Research design

In educational, social and behavioural research, at least three different ‘world views’ (Morgan 2007: 50) or overall approaches are described: quantitative, qualitative and a mixture of both techniques. All three approaches lead to certain research styles, such as ‘questions, data collection, data analysis, interpretation, write-up, validation’ (Cresswell 2008: 5). In this case one complete method as the core project (quantitative) plus a supplemental strategy (qualitative) following a research design with the main weighting set on the quantitative study is conducted (Tashakkori & Teddlie 1998; Cresswell & Plano Clark 2007). Basically this ‘explanatory design’ (Creswell & Plano Clark 2007: 85) makes it possible to gather deepening and additional data regarding the research questions. Hence, in this convergent parallel design, one type of data provides a basis for collection of another type of data. In the first part, a wide-range standardized questionnaire will be used to collect quantitative data, followed deepening semi-structured interview schedule with chosen participants. The questionnaire focuses on 8th to 10th grade learners in both countries, in which contrasting types of schools are chosen. Additionally, data of the specific context of each school will be gathered. This approach seeks convergence, corroboration, and correspondence of results from the different methods and an overall interpretation (Greene, Caracelli & Graham 1989).

Krosnick Visser, & Lavrakas (2000: 406) see that ‘survey research is a specific type of field study that involves the collection of data from a sample of elements [...] drawn from a well-defined population [...] through the use of a questionnaire’.

In this case Bremen’s and Durban’s grade eight to ten learners can be defined or shall be characterised as the population with specific features and conditions, in which the research design helps to gather data about the learners’ attitudes, ideas, and opinions regarding environmental issues (see figure 10).

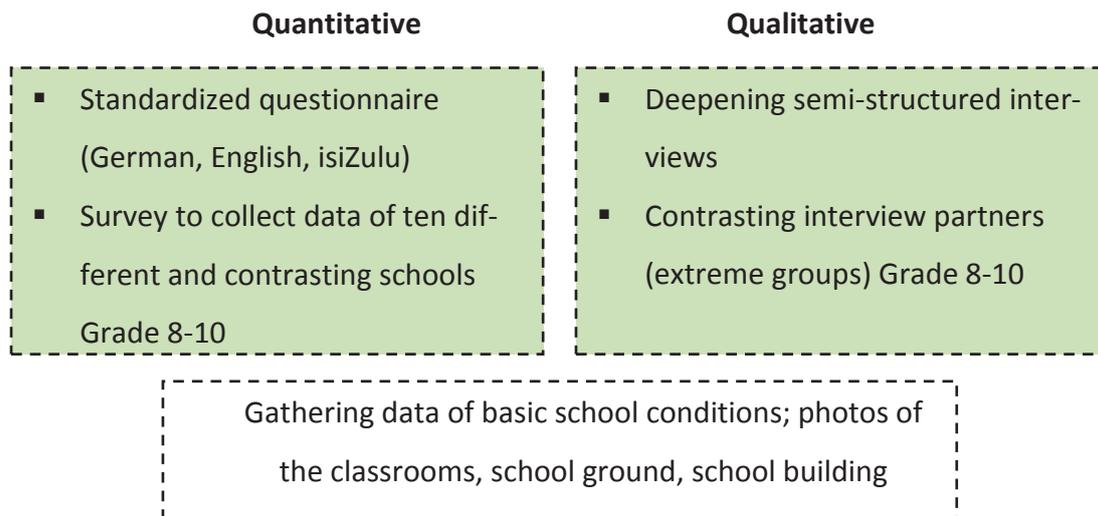


Figure 10 The research design of the study.

In other words, the study has a quantitative and a qualitative part, but the major focus is set on the quantitative measurement. The qualitative data which is gathered will be used to support and to underline the results of the quantitative part of the study.

3.5 Tools and instruments of data collection

In the following, the chronological sequence of data collection, the survey instruments standardized questionnaire and the semi-structured interview schedule are presented. The primary goal of this section is to illustrate the genesis of the standardized questionnaire and to outline the used and adapted instruments.

3.6 Chronological sequence of data collection

The first phase of quantitative and qualitative data collection started in April 2013 in Bremen at Oberschule an der Helgolanderstraße, Freie Evangelische Bekenntnisschule and Gesamtschule Bremen West (see figure 11). From April to July 2014 it was possible to hand out the questionnaire and have interviews with participants at Oberschule Findorff, Oberschule Ronzelenstraße, Oberschule Roter Sand and Ökumenisches Gymnasium. Quantitative and qualitative data collection in Durban was conducted in two phases from August to September 2014 at Chesterville Secondary School, Ridge Park College, Fairvale Secondary School, Centen-

ary Secondary School and Bonela Secondary School, and in April 2015 at Sea Cow Lake Secondary, KwaSanti Secondary, Margot Fonteyn Secondary, Queensburgh High School and Werda Secondary School. The researcher collected all data himself in both countries.

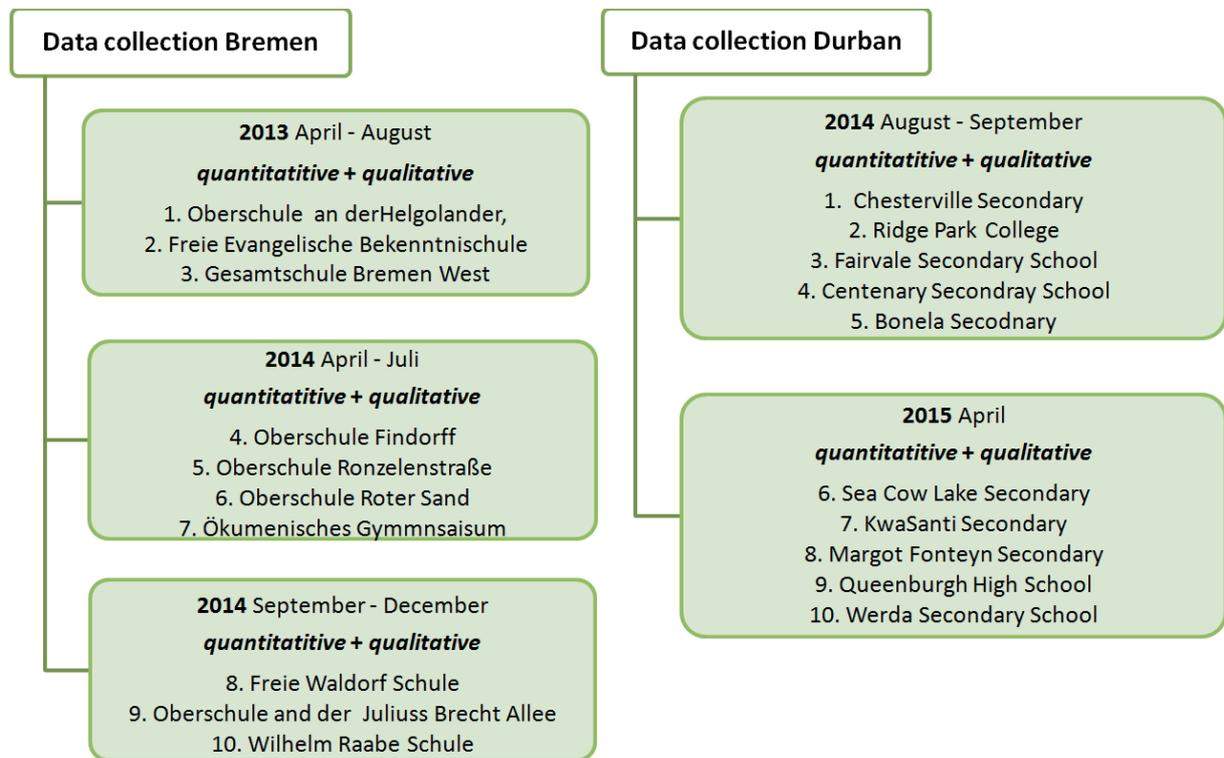


Figure 11 Chronological sequence of data collection.

3.7 Quantitative survey: standardized questionnaire

Due to the fact that a conglomerate of different existing and tested instruments as well as new developed tools derived from other scales are used in the standardized questionnaire, the development was documented for evaluation purposes. Since April 2013 the questionnaire has been developed and validated in a multiphase testing period at the Oberschule an der Helgolander Straße. In addition to that, ten randomly chosen learners were able to participate in the second validation phase, in which an audio recording of three participants reading and filling in the questionnaire was conducted and has been analysed afterwards. This method was used to identify language problems and as a result, certain words were replaced with more under-

standable words. An example for such changes in the German questionnaire is item two in the connectedness to nature scale: Instead of *'Ich fühle mich häufig eins mit der mich umgebenden Natur'* [I often feel a sense of entity with the natural world around me] this phrase was used *'Ich habe oft ein Gefühl der Einheit mit der natürlichen Umwelt, die mich umgibt'* [I often have a feeling of unity with the natural environment that surrounds me]. An example for a change in the English questionnaire is item ten in the environmental identity scale: Instead of *'My own interests usually seem to coincide with to the position advocated by environmentalists'* this phrase was used *'My own interests usually seem to conform to the position advocated by environmentalists'* [Meine Interessen stimmen im Allgemeinen mit den von Umweltschützerinnen und Umweltschützern vertretenden Positionen überein].

In Durban the English version of the questionnaire was tested with a group of 14 grade seven to ten learners in July and August 2013. The questionnaire was also translated into isiZulu to take account of the fact that this language is the mother tongue of some learners (49.8% English, 33.1% Zulu, 5.9% Xhosa, 3.6% Afrikaans, and 7.6% other) (Statistics South Africa 2011). Finally the fifth version of the questionnaire was used to gather data. In the following, the content of the questionnaire, measurement techniques, scales and their internal consistency, single items, numbers of used items, as well as examples of questions will be presented. Due to the fact, that the biggest part of the used scales and items were adapted or reformulated, the original authorship will be described and appreciated. Table 1 below shows the most important information of all categories respectively scales, it provides information about what is being measured with each scale, answers the question if the instrument uses open statements or a Likert scale, and additionally item examples are given. In chapter 2 all concepts described are operationalized in the standardized questionnaire using instruments that have been published and frequently used in a partial manner in different approaches and studies. These are the connectedness to nature scale by Mayer & Frantz (2004) and the environmental identity scale by Clayton (2003). Other scales that are used in the questionnaire

have been adapted and slightly changed using existing scales, such as encounters with nature by Cervinka et al. (2009), Zeidler (2009) and Kühn (2012), intention to act in a nature-orientated and sustainable way derived from Clayton (2003) and Kaiser (1998) and Schultz & Zelezny (1998), subjective norm by Hinds & Sparks (2008); and Karlegger (2010), behavioural control by Wilhelm (1999) and understanding of nature by Kühn (2012) (see table 1).

Table 1 The overview of the questionnaire.

Categories/ scales	What is measured?	Format	Items	Example	Authorship
Encounters with nature	With family, peer, school	Open / 5-step Likert	6 / 9	'In which activities in nature do you engage together with your school?'	Cervinka et al., (2009); Zeidler (2009); Kühn (2012)
Connectedness to nature	Self-identification and emotional bond with nature	5 and 10-step Likert	13 / 1	'I often feel a sense of oneness with the natural world around me.'	Mayer & Frantz (2004); Cervinka (2005)
Environmental identity	Self-identification with the environment	5-step Likert	24	'In general, being part of the natural world is an important part of my self-image.'	Clayton (2003)
Intention to act nature-orientated	Behavioural intention	5-step Likert	6	'During the next year, I intend to spend more time doing activities in nature.'	Clayton (2003)
Intention to act sustainable	Behavioural intention	5-step Likert	7	'In future, I will look for ways to reuse things.'	Kaiser (1998); Schultz & Zelezny (1998)
Subjective norm	Norm and motivation to relate that (family, peer, school)	5-step Likert	6	'The time spent in with my friends in contact with nature is very important for me.'	Hinds & Sparks (2008); Karlegger (2010)
Behavioural control	Self-efficacy expectation	5-step Likert	1	'If I wanted to, I could spend time in nature more regularly.'	Wilhelm (1999)
Understanding of nature	Perception on naturalness	10-step Likert	14	'Please state your feelings towards the depicted surroundings.'	Kühn (2012)
Background factors	Age, sex, grade, socio-economic background (residential area), school name	Open	5	'How old are you?'	Karlegger (2010)

In the following the standardized questionnaire will be presented and major features are highlighted for each category and scale.

3.7.1 Encounters with nature

In order to measure the participants' time spent outdoors and being engaged in activities in nature, 19 items are used in the questionnaire. The main part of the items was adapted by Zeidler (2009), Cervinka et al. (2009), and Kühn (2012) and reformulated with respect to the reference systems (family, peer group, and school) by Bronfenbrenner (1979). Examples are 'Do you engage in any activities together with your friends where you are in contact with nature (woods, mountains, field, lake, and ocean)?', or 'How many hours on average did you invest in such activities in nature?' In the former, it is possible to answer the questions using a five step Likert scale; in the latter, one open question is used. In addition to the items measuring current engagements with nature, there are two items used to measure the individuals' previous encounters with nature adapted and reformulated by Kals, Schumacher & Montada (1998) and Karlegger (2010) and can be answered by using a five step Likert scale. Examples for these statements are the following: 'During my childhood I spent a large part of my time in direct contact with nature.', or 'During my childhood I spent a large part of my time in direct contact with nature with my friends involved'.

3.7.2 Connectedness to nature scale

The connectedness to nature scale measures positive emotional feelings regarding nature and the degree of which the individual identifies itself with nature. The original scale by Mayer & Frantz (2004) has 14 items; in this case, a 13 item scale version was used. The participants are asked the following question: 'Please answer the following questions in terms of the way you generally feel. There is no right or wrong answers.' Examples of statements used in the scale are 'I often feel as part of the web of life', or 'I often feel a sense of oneness with the natural world around me'. This instrument is used to collect data regarding prediction of behaviour relating to lifestyles and ecological actions of the individuals. The questions are rated on a five point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Internal consistency of the

connectedness to nature scale is Cronbach's Alpha between $=.79$ to $=.84$ (Mayer & Frantz 2004; Zeidler 2009; Karlegger 2010).

3.7.3 Single item connectedness to nature

In addition a further simple screening regarding the connectedness to nature by Cervinka (2005) is used in the questionnaire. The single item connectedness to nature instrument measures the current emotional connection of an individual using a ten step Likert scale asking the following: 'How connected are you to nature? Please answer the question using the following scale, whereas 10 mean 'very high' and 1 'very low'. Tick off!'. This screening has been used frequently in different studies, e.g. by Cervinka, Hefler, Karlegger & Zeidler (2009) or Karlegger (2010).

3.7.4 Environmental identity scale

The environmental identity scale by Clayton (2003) was created to determine individuals' level of identification with the environment. The original version has 28 items; in this case a version with 24 items is used by asking the following question: 'Please answer a few questions about your actions and your way of thinking, rating the extent to which you agree or disagree with the following statements.' Two examples of this scale are 'I think of myself as a part of nature, not separated from it', or 'If I had enough time or money, I would certainly devote some of it to work for environmental protection.' The questions are rated on a five point Likert scale from 1 (strongly disagree) to 5 (strongly agree). This scale has a very high Cronbach's Alpha internal consistency between $=.90$ to $=.93$ (Clayton 2003; Karlegger 2010).

3.7.5 Intention to act in a nature-orientated and sustainable manner

To measure the participant's intention to act in a nature-orientated manner and sustainable, two different scales have been developed by asking the following question: 'In the following there will be a few questions about your future behaviour.' Examples for these two scales each with seven items are 'During the following year I intend to spend more time in activities

in nature’, or ‘In future, I will recycle newspapers, glass, or other items on a regular basis.’ Basis for the two designed scales is to measure the intention to act in the future in a pro-environmental way were items referring to the literature for environmental behaviour. In the first intention act nature-orientated scale, items of Claytons (2003) environmental identity scale are reformulated with respect to prospective pattern of behaviours.

The intention to act sustainable scale, which is a mixture of several fields, namely focuses on willingness to engage in activities in nature (Kühn 2012), *pro-environmental behaviour* by Schultz & Zelezny (1998), *general ecological behaviour* by Kaiser (1998), *environmental behaviour* by Nooney, Woodrum, Hoban & Clifford 2003), and *consideration of future consequence* (Stratham, Gleicher, Boninger & Edwards 1994). To sum it up: only a few items are used from each of the mentioned scale and afterwards reformulated with respect to intended behaviours.

3.7.6 Subjective norm

To give meaning to the importance of the participant’s important persons of the microsystem, the questionnaire has ten questions measuring their influencing factor on encounters with nature by asking the following: ‘Who are close people who accompany you during your time spent in nature? Please answer the following questions using the scale on the right side.’ Question examples of the subjective norm are ‘My teachers encourage the time I spend in nature.’, or ‘The time spent with my friends in contact with nature is very important for me.’ In this case the reference systems family, peer group, and school are being investigated. The items were adapted and reformulated by Hinds & Sparks (2009) and Karlegger (2010).

3.7.7 Behavioural control

One item is used to measure the perceived behavioural control of the individuals’ on their encounters with nature: ‘If I wanted, I could spend more time in nature.’ This item is adapted and reformulated by Wilhelm (1999).

3.7.8 Understanding of nature

In order to gather data regarding the participants' perception and judgement of nature, two different types of questions are used: On one hand, an open question ('What is nature for you?'), and on the other hand, 14 landscapes are depicted in the questionnaire by asking 'Please state your feeling towards the depicted surroundings, using the scale from 10 'very natural' to 1 'very unnatural' and tick off!' The scales were adapted by Kühn (2012) and personal, as well as pictures that are on public display; two examples are shown below in figure 12 and 13.



Figure 12 A mountain stream as an example of a nature picture.⁷

⁷ Note that a list of the picture sources can be found in the annex.



Figure 13 An elephant in the wilderness as an example of a nature picture (own visual material).

3.7.9 Socio-demographic data

To survey socio-demographic data and background factors five questions are being asked regarding the participants' age, sex, grade, residential area, and school's name. These items were adapted and reformulated by Karlegger (2010).

3.8 Statistical evaluation

All statistical data of the standardized questionnaire are evaluated with SPSS 22. Hereby the following mathematical-statistical analysis methods are used: reliability analysis, factor analysis, two sample t-test of mean scores, one-way ANOVA, effect size, regression analysis and Pearson two-sided correlation. In the following a short introduction to the used data analysis method will be given to highlight the key concepts and justify the use of these approaches.

The **reliability analysis** is a test instrument to analyse an instrument for example a scale with a certain number of items. This reliability analysis can be considered as an important criteria for the test quality. In order to validate the questionnaires scales and its sub scales the Cron-

bach's Alpha model is used. This model is based on the average correlation among the items of a scale and provides information on the reliability of a used scale. Cronbach's Alpha uses scores between 0 and 1. Hence, the higher the scores the better internal consistency of the items used in the scale. Scores above 0.8 are preferable (Schermelleh-Engel & Werner 2011).

The approach of a **factor analysis** can be used for the reduction of data within a used quantitative instrument. A factor analysis can be obtained with the aim to produce indicators with variables which measure very comparable concepts. On one hand it can be helpful for exploratory reasons, when there is a new designed scale which was not used or analysed before, and on the other hand, for confirmatory purposes if for instance, the number of variables are known from the literature which is available. Consequentially, it is necessary to interpret the results in order to come to the decision whether changes have to be done, e.g. to leave certain items out of the whole instrument (Bruin 2006).

In particular, the **two-sample t-test** is used to compare the both groups. According to Rasch, Frieese, Hofmann & Naumann (2004) the fundamental conditions to apply the two sample t-test are the following: the feature being examined is an interval scale, the feature is normally distributed in the population⁸, and the examined populations in which the feature is examined are of the same size. Hence, the two sample t-test can be considered as one of the most commonly used tests performed in quantitative studies with a comparative perspective. In this study the two sample t-test is used to set light on the question if the mediocre differences regarding key concepts of the quantitative approach of two contrasting groups (e.g. Bremen and Durban) are significant value. A two-sample t-test is significant, if the value is smaller than the used level of significance α , which is standard in this case .05 (5%) (Bruin 2006).

In many case the two sample t-test of mean score for independent samples is a suitable instrument to analyse data of different populations. In addition, the **univariate ANOVA** for

⁸ Note that according to Kolmogorov-Smirnov goodness-of-fit test the features being examined are not normally distributed.

more than two independent samples is a data analysis instrument which helps to compare more than two different population groups (analysis of variance). Hence, the core concept of this ANOVA is to evaluate the mean scores of at least three different populations (Cohen 1988).

The **effect size** can be used for purposes to give meaning to significant results that are achieved by t-test or ANOVA comparative analysis strategies. If very large sample sizes are achieved, very small effects can cause a statistical significance. In such cases it is not particularly relevant if an effect can be measured at all, but you can see how strong the effect really is. Furthermore, the conventional definition of the effect size Cohen's d (1998) is the following and can be found in Rasch, Frieze, Hofmann & Naumann (2004):

Small effect d = .20

Mediocre effect d = .50

Strong effect d = .80.

The **Pearson correlation** (r) can be considered as a valid indicator to describe a linear correlation between two interval scaled variables. Hence, a correlation analysis can help to show if a causal relationship between variables is recognizable and to understand the level of relation between the selected features. For the Pearson two-sided correlation between the used constructs, the subsequent overview of significance by Brosius (2002: 503) can be used (see table 2 below).

Table 2 Overview correlation level (Brosius 2002: 503).

Correlation value	Level of correlation
0	No correlation
More than 0 - 0.2	Very weak correlation
0.2 - 0.4	Weak correlation
0.4 - 0.6	Mediocre correlation
0.6 - 0.8	Strong correlation
0.8 - under 1	Very strong correlation
1	Perfect correlation

If the scores are negative, an inverted correlation between the constructs can be identified.

The **regression analysis** is an elaborate statistical analysis technique that allows the researcher to reveal relationships between different variables. At least two different aspects of a regression analysis can justify its application: Firstly, the correlation between an outcome variable and influential variables can be determined. Secondly, the scores of the outcome variable can be estimated respectively or even predicted with values of the influential variables. This aspect seems to be very useful in environmental education as well as psychology behind decision making processes (Bruin 2006).

3.9 Factor analysis

Although the connectedness with nature scale and the environmental identity scale have been commonly used in research and have proven themselves in practical applications, it is necessary to perform a factor analysis. Furthermore, the self-constructed intention to act nature-orientated scale and the intention to act sustainable scale are being analysed. The results of the factor analysis can be seen in the table 3 below.

Table 3 Overview of factor analysis of connectedness to nature, environmental identity, intention to act nature-orientated and intention to act sustainable scale.

Scale	KMO	Bartlett	Extracted factors (no coefficients under 0.4)
Connectedness to nature	0.90	0.000	Two factors: in literature they are named self-identification with nature and emotional connection with nature
Environmental identity	0.96	0.000	Four factors: in literature they are named self-identification with nature, positive feelings concerning nature, emotional connection to nature and interaction with nature
Intention to act nature-orientated	0.86	0.000	One factor: can be named nature-orientated intentional behaviours
Intention to act sustainable	0.87	0.000	One factor: can be named sustainable intentional behaviours

For the connectedness to nature scale a very high KMO value of 0.90 could be found. Hence, all 13 items of the scale are suitable for a factor analysis. The Bartlett significant level is 0.000 and reveals a very strong correlation between the variables of the scale. Two factors were extracted; as described in literature (Mayer & Frantz 2004) the subscale names are *self-identification with nature* and *emotional connection with nature* (all factor analysis can be found in the annex).

For the environmental identity scale a very high KMO value of 0.96 was measured, which means that all 24 items of the scale are suitable for factor analysis. In this case, the Bartlett significant level is 0.000 and shows a very strong correlation between the variables of scale. Four different factors were extracted; as described in literature (Clayton 2003) the subscales names are self-identification with nature, positive feelings for nature, emotional connection to nature and interaction with nature.

For the self-constructed intention to act nature-oriented and intention to act sustainable scale very high KMO values were measured (0.86 and 0.87). Here again all variables of the scale (six and seven) are suitable for a factor analysis. In both cases Bartlett significant level is 0,000 and emphasizes a very strong correlation between the factors. For both scales only one factor could be identified; for the first intention scale the name is nature-orientated intentional behaviours, and for the second scale sustainable intentional behaviours.

Summary

The researcher decided to use the 13-item scale and 24-item scale excluding any substantive modifications due to the fact the connectedness to nature scale (Mayer & Frantz 2004) and the environmental identity scale (Clayton 2003) are commonly used, show item clarity, are established and reliable as well as valid instruments (Clayton & Opatow 2003; Oskamp & Schultz 2005; Karlegger 2010; Kühn 2012).

For other reasons the two intentions to act in the future scales are also no subjects of changes. This is justified by the fact that the factor analysis indicated only one component within both scales (intended nature-orientation and intended sustainable behaviours) which is congruent with the content-related design of the scales. The results of the factor analysis of the connectedness to nature scale, environmental identity scale, intention to act nature-orientated scale and intention to act sustainable scale can be found in the appendix (13.).

3.10 Qualitative survey: Semi-structured interview schedule

As explained before, the main focus of this research study is set on the wide-ranging qualitative survey of two different geographical and cultural locations. Qualitative research is characterized by a large selection of approaches to investigate a certain phenomenon. Firstly, the outcome of an interview cannot be accurately predicted, and secondly, the individual case is focused on, which justifies the usage of a semi-structured interview schedule. This schedule provides the possibility to collect multi-faceted data. For the interview, a couple of different

instruments are used: Inclusion of nature in self (Schultz, 2001), ‘paint-a-picture-of-your-idea-of-nature’ which is theoretically orientated by Krömker & Simon (2005), and the model interrelationships of concepts and precursors (Klassen 2010: 10). The different instruments are described in the following chapters.

3.10.1 Semi-structured interview schedule

By using the described interrelationships of concepts and precursors model a semi-structured interview schedule was designed. Consequently, the semi-structured interview schedule has the following structure as shown in the table below in table 4.

Table 4 Overview of the semi-structured interview schedule.

What is measured?	Question or demand
1. Demographic data	Can you please introduce yourself by saying your name, age, and grade?
2. Current level of connectedness to nature	<ul style="list-style-type: none"> ▪ How connected to nature are you at the moment? ▪ Please illustrate, why you chose your specific level of connectedness.
3. Understanding of nature	<p>Please describe your painted nature picture.</p> <ul style="list-style-type: none"> ▪ Is that something that you made up, or does this natural surrounding really exist? ▪ Where are you in the picture?
4. Lived experiences	<p>Would you describe the place where you live as a rather rural or a rather urban area?</p> <ul style="list-style-type: none"> ▪ Please illustrate why. ▪ Are there special places where especially children can play outside? ▪ Are there some special geographic locations which you go to? <p>Do you have special recreation choices if you go on vacation together with your parents?</p> <ul style="list-style-type: none"> ▪ Please describe them and illustrate your activities that you engage with. ▪ Did you ever witness destruction of a natural environment around you?
5. Prior knowledge	Where do you get your environmental knowledge from (<i>education, generational knowledge passed on by adults, movies, books, song lyrics, and news media</i>)?
6. Cultural beliefs	<p>Would you say that you have certain cultural beliefs regarding nature or the environment?</p> <ul style="list-style-type: none"> ▪ Do you have certain values, attitudes or opinions of your family regarding nature and the environment?
7. Final question	Is there anything that I did not ask you but you would like to talk about regarding nature and the environment?

To a certain extent, the semi-structured interview schedule is pre-structured, but it still allows the interviewer to change the structure of the interrogation if necessary and possible.

3.10.2 Inclusion of nature in self instrument

In order to select the participants for the interview the first tool which is used is the inclusion of nature in self scale by Schultz (2001). In the beginning, the participants are asked the following: ‘Please circle the picture below which describes your relationship with the natural environment. How interconnected are you with nature?’ This single item graphical scale consists of seven more or less overlapping circles labelled ‘self’ and ‘other’ (see figure 14). Self stands for the individual, and other stands for nature or the environment. The circle with complete overlapping indicates an individual’s high attachment to nature. The inclusion of nature in self is frequently used in ecological and school research (Schultz 2002; Reist 2004) to measure the extent to which individuals feel to include nature in their self-concept. This scale is used to select participants for a comparison of extreme groups with regard to their connectedness to nature. The selection criterion for the interview is a rather high or a rather low interconnectedness with the natural world.

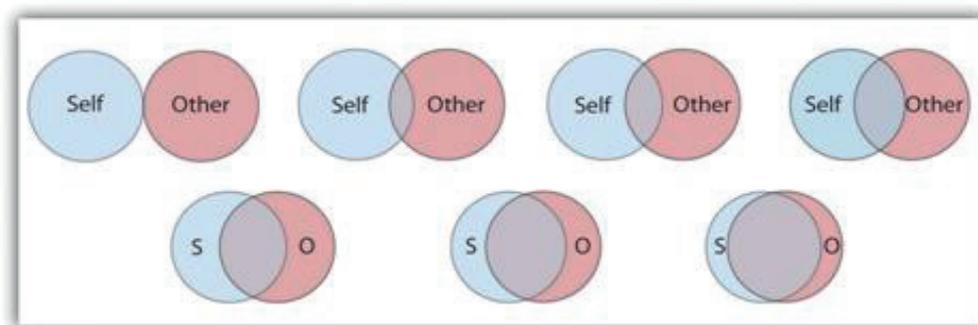


Figure 14 The inclusion of nature in self instrument by Schultz (2001)
(http://catalog.flatworldknowledge.com/bookhub/127?e=stangor-ch14_s01).

3.10.3 Instrument: paint-a-picture-of-your-idea-of-nature

In the next step, the participants are asked to paint a picture of their own idea of nature by asking: ‘What is nature for you? Please take your time and draw a picture of your own idea of

nature. Where are you in this picture?’ Mainly, this instrument is used to gather information of the individuals’ experience with nature, their perception of nature, as well as placing certain topics at the beginning of the conversation.

3.10.4 Analysis of qualitative interview

A method described in literature to analyse qualitative interviews is given by Mayring (2010) which is basically followed in this study. In order to carry out this approach, a few important steps of analytic procedures have to be conducted, which are discussed in the following. In one of the first steps of Mayring’s (2010) content based structural analysis approach, the researcher has to define units within the interviews that can be used for further analysis. In this case, these units are short sections of the interviews, which are analysed with the model described in the following chapter (3.11.1).

3.10.5 Evaluation model: Interrelationships of concepts and precursors

The interrelationships of concepts and precursors model was designed by Klassen (2010: 10) after having conducted a research study regarding a comparison of rural and urban participant’s experience with nature. The model focuses on different areas that have a significant impact on the individual’s ecological identity, in which four different factors can be identified: (1) the ‘*lived experiences*’ of the participants, (2) ‘*encounters and conversations*’ with close individuals of the microsystem, (3) the ‘*cultural background*’, and (4) ‘*prior knowledge*’ about environmental issues. For this present study, a reduced version of this model was used, which is illustrated below in figure 15. Assuming that the three major influencing groups on the individuals are family, peer group, and school, the section ‘encounters & conversations with passionate, caring, or dedicated role models’ Klassen (2010: 10) is not part of the examination model. Moreover, the sections ‘*cultural background*’ and ‘*prior knowledge*’ have been reduced by ‘politicians’, ‘community members’, ‘literature review’, and ‘articles’. In this study, the mentioned groups and sources of information play a secondary role to focus on a few chosen aspects.

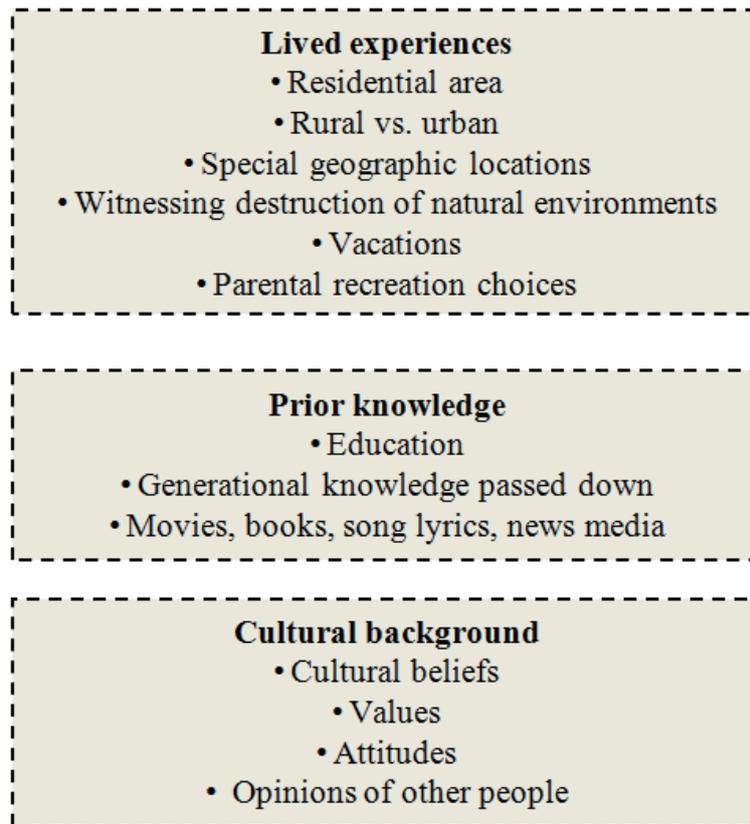


Figure 15 Adapted and reduced model Interrelationships of Concepts and Precursors by Klassen (2010: 10) used in the qualitative study.

The headlines *‘lived experiences’*, *‘prior knowledge’*, and *‘cultural background’* are used as categories for data analysis.

The category **lived experiences** has six different subcategories: residential area (description of the environment in which the individual’s home is located), rural vs. urban (information whether the home is located in a rather rural or rather urban area of the city), special geographical locations (this includes a description of areas where the learners go to when they have encounters with nature), witnessing destruction of natural environments (description of environmental pollution or destruction), and parental recreation choices (encounters with nature in connection with their parents during vacations).

The category **prior knowledge** has three subcategories: education (in this subcategory the learners report about prior knowledge that has a connection with the educational system, generational knowledge passed down (knowledge about nature and the environment which is connected to e.g. parents, grandparents), and movies, books, song, lyrics, news media (knowledge that is available connected with different kind of media).

The category **cultural background** has four subcategories: cultural beliefs (includes religious thoughts regarding nature and the environment), values (value system of modern society or close individuals regarding nature and the environment), attitudes (promoted by modern society or close individuals regarding nature and the environment), and opinions (of modern society or close individuals regarding nature and the environment).

Examples of the analysed units can be found in chapter 4.19.

3.10.6 Quality criteria for qualitative interviews

In the following quality criteria for the qualitative interviews are presented which are linked to Mayring (2002: 141 et seq.). First criteria of quality regarding the conduction of the interviews is the rule-based performance of a structured content analysis (Mayring 2010). Secondly, a theoretical validation is conducted by the usage of a theoretical framework by Klassen (2010) as a system of categories. Thirdly, the documentation of the analysis process is provided. This is ensured by presenting the used text units of the interviews that the approach is reproducible for the reader. Fourthly, an argumentative interpretation validation is conducted in an expert discussion with Dr. Wischmann (staff member of the Institute of Biology Didactics of the University of Bremen) to ensure the appropriate interpretation of the findings. And fifthly, a validation of the determined text units and their coding within an expert discussion with Dr. Wischmann.

3.11 Ethical considerations

Relating to Honan & Gitsaki (2015) one of the main issues regarding ethical clearance is that the rights and needs of the voluntary participants have to be respected and protected at any time of the research. In Denzin & Lincoln (2011) Christians (2011: 66) formulates guidelines namely 1) Informed consent: All participants must agree to participate, in this case voluntarily. Christians (2011: 139) emphasizes the necessity that ‘this agreement must be based on full and open information’ on the purpose of the research study. 2) Privacy and confidentiality: All participants have to be safe against unwanted exposure and shall be ‘made public only behind a shield of anonymity’. 3) Deception and accuracy: ‘Deliberate misrepresentation’ of all kinds is forbidden. In addition to that, ethical principles for reflective practice are announced by the German Association of Research (1999) to ensure high quality in research practice. 4) ‘Data collected for evaluation will be used for this purpose only.’

Krefting (1991: 215) sums Guba's (1981) ideas up by stating that it ‘is based on the identification of four aspects of trustworthiness that are relevant to both quantitative and qualitative studies: (a) truth value, (b) applicability, (c) consistency, and (d) neutrality.’

3.12 Key messages

Quantitative

- For the questionnaire, frequently used existing scales were adapted and adjusted but substantive changes were made (connectedness to nature scale by Mayer & Frantz in 2004, single item connectedness to nature scale by Cervinka in 2005, environmental identity scale by Clayton in 2003).
- By using existing items, re-adjusted scales were designed (meaningful encounters with nature by Cervinka et al. (2009), Zeidler (2009) and Kühn (2012), perceived behavioural control by Wilhelm (1999), and subjective norm by Hinds & Sparks (2008) and Karlegger (2010).
- The intention to act in nature-orientated and the intention to act sustainable scale way have been introduced by reformulating existing scales by Clayton (2003), Kaiser (1998) and Schultz & Zelezny (1998).
- In order to validate the questionnaire a testing phase and a recorded audio validation were conducted.
- There is a German, English and isiZulu version of the questionnaire.

Qualitative

- Analysis method for qualitative interviews is basically followed by Mayring (2010). In this content based structural analysis approach, the researcher defines units within the interviews that can be used for further analysis.
- For the interviews three types of instruments are used:
 - i. The inclusion of nature in self scale (Schultz 2001) to measure the participants' current connectedness to nature and to select contrasting types of subjects.
 - ii. Self-painted nature images to test their understandings of nature (Krömker & Simon 2005).

- iii. A rule-based performance and a theoretical framework of category systems are used (Klassen 2010) to analyse the data: lived experiences, prior knowledge, and cultural background.
- Furthermore, the analysis process is documented and provided to the reader, expert discussions with Dr. Wischmann are conducted to ensure the appropriate interpretation of the findings and to validate the determined text units and their coding.

4. CHAPTER FOUR- FINDINGS

4.1 Introduction

In the following the main findings of the quantitative study will be presented. Firstly, a detailed description of the participants is given as well as a comprehensive overview of all contributing schools in Bremen and Durban (chapter 4.2). Secondly, the main results of the quantitative study are illustrated, starting with encounters with nature (chapter 4.5), the influence of family, peer groups and school regarding encounters with nature (chapter 4.6), the patterns of activities and locations of encounters with nature (chapter 4.8) and the behavioural control to engage in such activities chapter 4.10). Thereafter results of the learners' connectedness to nature (chapter 4.11), their environmental identity (chapter 4.12), and their intention to act nature-orientated and sustainable are highlighted (chapter 4.13). Hereafter, the results of the learners' understanding of nature are presented (chapter 4.15) as well as the correlations between the experiences with nature, connectedness with nature, environmental identity, and the intention to act nature-orientated and sustainable (chapter 4.17).

Finally, the main findings of the qualitative study are discussed. In order to emphasize the complementary nature of the semi-structured interviews the findings of respectively two types of contrasting interview participants are presented (chapters 4.19 - 4.21).

4.2 Participants of the quantitative study

All in all, $n = 1682$ subjects participated in the quantitative survey, $n = 836$ in Bremen and $n = 846$ in Durban. The participants were between the ages of 12-19 ($M = 14.68$), in Bremen $M = 14.74$ and Durban $M = 14.53$.

4.2.1 Sex

Altogether, 53.5% (900) female and 46.5% (782) male participants contributed in whole study, in Bremen 49.6% (415) were female, 50.4% were male (421), in Durban 57.3% (485) were female, 42.7% (361) were male.

4.2.2 Grade

Entirely 35.0% (588) participants are in grade 8, 33.9% (570) in grade 9 and 31.2% (524) in grade 10. In Bremen 33.6% (281) are in grade 8, 32.8% (274) in grade 9, 33.6% (281) in grade 10, and in Durban 36.3% (307) in grade 8, 35.0% (296) in grade 9, and 28.7% (243) in grade 10.

4.2.3 Socio-economic background

In the whole study, 49.1% (840) of all participants are categorized attending at schools that are defined as a weak socio-economic background, and 50.9% (842) as a strong background. In Bremen 47.8% (400) have a weak socio-economic background, 52.2% (436) strong and in Durban 52.0% (440) have a weak socio-economic background, 48.0% (406) strong.

4.2.4 Participating schools in Bremen/ Bremerhaven

In the following, the participating schools are presented and subdivided into socio-economic weak and strong backgrounds (see figure 16 below).

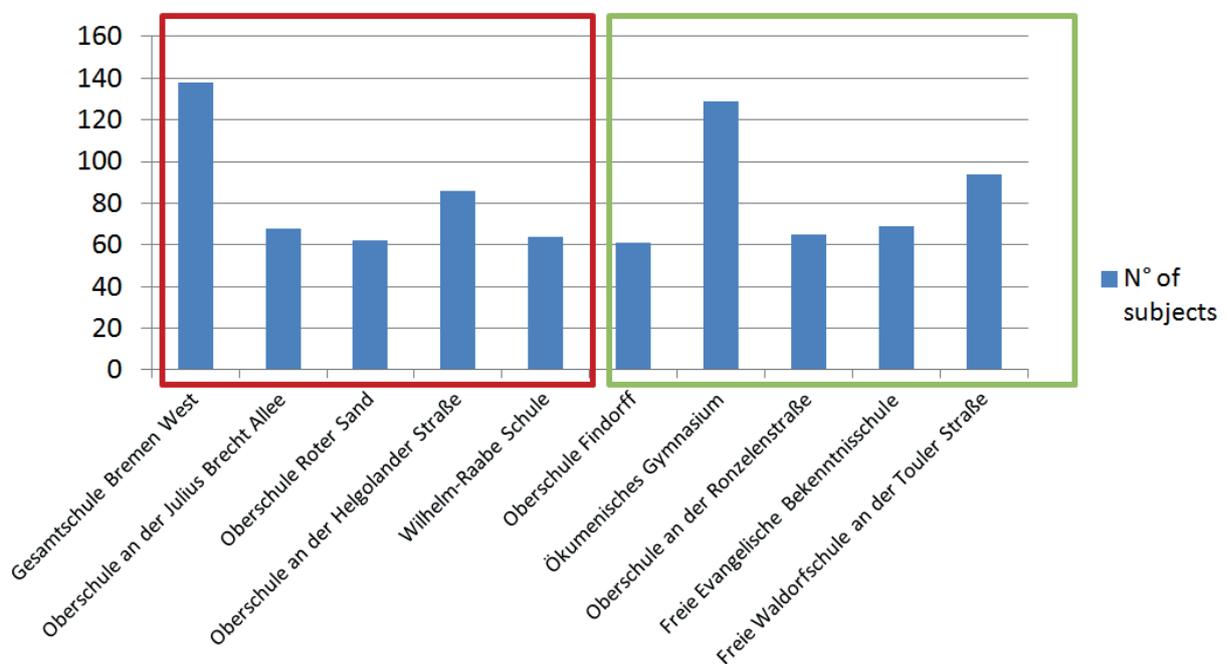


Figure 16 Participating schools in Bremen divided into schools with strong and weak socio-economic background.

In Bremen the largest number of cases was conducted at the Gesamtschule West 16.5% (138) and at the Ökumenisches Gymnasium 15.4% (129). The smallest number of cases was conducted at the Oberschule Roter Sand 7.4% (62) and the Oberschule Findorff 7.3% (61). Five schools can be categorized having a weak socio-economic background (red) and five schools can be categorized having a strong socio-economic background (green).

4.2.5 Participating schools in Durban

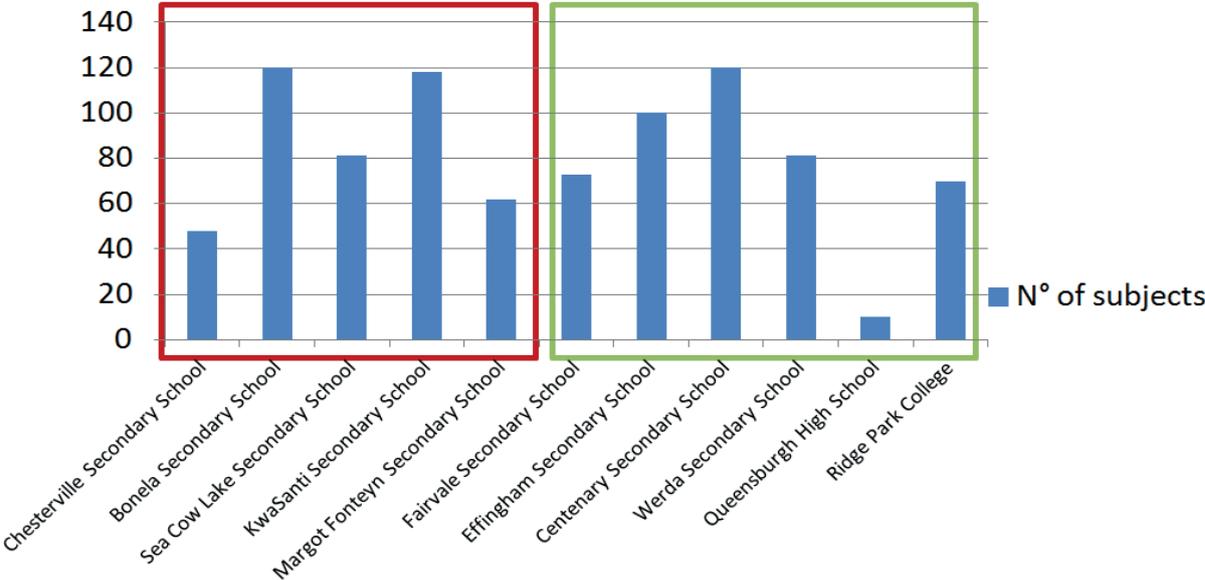


Figure 17 Participating schools in Durban divided into schools with strong and weak socio-economic background.

As seen in figure 17, in Durban the largest number of cases was conducted at Centenary Secondary School 14.2% (120) and KwaSanti Secondary School 13.9% (118). The smallest number of cases was conducted at Queensburgh High School 1.2% (10) and Bonela Secondary School 5.7% (48). Five schools can be categorized having a weak socio-economic background (red) and six schools can be categorized having a strong socio-economic background (green).

4.2.6 Background of participating schools

In order to underline the different contrasting surroundings and socio-economic backgrounds of the participating schools, collected exemplary data regarding the focus and school-based data are presented in the following. As highlighted before data of the basic school conditions of each school in Bremen/ Bremerhaven and Durban were gathered. On one hand, hard facts like social indicators respectively quintile level as well as an average class sizes, number of teachers and number of natural sciences class per week were investigated. On the other hand, soft facts like a certain school profile, offered nature-based activities and special places close to school were included. In addition to that, pictures of the school interior as well as exterior were taken in order to visualize the framework conditions of each school. For Bremen/ Bremerhaven and for Durban two schools are presented highlighting exemplary features of contrasting school types. Mostly, data was gathered using the homepage of the Department of Education (Senatorin für Bildung und Wissenschaft 2015), which provides a profile for each school in the federal state of Bremen. In Durban the homepage of the Department of Education (2015) and the Annual Surveys for Ordinary Schools Report (2009/ 2010) and 2011's Snap Survey Report for Ordinary Schools helped to get an overview of important processes, circumstances and issues of KwaZulu-Natal's school system. In the following, two contrasting types of schools are presented by highlighting similarities as well as existing differences.

4.2.7 Exemplary contrasting school-based facts Bremen

First of all, the residential area of Gröpelingen in which the Gesamtschule Bremen West an der Lissaer Straße is located has the lowest of all social indicator index' within Bremen (-146.00). The Gesamtschule West has the status of an Oberschule with 530 learners and an average class size of 22⁹ and 46 teachers. The Gesamtschule West Bremen mainly is charac-

⁹ Note that the concept of the Oberschule strives to limit the average class size to 22 learners per class. This is not the case regarding the Gymnasium classes and independent schools which have an average class size of approx. 25 (Senatorin für Bildung und Wissenschaft 2014).

terized by a rather big quantity of differentiation in the lessons and intensive inclusive schooling in everyday situations.

The residential area of Schwachhausen in which the Waldorfschule an der Touler Straße is located has the third highest social indicator index in Bremen¹⁰ (+98.75). At the Waldorfschule an der Touler Straße various teaching methods are used to achieve diversified lessons which focus on the individual capacity of the learners. The Waldorf concept is characterized by an entire education as well as nature based activities. Table 5 gives an overview of all school-based facts for the Gesamtschule West Bremen and the Waldorfschule an der Touler Straße.

¹⁰ Note that only the residential areas of Borgfeld (+102.59) and Bürgerpark (+111.41) have a higher social index in Bremen (Senatorin für Arbeit, Frauen, Gesundheit, Jugend und Soziales 2009: 14). In the residential area of Borgfeld only two primary schools are located (Schule Am Borgfelder Saatland and Schule Borgfeld). In the residential area of Bürgerpark one Oberschule is located but this school does not have grade 9 and 10 learners (status as 2015). That is the reason why these areas are not involved in the sampling of schools.

Table 5 Overview of school-based facts: Gesamtschule West and Waldorfschule an der Toulser Straße.

	Gesamtschule West Bremen an der Lissaer Straße	Waldorfschule an der Toulser Straße Bremen
Social indicator	-146.00	+98.75
Profile	Comprehensive school	Entire education (focusing to feel, to think and to act)
Teachers/ learners	46/ 530	53/ 422
Nature based activities	None	<p>Gardening: annual garden sessions in school gardens; picking apples and Mirabelle plums; elder juice preparation</p> <p>Preparing plant beds: each class has tasks like cultivating; together with parents</p> <p>Agriculture internship: two weeks a year on farms in the region of Bremen; various work areas</p>
Special places close to school	Waller Feldmarksee (lake), sports field Lissaer Straße, Grünzug West (green space)	Bürgerpark, Rhododendronpark (park), Riensberger Friedhof (graveyard)

Main aspects of these school-based facts are the following. Firstly, the two school examples indicate the contrasting approach of the study in which the Gesamtschule West has the weakest and the Waldorfschule an der Toulser Straße the strongest socio-economic background. Another main feature is that the Waldorfschule focuses entire education which centres nature-based activities like gardening. The two schools were also chosen and presented to give an idea of the background and the conditions in which the schools are.

In order to receive an additional impression of the two contrasting types of schools the following pictures (figures 18 to 21) are provided giving an insight of the schools as well as to highlight certain differences.



Figure 18 Exterior of Gesamtschule West Bremen in November 2014 (Homepage Gesamtschule West Bremen 2015).



Figure 19 Interior of Gesamtschule West Bremen in August 2013 (own visual material).



Figure 20 Exterior of Waldorfschule an der Toulter Straße Bremen in November 2014 (Panoramio 2015).



Figure 21 Interior of Waldorfschule an der Toulter Straße November 2014 (own visual material).

4.2.8 Exemplary contrasting school-based facts Durban

Very similar as key aspects are defined to be hard facts such as quintile status, total number of learners, average class size, total number of teachers, number of life and natural sciences teachers and the latest matriculation rate for the school-based facts by interviewing principals and teachers of each school. In the following, two contrasting schools are presented by high-

lighting similarities as well as the severe existing differences. In this case, Bonela Secondary School (quintile 4) and Ridge Park College (quintile 5) serve as good examples. Both schools have the same number of learners (1050) but have a contrasting average class size (Bonela Secondary 40-47; Ridge Park 25-35). In 2008, the average class size in ordinary schools in KwaZulu-Natal was 39. Bonela Secondary has 37 teachers and Ridge Park College 62. Great differences also can be seen in the number of life science and natural science teachers (Bonela Secondary 4; Ridge Park 8). The number of natural science classes per week is about the same (Bonela Secondary 5; Ridge Park 3-4). 96% of Ridge Park learners passed the latest matriculation, but only 80.5% did at Bonela Secondary. Bonela Secondary focuses on basic academic education, and additionally Ridge Park has a well-developed sports profile in which learner participation is compulsory. Very similar nature based activities are offered (eco-club and environmental club), that do have a common approach. According to the interviewed individuals at the schools special places close to the environment are the sea and beaches, as well as a bird park for Bonela Secondary, Mitchell Park and the Durban Botanic Gardens which are embedded in the school curriculum for Ridge Park College (see table 6).

Table 6 Overview of school-based facts: Bonela Secondary School and Ridge Park College.

	Bonela Secondary School	Ridge Park College
Quintile	4	5
Profile	Comprehensive school	Sports (hockey, net-, volley-, soft-, basketball, soccer, rugby, athletics, swimming, tennis, karate; compulsory; school teams)
Teachers/learners	37/ 1050	62/ 1050
Nature based activities	'Eco club' : regularly, voluntarily and monthly basis; beach excursions; support by community members	'Environmental club' : gardening, vegetable planting, recycling sessions, litter collections at beach; weekly, 90 minutes; only a few learners participate
Special places close to school	Sea, treasure beach, ocean view, nature reserves, bird park	Mitchell Park, Durban Botanic Gardens (embedded in curriculum), North + South beach, sea

Main aspects of this list of school based facts are the elaborate sport portfolio and facilities of Ridge Park College which is not readily comparable with Bonela Secondary School. Another aspect is that both schools have the exact same number of learners but very differing numbers of teachers. The following pictures shall provide a further impression of the exterior in this case the difference in level of maintained green spaces by underlining the care of the grounds and the availability of sports facilities. Furthermore the variations of equipment and facilities of the interior are presented (see figure 22 to 25).



Figure 22 Interior of Bonela Secondary School in October 2014 (own visual material).



Figure 23 Exterior of Bonela Secondary School in October 2014 (own visual material).



Figure 24 Interior of Ridge Park Secondary School (girls only) in October 2014 (own visual material).



Figure 25 Exterior of Ridge Park Secondary School (girls only) in October 2014 (own visual material).

4.3 Key Messages

- The sample size is $n = 1682$ (Bremen $n = 836$, Durban $n = 846$)
- The sex (female, male), grade (8th, 9th, 10th) and socio-economic status (weak, strong) are almost equally numbered.
- Contrasting types of schools could be identified in both cities.

4.4 Findings of the quantitative study

The standardized questionnaire contains statements that use a Likert scale (quantitative) as well as open questions (qualitative). The following findings were gathered with Likert scale questions. Note that the background factors (sex, grade, socio-economic background) are only mentioned, if they have a significant influence on the main constructs encounters with nature, connectedness to nature, environmental identity and the intention to act nature-orientated and sustainable.

4.5 What are the learners' experience of nature?

All 1682 participants gave an answer to the questions and statements regarding their engagement in outdoor activities together with their reference systems 'family', 'friends', and 'school' (see table 7 below).

Table 7 Overview results outdoor activities with family, friends, and school.

		Entire study	Bremen	Durban
Family	Yes	67,8% (1141)	61,6% (515)	74,0% (626)
	No	32,2% (541)	38,4% (321)	26,0% (220)
Friends	Yes	62,5% (1051)	59,7% (499)	65,2% (552)
	No	37,5% (631)	40,3% (337)	34,8% (294)
School	Yes	29,8% (501) ¹¹	20,5% (171)	39% (330)
	No	70% (631)	79,4% (664)	60,6% (513)

With regard to the activities in contact with nature together with the family 67.8% (1141) of all participants agreed to have such experience, 61.6% (515) in Bremen and 74.0% (626) in Durban. Hence, responding to the same question 32.2% (541) of all participants answered with no 38.4% (321) in Bremen and 26.0% (220) in Durban.

¹¹ Two missing.

The question of whether they do activities in contact with nature with their friends was answered with yes by 62.5% by all participants, 59.7% (499) in Bremen and 65.2% (552) in Durban. 37.5% (631) of all participants answered with no; 40.3% (337) in Bremen and 34.8% (294) in Durban.

All in all, only two participants did not answer this question. On one hand, asked if they do activities in contact with nature with their school, 29.8% (501) of all participants answered with yes; 20.5% (171) in Bremen and 39.0% (330) in Durban. On the other hand, 70.0% (631) of all participants answered with no; 79.4% (664) in Bremen and 60.6% in Durban.

4.6 How frequently and intensively do the participants have encounters with nature?

In the following, the results of the reference system family, friends, and school regarding the frequency and the intensity of activities in contact with nature are presented.

4.6.1 Family: Frequency

All participants answered the question concerning how often on the average they had activities in nature during the past year (figure 23 below). 6.7% of all participants in Bremen answered that they 'never' had activities in contact with nature with their families, 56.0% said 'less often', 19.6% 'at least once a month', and 17.6% said 'at least once a week'. Not a single participant from Bremen answered to have activities with nature with the family on a daily basis. In Durban 0.8% answered to 'never' have such activities, 18.4% said 'less often', 30.0% answered 'at least once a month', 43.4% said 'at least one a week', and 7.3% believed to have such activities on a 'daily' basis (figure 26).

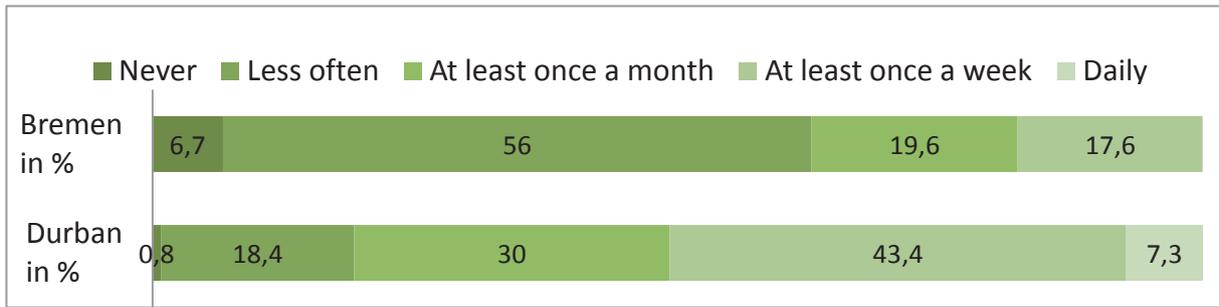


Figure 26 Frequency of time spent in activities in nature with family.

4.6.2 Family: Intensity

All participants answered the question concerning how many hours on the average they invest in activities in contact with nature together with their families (figure 27 below). 45% of all participants in Bremen answered to invest ‘less than ½ hours’ in such activities, 12.7% said ‘1/2 an hour to 1 hour’, 30.1% said ‘2-3 hours’, 11.2% answered ‘4-5 hours’ and 1% said ‘more than 5 hours’. In Durban 47.4% believe to invest ‘less than ½ hour’ in such activities, 10% said ‘1/2 an hour to 1 hour’, 23.3% said ‘2-3 hours’, 11.5% said 4-5 hours, and 7.8% answered to invest ‘more than 5 hours’.

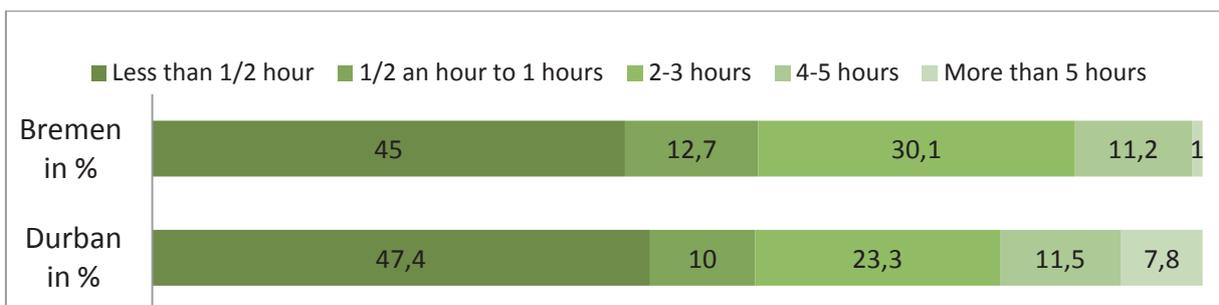


Figure 27 Intensity of time spent in activities in nature with family.

4.6.3 Friends: Frequency

All participants answered the questions concerning how many hours they invest in activities in nature together with their friends. In Bremen 7.8% answered to ‘never’ have activities with their friends during the past year, 63.7% answered ‘less often’, 17.7% said ‘at least one a

month’, and 10.8% believed to have such activities ‘at least once a week’. In Durban, 10.3% answered ‘never’ have activities with their friends, 52.1% said ‘less often’, 18.8% ‘at least once a month’, 18.2% said ‘at least once a week’, and 0.6% answered on a ‘daily’ basis (figure 28).



Figure 28 Frequency of time spent in activities in nature with friends.

4.6.4 Friends: Intensity

All participants answered the question, how many hours on the average they invested in activities in nature together with their friends during the past year. In Bremen 46.8% believed to invest ‘less than ½ hour’ in such activities, 13.9% answered ‘1/2 an hour to 1 hour’, 26.0% said ‘4-5 hours’, and 0.7% answered ‘more than 5 hours’. In Durban 45.9% answered ‘less than ½ hour’, 12.8% said ‘1/2 hour to 1 hour’, 23.5% said ‘2-3 hours’, 12.8% answered ‘4-5 hours’, and 5.1% said ‘more than 5 hours’ (figure 29).



Figure 29 Intensity of time spent in activities in nature with friends.

4.6.5 School: Frequency

All participants answered the question, how long on the average they invested in activities in contact with nature together with their school during the past year. In Bremen 1.4% of all participants believed to ‘never’ have such activities, 85.9% said ‘less often’, 2.8% answered ‘at least once a month’, 9.8% said ‘at least once a week’, and 0.1% answered to ‘daily’. In Durban 7.2% answered ‘never’, 72.0% said ‘less often’, 6.3% said ‘at least once a month’, 13.2% answered ‘at least once a week’, and 1.3% answered ‘daily’ (figure 30).

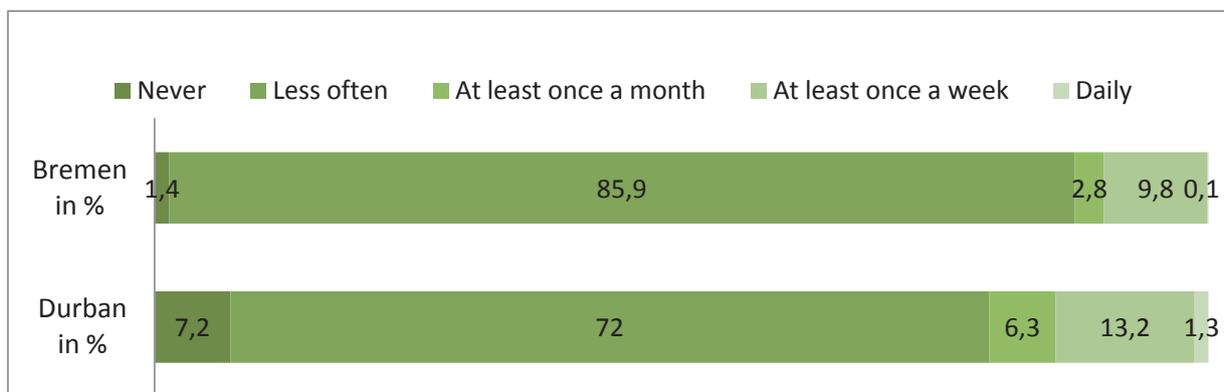


Figure 30 Frequency of time spent in activities in nature with school.

4.6.6 School: Intensity

All participants answered the question, how many hours on the average they invested in activities in contact with nature together with their school during the past year. In Bremen 81.3% answered ‘never’, 2.5% said ‘1/2 an hour to 1 hour’, 6.5% said ‘2-3 hours’, 7.8% answered ‘4-5 hours’, and 1.9% said ‘more than 5 hours’. In Durban, 68.8% believed to invest ‘less than 1/2 hours’ in such activities, 4.8% said ‘1/2 an hour to 1 hour’, 8.0% answered ‘2-3 hours’, 9.9% said ‘4-5 hours’, and 8.4% answered ‘more than 5 hours’ (figure 31).

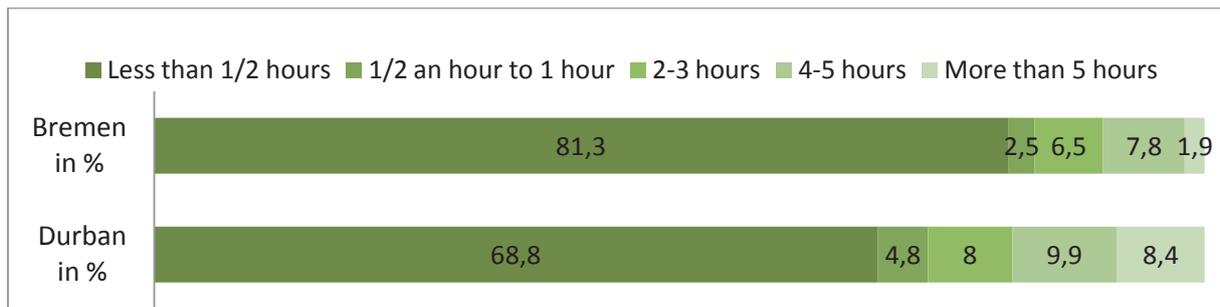


Figure 31 Intensity of time spent in activities in nature with friends.

4.7 What influence do the reference systems family, peer group, and school have on the pattern of encounters with nature?

In the following, the findings regarding the influence of the reference systems family, peer group, and school on the patterns of encounters with nature are being presented.

4.7.1 Family

In Bremen 836 and in Durban 832 participants answered the two questions of the importance to spent time in contact with nature together with the family. In Bremen a mean score of 3.72 (SD = .87) and in Durban 3.74 (SD = .82) can be measured. The two sample t-test proves no significant difference. Regarding the cross city comparison of gender data (male M = 3.72, SD = .82; female M = 3.73, SD = .86), of socio-economic factor data (strong M = 3.75, SD = .82; weak M = 3.70, SD = .87), as well as of grade data (8th M = 3.76, SD = .85; 9th M = 3.76, SD = .82; 10th M = 3.66, SD = .87) no significant differences could be measured.

4.7.2 Friends

In Bremen 836 and in Durban 832 subjects answered the questions regarding the motivation to invest time in activities in contact with nature together with their friends. In Bremen a mean score of 3.21 (SD = .1.01) and in Durban 3.51 (SD = .98) can be measured. The two sample t-test proves no significant difference. The cross city comparison of gender data (male M = 3.31, SD = .99; female M = 3.40, SD = 1.00), of socio-economic factor data (strong M = 3.28,

SD = .1.02; weak M = 3.44, SD = .97), as well as of grade data (8th M = 3.31, SD = 1.00; 9th M = 3.38, SD = .98; 10th M = 3.39, SD = 1.03) no significant differences could be measured.

4.7.3 School

In Bremen 836 and in Durban 832 subjects answered the questions regarding their motivation to invest time in activities in contact with nature together with their school respectively teachers. In Bremen a mean score of 2.76 (SD = .97) and in Durban 3.26 (SD = .1.03) can be measured. The two sample t-test proves no significant difference. The cross city comparison of gender data (male M = 2.91, SD = .1.03; female M = 3.09, SD = .1.02), of socio-economic factor data (strong M = 2.97, SD = .1.00; weak M = 3.05, SD = 1,07), as well as of grade data (8th M = 3.09, SD = 1.05; 9th M = 3.03, SD = .97; 10th M = 2.89, SD = 1.05) no significant differences could be measured.

4.8 What types and forms of encounters with nature can be identified and where do they engage in these activities?

In the following, the findings regarding the types and forms of encounters with nature together with family, friends and school as well as the locations of the activities are presented. These findings were gathered with the help of open questions. Note that multiple answers were possible.

4.8.1 Activities with family

All in all 61.6% (515) participants in Bremen and 74,0% (626) in Durban answered that they have encounters with nature together with their families. In the table 8 below all findings regarding encounters together with the family are shown. In the following, the red groups include the smallest values, the yellow group includes small values, the light green includes big values and the green group the largest values. Altogether in Bremen a number of 827 responses and in Durban 738 were given.

Table 8 Overview results of categories of encounters with nature with the family.

Activity category	Bremen		Durban	
	Number of mentions	Percentage points	Number of mentions	Percentage points
1. Fishing	10	2.0%	61	11.0%
2. Water sports	161	31.6%	109	19.6%
3. Camping	29	5.7%	102	18.3%
4. Hiking	276	54.2%	77	13.8%
5. Having a picnic	30	5.9%	25	4.5%
6. Cycling tours	133	26.1%	5	0.9%
7. Vacation	62	12.2%	165	29.7%
8. Agricultural work	19	3.7%	64	11.5%
9. Ball sports	35	6.9%	32	5.8%
10. Relaxation	16	3.1%	59	10.6%
11. Other sports	56	11.0%	39	7.0%
	827	162.4%	738	132.7%

In Bremen the smallest values are in the categories are ‘fishing’ (2.0%), ‘agricultural work’ (3.7%) and camping (5.7%). The category ‘vacation’ (12.2%) has a mediocre value. The largest values can be identified within the categories ‘cycling tour’ (26.1%), ‘water sports’ (31.6%) and ‘hiking’ (54.2%). In Durban the smallest values are in the categories ‘cycling tours’ (0.9%), ‘having a picnic’ (4.5%) and ‘ball sports’ (5.8%). Mediocre values can be found within categories like ‘fishing’ (11.0%), ‘agricultural work’ (11.5%) and ‘hiking’ (13.8%). The largest value can be identified in the category ‘vacation’ (29.7%).

4.8.2 Locations with family

In table 9 below all findings regarding the locations of encounters with nature together with the family are shown. Altogether in Bremen a number of 907 responses and in Durban 915 were given.

Table 9 Overview results of locations of encounters with nature with the family.

Location categories	Bremen		Durban	
	Number of mentions	Percentage points	Number of mentions	Percentage points
1. Mountains	110	22.2%	175	28.7%
2. Forest	166	33.5%	135	22.1%
3. Beach	176	35.6%	316	51.8%
4. Lake	135	27.3%	88	14.4%
5. At home	44	8.9%	31	5.1%
6. Park	69	13.9%	23	3.8%
7. Meadow	82	16.6%	1	0.2%
8. Field	17	3.4%	145	23.8%
9. Vacation destination	108	21.8%	1	0.2%
	907	164.8%	915	150.1%

In Bremen the smallest values are in the location categories ‘field’ (3.4%) and ‘at home’ (8.9%). Mediocre values can be found in the categories ‘park’ (13.9%) and ‘meadow’ (16.6%). The largest values can be identified in categories like ‘mountains’ (22.2%), ‘lake’ (27.3%), ‘forest’ (33.5%) and ‘beach’ (35.6%). In Durban the smallest values are in location categories like ‘vacation destination’ (0.2%), ‘meadow’ (0.2%) and ‘at home’ (5.1%). Mediocre values can be identified in the categories ‘lake’ (14.4%). The largest value is found in categories like ‘mountains’ (28.7%) and ‘beach’ (51.8%).

4.8.3 Activities with friends

All in all 59.7% (499) participants in Bremen and 65.2% (552) in Durban answered that they have encounters with nature together with their friends. In table 10 all findings regarding encounters together with the friends are shown. Altogether in Bremen a number of 893 responses and in Durban 554 were given.

Table 10 Overview results of categories of encounters with nature with the friends.

Activity category	Bremen		Durban	
	Number of mentions	Percentage points	Number of mentions	Percentage points
1. Ball sports	125	24.8%	89	19.9%
2. Water sports	209	41.5%	110	24.6%
3. Camping	21	4.2%	55	12.3%
4. Beach	5	1.0%	77	17.6%
5. Relaxation	73	14.5%	70	15.6%
6. Cycling tours	199	19.6%	6	1.3%
7. Hiking	132	26.2%	85	19.0%
8. Having a picnic	45	8.9%	10	2.2%
9. Other sports	84	16.7%	52	11.6%
	893	157.4%	554	124.1%

In Bremen the smallest values are in the categories 'beach' (1.0%) and 'camping' (4.2%). Categories like 'relaxation' (14.5%) and 'other sports' (16.7%) have mediocre values. The largest value can be identified in the categories 'hiking' (26.2%) and 'water sports' (41.5%). In Durban the smallest values are in the categories 'cycling tours' (1.3%) and 'having a picnic' (2.2%). Categories like 'camping' (12.3%) and 'ball spots' (19.9%) have mediocre values. The largest value can be identified in the category 'water sports' (24.6%).

4.8.4 Locations with friends

In table 11 all findings regarding the locations of encounters with nature together with the friends are shown. Altogether in Bremen a number of 937 responses and in Durban 625 were given.

Table 11 Overview results of categories of encounters with nature with the friends.

Location categories	Bremen		Durban	
	Number of mentions	Percentage points	Number of mentions	Percentage points
1. Mountains	13	2.6%	70	14.2%
2. Forest	100	20.3%	83	16.8%
3. Beach	65	13.2%	199	40.4%
4. Lake	232	47.1%	53	10.8%
5. Park	122	24.7%	49	9.9%
6. Meadow	137	27.8%	4	0.8%
7. Field	13	2.6%	156	31.6%
8. Vacation destination	44	8.9%	5	1.0%
9. Sports ground	74	15.0%	6	1.2%
	937	148.7%	625	125.8%

In Bremen the smallest values are in the location categories ‘mountains’ (2.6%), ‘field’ (2.6%) and ‘vacation destination’ (8.9%). Mediocre values can be identified in categories like ‘forest’ (20.3%) and ‘meadow’ (27.8%). The largest value can be found in the location categories ‘lake’ (47.1%). In Durban the smallest values can be identified in categories like ‘vacation destination’ (1.0%) and ‘sports ground’ (1.2%). Mediocre values can be found in location categories ‘lake’ (10.8%), ‘mountains’ (14.2%), and ‘forest’ (16.8%). The largest values are in the categories ‘field’ (31.6%) and ‘beach’ (40.4%).

4.8.5 Activities with school

All in all 20.5% (171) participants in Bremen and 39.0% (330) in Durban answered that they have encounters with nature together with their school. In table 12 below all findings regarding encounters with nature together with the school are shown. Altogether in Bremen a number of 199 responses and in Durban 340 were given.

Table 12 Overview results of locations of encounters with nature with the school.

Activity categories	Bremen		Durban	
	Number of mentions	Percentage points	Number of mentions	Percentage points
1. Excursions	70	43.5%	59	19.7%
2. Caring for animals	0	0.0%	23	7.7%
3. Camping	5	3.1%	36	12.0%
4. Hiking	29	18.0%	23	7.7%
5. Gardening	29	18.0%	25	8.3%
6. Ball sport	11	6.8%	54	18.0%
7. Other sports	23	14.3%	40	13.3%
8. Learning	8	5.0%	26	8.7%
9. Relaxation	4	2.5%	31	10.3%
10. Water sports	20	12.4%	22	7.3%
	199	123.6%	340	113.0%

In Bremen the smallest values are in the categories 'relaxation' (2.5%), 'camping' (3.1%), 'learning' (5.0%) and 'ball sport' (6.8%). Mediocre values can be identified in categories like 'water sports' (12.4%), 'hiking' and 'gardening' (respectively 18.0%). The largest value can be found within the category 'excursions' (43.5%). In Durban the smallest values can be found in the categories 'water sports' (7.3%), 'caring for animals' and 'hiking' (7.7%), 'gar-

dening’ (8.3%) and ‘learning’ (5.0%). Mediocre values can be found in categories ‘relaxation’ (10.3%), ‘camping’ (12.0%), ‘other sports’ (13.3%), ‘ball sports’ (18.0%) and ‘excursions’ (19.7%).

4.8.6 Locations with school

In table 13 all findings regarding the locations of encounters with nature together with the school are shown. Altogether in Bremen a number of 191 responses and in Durban 325 were given.

Table 13 Overview results of locations of encounters with nature with the school.

Location categories	Bremen		Durban	
	Number of mentions	Percentage points	Number of mentions	Percentage points
1. School	32	22.1%	63	22.3%
2. Beach	14	9.7%	41	14.5%
3. Mountains	8	5.5%	30	10.6%
4. Park	45	31.0%	6	2.1%
5. Excursion spot	33	22.8%	15	5.3%
6. Field	1	0.7%	111	39.4%
7. Playground	14	9.7%	18	6.4%
8. Forest	22	15.2%	19	6.4%
9. Lake	22	15.2%	22	6.7%
	191	131.9%	325	227.4%

In Bremen the smallest values are in the location categories ‘field’ (0.7%), ‘mountains’ (5.5%), ‘beach’ and ‘playground’ (both 9.7%). Mediocre scores can be found within the categories ‘forest’ and ‘lake’ (both 15.2%). The largest values can be identified within the catego-

ries 'school' (22.1%), 'excursions spots' (22.8%), and 'park' (31.0%). In Durban the smallest values can be found in categories like 'park' (2.1%), 'playground' and 'forest' (both 6.4%), and 'lake' (6.7%). Mediocre values can be identified within the categories 'mountains' (10.6%) and 'beach' (14.5%). The largest value can be found in the categories 'school' (22.3%) and 'field' (39.4%).

4.9 How do they perceive their behavioural control regarding encounters with nature?

The following findings were gathered with the help of Likert scale items. In Bremen 834 and in Durban 832 participants gave an answer to the question regarding the behavioural control linked to encounters with nature. In Bremen 8.7% (73) answered that they 'strongly disagree' with the statement to be able to influence the time spend in contact with nature on their own, 17.2% (144) 'disagree', 22.1% (185) state 'neutral', 33.7% (282) 'agree', and 17.9% (150) 'strongly agree'.

Answering the same question, in Durban 3.0% (25) 'strongly disagree', 7.1% (60) 'disagree', 26.2% (222) state 'neutral', 33.9% (287) 'agree', 28.1% (238) 'strongly agree'. If the two highest steps of the Likert scale ('strongly agree'; 'agree') are add up, the statistical value in Bremen is 51.6% and in Durban 62.0%. The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.38 (Cohen's d) can be identified.

4.10 Key messages

Patterns of encounters with nature

- Compared with Bremen participants in Durban significantly invest and spend more time in activities in direct contact with nature together with their family.
- Compared with Bremen participants in Durban significantly invest and spend more time in activities in direct contact with nature together with their friends.
- Participants in Bremen and Durban rarely spend time in activities in direct contact with nature together with their school.

Subjective norm

- Participants in Bremen and Durban very similarly consider that activities in direct contact with nature are important for their families.
- Compared with Bremen participants in Durban are significantly more the opinion that activities in direct contact with nature are important for their friends.
- Compared with Bremen participants in Durban are significantly more the opinion that activities in direct contact with nature are important for their school.

Activities and locations of encounters with nature Patterns of encounters with nature

Bremen: family

- Rarely, participants in Bremen do activities with their family like fishing or agricultural work. Sometimes they engage in activities in nature during their vacations, and often in water sports and hiking.
- Rarely, these activities are carried out at home and in the field, sometimes in parks and meadows. Very common locations to engage in activities in nature are vacation destinations, meadows, lakes, fields and the beach.

Durban: family

- Rarely, participants in Durban engage in activities in nature like cycling tours and picnics. Sometimes they do activities like fishing, agricultural work and water sports. They often carry out these activities during their vacations.
- Rarely, these activities are carried out in meadows, in their vacation destinations, and in parks. Sometimes they do these activities at lakes and often in the forest, in fields, and in the mountains.

Bremen: friends

- Rarely, participants from Bremen engage in activities in nature like fishing, camping, having picnics, agricultural work, ball sports and relaxation. Sometimes they do other sports and often they do cycling tours, water sports and very often hiking.
- Rarely, these activities are carried out in field and at home. Sometimes they do these activities in parks and in meadows and often in the mountains, at lakes, in forests and at the beach.

Durban: friends

- Rarely, participants from Durban engage in activities like cycling tours, ball sports, and other sports. Sometimes they carry out activities like fishing, relaxation, agricultural work and hiking. Often they do water sports.
- Rarely, these activities are carried out in meadows, in parks, at home, and at their vacation destination. Sometimes they do these activities at lakes and often in the forest, in the mountains, in fields and at the beach.

Bremen: school

- Rarely, participants from Bremen engage in activities in nature with their school like relaxation, camping and ball sports. Sometimes they do water sports, other sports, hiking and gardening and very often excursions.

- Rarely, these activities are carried out in fields, in the mountains, at the playground and at the beach. Sometimes they do these activities in locations like the forest and at the lake, often at the school, at excursion spots and very often in parks.

Durban: school

- Rarely, participants from Durban engage in activities in nature with their school like water sports, caring for animals, gardening, learning and hiking. Sometimes they do activities like relaxation, ball sports, and other sports and often they do excursions.
- Rarely, these activities are carried out in parks, at excursion spots, at the playground, in the forest and at lakes. Sometimes they do these activities at the beach, in the mountains, often at school and very often in fields.

Behavioural control

- Compared with Bremen participants in Durban are significantly more of the opinion that they can determine frequency and intensity of their activities in direct contact with nature on their own.

4.11 What is the learners' connectedness to nature?

In the following, the results of the connectedness to nature scale and the findings of the single item connectedness to nature scale are presented.

4.11.1 Connectedness to nature scale

In Bremen 836 and in Durban 843 participants answered the 13 item connectedness to nature scale. The reliability of this scale (Cronbach's Alpha) is found to be .80. Cronbach's Alpha for the first sub scale 'self-identification with nature' is .66 and for the second one 'emotional bonding with nature' is .77. A mean score of $M = 3.14$ ($SD = .64$) could be measured in Bremen and $M = 3.59$ ($SD = .54$) in Durban. The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.76 (Cohen's d) can be identified.

As an example item of the scale, the results of the statement 'I think of the natural world as a community to which I belong' are presented. In Bremen 11.0% of all participants answered 'strongly disagree', 18.2% 'disagree', 32.5% 'neutral', 27.8% 'agree', and 10.5% 'strongly agree'. In Durban 2.7% answered 'strongly disagree', 7.2% 'disagree', 18.4% 'neutral', 38.0% 'agree', and 33.7% 'strongly agree' (figure 32).

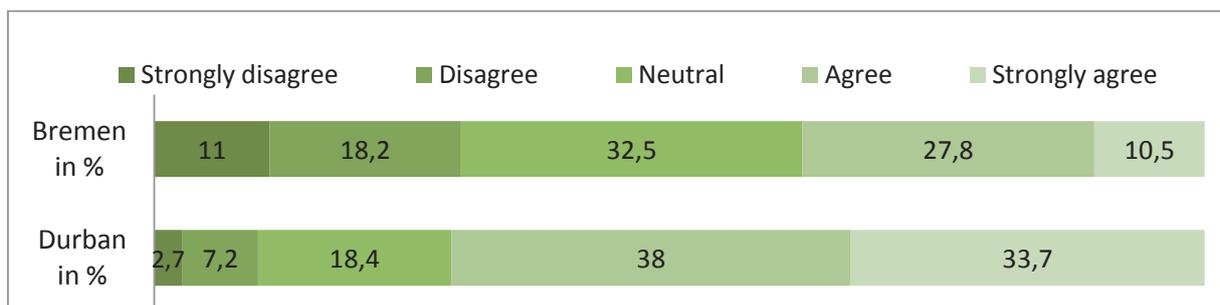


Figure 32 Results of an item example connectedness to nature scale: 'I think of the natural world as a community to which I belong'.

The cross city comparison of gender data (male $M = 3.34$, $SD = .65$; female $M = 3.39$, $SD = .62$), of socio-economic factor data (strong $M = 3.42$, $SD = .64$; weak $M = 3.30$, $SD = .63$), as

well as of grade data (8th $M = 3.38$, $SD = .64$; 9th $M = 3.38$, $SD = .60$; 10th $M = 3.34$, $SD = .66$) no significant differences could be measured.

The following table provides an overview of all items of the connectedness to nature scale in which the numbers of participants who answered the statements, the mean scores (M), standard deviation (SD) as well as the level of significance is highlighted (table 14).

Table 14 Overview results of all items of the connectedness to nature scale including level of significance.

Item	City	N° of participants	Mean score	Standard deviation	Level of significance
1	Bremen	835	3.15	1.05	p = .000
	Durban	831	3.59	1.12	
2	Bremen	836	3.09	1.15	p = .000
	Durban	837	3.93	1.03	
3	Bremen	835	3.74	1.10	p = .000
	Durban	836	4.15	1.00	
4	Bremen	835	3.47	1.03	p = .284
	Durban	830	3.41	1.30	
5	Bremen	836	3.06	1.28	p = .000
	Durban	831	3.67	1.16	
6	Bremen	835	2.58	1.29	p = .000
	Durban	825	3.58	1.19	
7	Bremen	836	3.19	1.21	p = .000
	Durban	831	3.92	1.10	
8	Bremen	836	3.52	1.10	p = .000
	Durban	835	3.88	1.10	
9	Bremen	835	3.02	1.15	p = .000
	Durban	824	3.59	1.07	
10	Bremen	836	3.15	1.21	p = .000
	Durban	833	3.69	1.18	
11	Bremen	835	2.95	1.16	p = .000
	Durban	836	3.68	1.13	
12	Bremen	835	2.90	1.18	p = .110
	Durban	839	3.00	1.36	
13	Bremen	835	3.08	1.15	P = .333
	Durban	839	3.14	1.24	

4.11.2 Single item connectedness to nature scale

In Bremen 834 and in Durban 803 participants answered the single item connectedness scale. A mean score of 6.17 (SD = 1.97) in Bremen and 6.69 (SD = 2.27) in Durban could be measured. The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.25 (Cohen's d) can be identified. The highest values in Bremen can be recognized for level seven (20.3%; 170), five (18.5%; 155), six and eight (in each case 15.7%; 131). The lowest values can be measured for stage one (1.6%; 13), stage two (1.8%; 15) and stage 10 (3.6%; 30) (figure 33).

The highest values in Durban can be recognized for level five (17.6%; 149), ten (15.4%; 130), seven (14.8%; 125). The lowest values can be measured for stage two (1.5%; 13) and stage one (2.6%; 22) (figure 33).

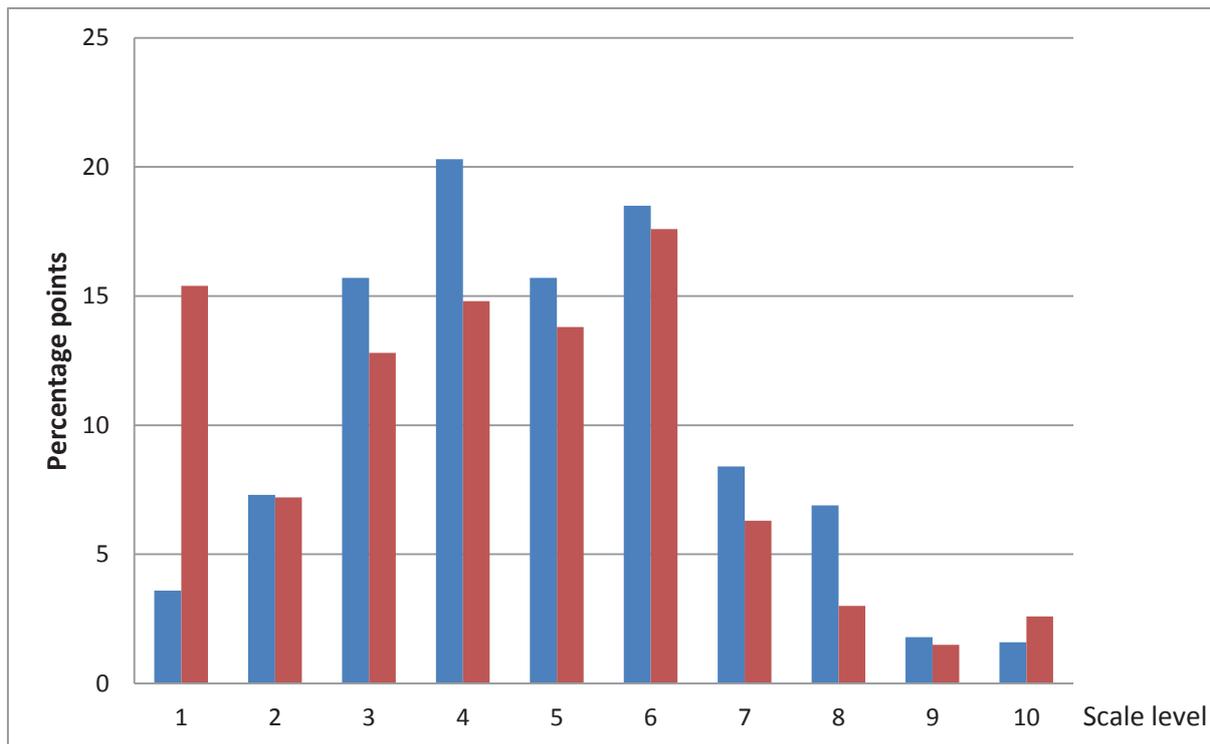


Figure 33 Bar chart result of the single item connectedness to nature scale of Bremen (blue) and Durban (red).

4.12 What is the learners' environmental identity?

In Bremen 836 and in Durban 843 participants answered the 24 item environmental identity scale. The reliability of this scale (Cronbach's Alpha) is found to be .93. Cronbach's Alpha for the sub scales are the following: 'pro-environmentalist ideology' is .61, 'self-identification with nature' is .81, 'positive feelings towards nature' is .83, and 'interaction with nature' is .71. A mean score of $M = 3.15$ ($SD = .71$) could be measured in Bremen and $M = 3.69$ ($SD = .65$) in Durban. The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.79 (Cohen's d) can be identified.

As an example item of the scale, the results of the statement 'Being a part of the ecosystem is an important part of who I am' are presented. In Bremen 16.9% of all participants answered 'strongly disagree', 24.5% 'disagree', 35.2% 'neutral', 17.9% 'agree', and 5.5% 'strongly agree'. In Durban 3.1% answered 'strongly disagree', 7.2% 'disagree', 23.0% 'neutral', 31.4% 'agree', and 35.3% 'strongly agree' (figure 34).

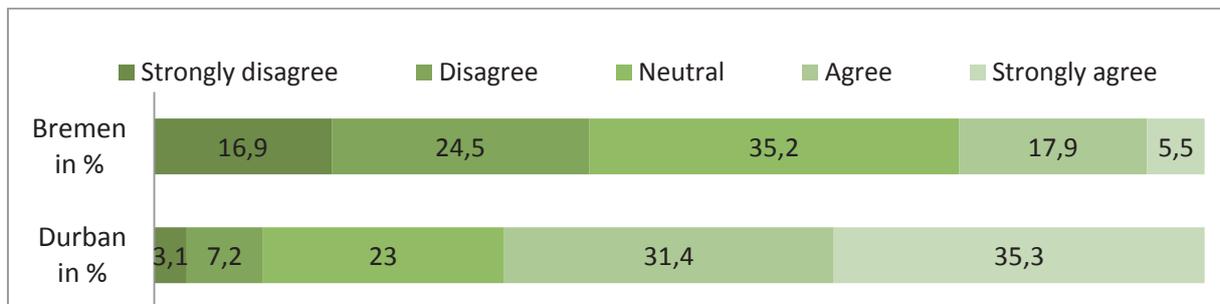


Figure 34 Results of an item example environmental identity scale: 'Being a part of the ecosystem is an important part of who I am'.

The cross city comparison of gender data (male $M = 3.34$, $SD = .73$; female $M = 3.49$, $SD = .73$), of socio-economic factor data (strong $M = 3.49$, $SD = .72$; weak $M = 3.34$, $SD = .74$), as well as of grade data (8th $M = 3.42$, $SD = .76$; 9th $M = 3.45$, $SD = .69$; 10th $M = 3.40$, $SD =$

.76) no significant differences could be measured. In the following the results of all items of the environmental identity scale are highlighted (table 15).

Table 15 Overview results of all items of the environmental identity scale including level of significance.

Item	City	N° of participants	Mean score	Standard deviation	Level of significance
1	Bremen	835	3.52	1.11	p = .025
	Durban	837	3.40	1.17	
2	Bremen	836	3.26	1.04	p = .000
	Durban	837	3.74	1.01	
3	Bremen	835	3.18	1.03	p = .000
	Durban	835	8.80	1.07	
4	Bremen	835	3.44	1.26	p = .000
	Durban	836	3.74	1.18	
5	Bremen	836	2.36	1.10	p = .161
	Durban	838	3.60	1.11	
6	Bremen	836	2.75	1.26	p = .000
	Durban	838	3.35	1.30	
7	Bremen	834	2.36	1.10	p = .000
	Durban	841	3.60	1.12	
8	Bremen	835	3.12	1.18	p = .000
	Durban	841	3.79	1.10	
9	Bremen	834	2.68	1.20	p = .000
	Durban	835	3.53	1.11	
10	Bremen	836	2.81	1.14	p = .000
	Durban	834	3.57	1.09	
11	Bremen	836	2.71	1.11	p = .000
	Durban	819	3.89	1.08	
12	Bremen	836	2.98	1.22	p = .000
	Durban	835	3.60	1.08	
13	Bremen	835	3.34	1.12	p = .000
	Durban	837	3.77	1.07	
14	Bremen	836	3.93	.99	p = .000
	Durban	836	4.38	.84	
15	Bremen	836	3.23	1.08	p = .000
	Durban	834	3.93	.91	
16	Bremen	836	3.39	1.32	p = .001
	Durban	833	3.60	1.27	
17	Bremen	836	3.22	1.34	p = .000
	Durban	822	3.90	1.17	
18	Bremen	834	3.06	1.31	p = .000
	Durban	832	3.80	1.06	
19	Bremen	836	3.55	1.20	p = .000
	Durban	836	3.91	1.07	
20	Bremen	835	3.32	1.23	p = .000
	Durban	829	3.93	1.07	
21	Bremen	836	3.70	1.24	p = .000
	Durban	826	4.11	1.07	
22	Bremen	835	2.54	1.31	p = .000
	Durban	824	3.67	1.18	
23	Bremen	836	2.97	1.21	p = .000
	Durban	834	3.58	1.12	
24	Bremen	836	3.05	1.35	p = .000
	Durban	835	3.58	1.24	

4.13 What are the learners' intentions to act nature-orientated and sustainable?

In the following, the results of the intention to act nature-orientated scale and the intention to act sustainable scale are presented.

4.13.1 Intention to act nature-orientated

In Bremen 835 and in Durban 839 participants answered the six item intention to act nature-orientated scale. The reliability of this scale (Cronbach's Alpha) is found to be .84. A mean score of $M = 3.04$ ($SD = .47$) could be measured in Bremen and $M = 3.23$ ($SD = .43$) in Durban. The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.42 (Cohen's d) can be identified.

As an example item of the scale, the results of the statement 'During the following year I intend to spend more time in activities in nature' are presented. In Bremen 7.4% of all participants answered 'strongly disagree', 18.3% 'disagree', 30.6% 'neutral', 32.7% 'agree', and 10.9% 'strongly agree'. In Durban 3.1% answered 'strongly disagree', 7.2% 'disagree', 20.8% 'neutral', 40.7% 'agree', and 28.1% 'strongly agree' (figure 35).

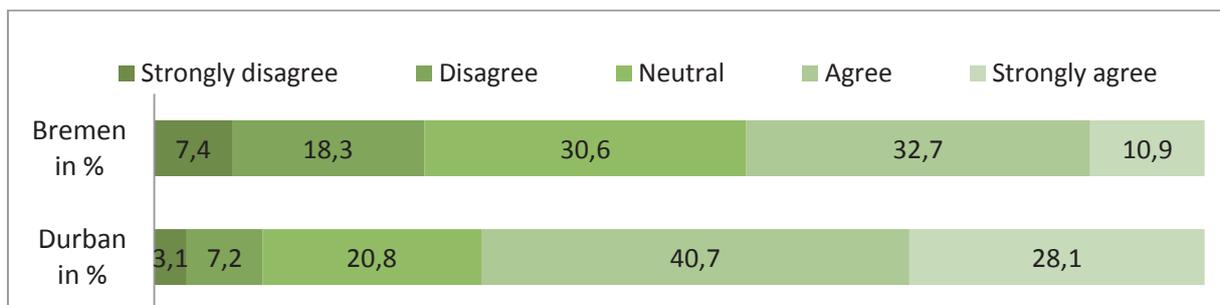


Figure 35 Results of an item example intention to act nature-orientated scale: 'During the following year I intend to spend more time in activities in nature'.

The cross city comparison of gender data (male $M = 3.12$, $SD = .47$; female $M = 3.16$, $SD = .46$), of socio-economic factor data (strong $M = 3.18$, $SD = .45$; weak $M = 3.09$, $SD = .47$), as well as of grade data (8th $M = 3.12$, $SD = .46$; 9th $M = 3.16$, $SD = .44$; 10th $M = 3.12$, $SD = .49$) no significant differences could be measured.

In the following the results of all items of the intention to act sustainable scale are highlighted (table 16).

Table 16 Overview results of all items of the intention to act nature-orientated scale including level of significance.

Item	City	N° of participants	Mean score	Standard deviation	Level of significance
1	Bremen	834	3,21	1,096	p = .000
	Durban	835	3,84	1,016	
2	Bremen	834	3,26	1,265	p = .000
	Durban	837	3,55	1,261	
3	Bremen	834	3,13	1,093	p = .000
	Durban	830	3,68	1,027	
4	Bremen	834	2,66	1,257	p = .000
	Durban	828	3,41	1,216	
5	Bremen	833	2,78	1,233	p = .000
	Durban	830	3,72	1,179	
6	Bremen	834	2,58	1,269	p = .000
	Durban	818	3,74	1,126	

4.13.2 Intention to act sustainable

In Bremen 834 and in Durban 835 participants answered the seven item intention to act sustainable scale. The reliability of this scale (Cronbach's Alpha) is found to be .83. A mean score of $M = 2.87$ ($SD = .90$) could be measured in Bremen and $M = 3.67$ ($SD = .75$) in Durban. The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.97 (Cohen's d) can be identified.

As an example item of the scale, the results of the statement 'During the following year I intend to spend more time in activities in nature' are presented. In Bremen 7.4% of all participants answered 'strongly disagree', 18.3% 'disagree', 30.6% 'neutral', 32.7% 'agree', and 10.9% 'strongly agree'. In Durban 3.1% answered 'strongly disagree', 7.2% 'disagree', 20.8% 'neutral', 40.7% 'agree', and 28.1% 'strongly agree' (figure 36).

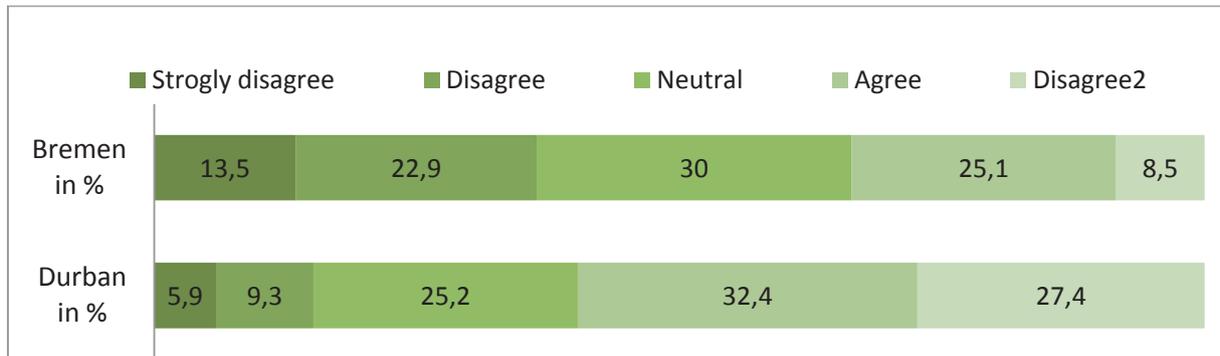


Figure 36 Results of an item example intention to act sustainable scale: 'During the following year I intend to spend more time in activities in nature'.

The cross city comparison of gender data (male $M = 3.17$, $SD = .90$; female $M = 3.36$, $SD = .93$), of socio-economic factor data (strong $M = 3.36$, $SD = .91$; weak $M = 3.17$, $SD = .92$), as well as of grade data (8th $M = 3.32$, $SD = .91$; 9th $M = 3.28$, $SD = .89$; 10th $M = 3.21$, $SD = .96$) no significant differences could be measured.

In the following all results if the intention to act sustainable scale are highlighted (table 17).

Table 17 Overview results of all items of the intention to act sustainable scale including level of significance.

Item	City	N° of participants	Mean score	Standard deviation	Level of significance
1	Bremen	834	2,92	1.16	$p = .000$
	Durban	819	3,66	1.14	
2	Bremen	834	2,68	1.30	$p = .000$
	Durban	825	3,40	1.23	
3	Bremen	834	2,43	1.22	$p = .000$
	Durban	832	3,61	1.15	
4	Bremen	834	2,98	1.31	$p = .000$
	Durban	829	3,76	1.07	
5	Bremen	834	3,35	1.21	$p = .000$
	Durban	832	3,78	1.03	
6	Bremen	835	2,97	1.21	$p = .000$
	Durban	835	3,86	1.03	
7	Bremen	835	3,24	1.18	$p = .000$
	Durban	833	3,93	1.04	

4.14 Key messages

Connectedness to nature

- Compared with Bremen participants in Durban significantly feel more connected to nature.

Environmental identity

- Compared with Bremen participants from Durban significantly identify more with their environment.

Intention to act

- Compared with Bremen participants in Durban significantly have a higher intention to act nature-orientated in the future.
- Compared with Bremen participants in Durban significantly have a higher intention to act sustainable in the future.

4.15 What is learners' understanding of nature?

In the following, the results regarding understanding of nature are presented. On one hand, the understanding of nature include an open question, on the other hand 14 depicted natural surroundings which had to be rated by the participants. Note that multiple answers were possible.

4.15.1 Open question understanding of nature

The participants answered the open question 'What is nature for you?', hence more than one respond could be given. In Bremen, all in all 1369 answers and in Durban 1278 answers were given. As discussed in chapter 2.4, the theoretical framework by Kattmann (1994) is used to categorize the given answers, who defined at least seven different groups.

In addition to Kattmann (1994), on the basis of the given answers five more categories could be derived from that. Examples are given to emphasize the categories content.

8. 'Untouched nature' (naturalness without human intervention); examples in Bremen are 'Natur ohne Menschen' [nature without humans], 'unberührt' [untouched], 'Natur ist, wo die Menschen nicht ihre Hände im Spiel haben' [nature is where humans do not interfere] and in Durban 'not man-made' or 'no man-made structure'.

9. 'Recreational nature' (linked to activities and relaxation purposes): examples in Bremen are 'Entspannung' [relaxation] or 'durchatmen' [breathe deeply] and in Durban 'an escape from troubles' or 'I use nature to heal my heart when I am sad'.

10. 'Living nature' (flora and fauna description or enumeration); examples in Bremen are 'Bäume, Seen, Büsche, Vögel' [trees, lakes, bushes, birds] or 'Bäume, Pflanzen, Tiere' [trees, plants, animals] and in Durban 'plants, animals' or 'everything around us, air, water, sand'.

11. 'Free and open nature' (fresh air and clear sky): an example in Bremen is 'keine Autoabgase, frische Luft' [no car exhaust gases, fresh air] and examples in Durban are 'fresh air' or 'A space where you get fresh air'.

12. 'Green nature' (association with the colour green); examples are 'grün' [green] or 'grüne Landschaften' [green landscapes] and in Durban 'Green' or 'green land'.

In table 18, the additional categories are numbered consecutively and integrated into Kattmann's model (1994) (number eight to twelve). The red groups include the smallest values, the yellow group includes small values, the light green includes values big values and the green group the largest values.

Table 18 Overview of given answers understandings of nature by Kattmann (1994) with five additional categories.

Nature category	Bremen		Durban	
	Number of mentions	Percentage points	Number of mentions	Percentage points
1. Required nature	66	8%	77	10%
2. Beloved nature	48	6%	21	3%
3. Honoured nature	7	1%	154	20%
4. Experienced nature	116	15%	156	20%
5. Ruled nature	1	0%	13	2%
6. Threatened nature	25	3%	43	6%
7. Lived nature	84	11%	201	26%
8. 'Untouched nature'	255	33%	181	23%
9. 'Recreational nature'	95	12%	61	8%
10. 'Living nature'	469	60%	321	41%
11. 'Free and open nature'	97	12%	17	2%
12. 'Green nature'	101	13%	17	2%
	1369	176%	1278	164%

In Bremen, the most frequently given responses are 'living nature' with 60% (469), 'untouched nature' with 33% (255) and 'experienced nature' with 15% (116). The least frequently given answers are 'ruled nature' being named by one participant, 'honoured nature' with 1% (7), and 'threatened nature' with 3% (25). In Durban, the most frequently given answers are 'living nature' with 41% (321), 'lived nature' with 26% (201) and 'untouched nature' with 23% (181). The least frequently given responses are 'ruled nature' with 2% (13), and 'free and open nature' and 'green nature' respectively with 2% and 17 mentions.

The biggest differences between the two groups of participants in Bremen and Durban can be found in the following categories: in each case ‘honoured nature’ and ‘living nature’ with a difference of 19%, ‘lived nature’ with 14%, ‘untouched nature’, ‘free and open nature’ and ‘green nature’ respectively with 10%.

4.15.1.1 Understandings of nature: Subdivision ‘grade’

In the following, the results are subdivided into the background factor grade are presented (see table 19).

Table 19 Overview of given answers understandings of nature subdivided into background factor 'grade'.

	Bremen			Durban		
Nature category	Number of mentions (percentage points)					
	Grade 8	Grade 9	Grade 10	Grade 8	Grade 9	Grade 10
1. Required nature	15 (6%)	24 (9%)	27 (10%)	17 (6%)	34 (12%)	26 (11%)
2. Beloved nature	22 (9%)	15 (6%)	4 (4%)	9 (3%)	4 (1%)	8 (3%)
3. Honoured nature	4 (2%)	2 (1%)	1	63 (23%)	54 (20%)	37 (16%)
4. Experienced nature	38 (15%)	33 (13%)	45 (17%)	48 (18%)	53 (19%)	55 (24%)
5. Ruled nature	0	0	1	6 (2%)	4 (1%)	3 (1%)
6. Threatened nature	11 (4%)	8 (3%)	6 (2%)	15 (6%)	15 (5%)	13 (6%)
7. Lived nature	31 (12%)	28 (11%)	25 (9%)	59 (22%)	70 (26%)	72 (31%)
8. 'Untouched nature'	75 (30%)	84 (32%)	96 (36%)	63 (23%)	50 (18%)	68 (29%)
9. 'Recreational nature'	39 (16%)	28 (11%)	28 (11%)	18 (7%)	25 (9%)	18 (8%)
10. 'Living nature'	142 (57%)	165 (63%)	162 (61%)	116 (43%)	111 (41%)	94 (40%)
11. 'Free and open nature'	24 (10%)	37 (14%)	36 (14%)	7 (3%)	7 (3%)	3 (1%)
12. 'Green nature'	31 (12%)	38 (14%)	32 (12%)	6 (2%)	4 (1%)	7 (1%)
	435 (174%)	471 (176%)	471 (177%)	434 (160%)	431 (156%)	404 (171%)

In the following, only the biggest values will be presented. In Bremen, the most frequently given responses are 'living nature' with 142 (57%) in grade 8, 165 (63%) in grade 9 and 161 (61%) in grade 10. The second biggest group is 'untouched nature' with 75 (30%) in grade 8, 84 (32%) in grade 9 and 96 (36%) in grade 10. The third biggest group is 'experienced nature' with 38 (15%) in grade 8, 33 (13%) in grade 9 and 45 (17%) in grade 10. In Durban the biggest values has the group 'living nature' with 116 (43%). In grade 8, 111 (41%) in grade 9

and 94 (40%) in grade 10. The second biggest group is ‘untouched nature’ with 63 (23%) in grade 8, 50 (18%) in grade 9 and 68 (29%) in grade 10. The third biggest group is ‘honoured nature’ with 63 (23%) in grade 8, 54 (20%) in grade 9 and 37 (16%) in grade 10.

4.15.1.2 Understandings of nature: Subdivision ‘sex’

In the following paragraph, the results of the understandings of nature with the subdivision ‘sex’ are presented (see table 20).

Table 20 Overview of given answers understandings of nature subdivided into background factor ‘sex’.

Nature category	Bremen		Durban	
	Number of mentions (percentage points)		Number of mentions (percentage points)	
	Male	Female	Male	Female
1. Required nature	22 (6%)	44 (11%)	39 (12%)	38 (8%)
2. Beloved nature	18 (5%)	30 (8%)	10 (3%)	11 (2%)
3. Honoured nature	4 (1%)	3 (1%)	64 (19%)	90 (20%)
4. Experienced nature	49 (13%)	67 (17%)	45 (14%)	111 (25%)
5. Ruled nature	1	0	3 (1%)	10 (2%)
6. Threatened nature	10 (3%)	15 (4%)	17 (5%)	26 (6%)
7. Lived nature	37 (9%)	47 (12%)	83 (25%)	118 (26%)
8. ‘Untouched nature’	134 (34%)	121 (31%)	79 (24%)	102 (23%)
9. ‘Recreational nature’	41 (10%)	54 (14%)	20 (6%)	41 (9%)
10. ‘Living nature’	222 (57%)	247 (64%)	134 (41%)	187 (42%)
11. ‘Free and open nature’	49 (13%)	48 (12%)	10 (3%)	7 (2%)
12. ‘Green nature’	49 (12%)	54 (14%)	7 (2%)	10 (2%)
	637 (163%)	732 (189%)	522 (158%)	756 (168%)

In the following, only the biggest values will be presented. In Bremen, the most frequently given responses are 'living nature' with 222 (57%) for male and 247 (64%) for female participants. The second biggest group is 'untouched nature' with 134 (34%) for male and 121 (31%) for female participants. The third biggest group is 'experienced nature' with 49 (13%) for male and 67 (17%) for female participants. In Durban the group 'living nature' with 134 (41%) for male and 187 (42%) for female participants has the largest values. The second biggest group is 'lived nature' with 83 (25%) for male and 118 (26%) for female participants. The third biggest group is 'untouched nature' with 79 (24%) for male and 102 (23%) for female participants.

4.15.1.3 Understanding of nature: Subdivision 'socio-economic status'

In the following paragraph the results of the understanding of nature with the subdivision 'socio-economic status' are presented (see table 21).

Table 21 Overview of given answers understandings of nature subdivided into background factor 'socioeconomic-status'.

Nature category	Bremen		Durban	
	Number of mentions (percentage points)		Number of mentions (percentage points)	
	Strong	Weak	Strong	Weak
1. Required nature	30 (8%)	36 (9%)	37 (8%)	40 (12%)
2. Beloved nature	23 (6%)	25 (7%)	18 (4%)	3 (1%)
3. Honoured nature	4 (1%)	3 (1%)	59 (13%)	95 (29%)
4. Experienced nature	63 (16%)	53 (14%)	119 (26%)	37 (11%)
5. Ruled nature	1	0	8 (2%)	5 (2%)
6. Threatened nature	19 (5%)	6 (2%)	24 (5%)	19 (6%)
7. Lived nature	42 (11%)	42 (11%)	138 (30%)	63 (19%)
8. 'Untouched nature'	142 (36%)	113 (30%)	96 (21%)	85 (26%)
9. 'Recreational nature'	65 (16%)	30 (8%)	50 (11%)	11 (3%)
10. 'Living nature'	226 (57%)	243 (63%)	197 (43%)	124 (38%)
11. 'Free and open nature'	45 (11%)	52 (14%)	12 (3%)	5 (2%)
12. 'Green nature'	52 (13%)	49 (13%)	13 (3%)	4 (1)
	714 (180%)	655 (171%)	781 (172%)	756 (168%)

In the following, only the biggest values will be presented. In Bremen, the most frequently given responses are 'living nature' with 226 (57%) for participants with a strong socio-economic status and 243 (63%) with a weak one. The second biggest group is 'experienced nature' with 63 (16%) for participants with a strong socio-economic status and 53 (14%) with a weak one. The third biggest group is 'green nature' with 52 (13%) for participants with a strong socio-economic status and 49 (13%) with a weak one. In Durban the group 'living na-

ture' with 197 (43%) for participants with a strong socio-economic status and 124 (38%) with a weak one have the biggest values. The second biggest group is 'lived nature' with 138 (30%) for participants with a strong socio-economic status and 63 (19%) with a weak one. The third biggest group is 'experienced nature' with 119 (26%) for participants with a strong socio-economic status and 'honoured nature' for participants with a weak socio-economic status.

4.15.2 Rating of depicted natural surroundings

In the following, the results of all 14 depicted natural surroundings and the mean scores are highlighted for both cities (see table 22 and 23). In order to underline the findings, the three highest and lowest mean scores are shown. In Bremen the picture with the highest mean score is the 'elephant in the wilderness' with 9.35, followed by the 'mountain stream' with 9.12. The lowest means scores can be identified for the 'dam' with 4.34, 'elephant in zoo' with 3.28 and 'traffic modern city' with 1.98.

Table 22 Overview of results all depicted natural surroundings Bremen.

Bremen	Nature picture	Mean score
1	Elephant in the wilderness	9.35
2	Mountain stream	9.27
3	Mountains	9.12
4	Beach	8.68
5	River	7.93
6	Agricultural land	6.84
7	Organic garden	6.53
8	City park	5.65
9	Playground	5.21
10	Soccer field	4.98
11	Rural road	4.41
12	Dam	4.34
13	Elephant in zoo	3.28
14	Traffic modern city	1.98

In Durban the three highest mean scores can be found for the picture ‘elephant in the wilderness’ with 8.76, ‘mountains’ with 8.39 and ‘river’ with 8.34. The three lowest mean scores can be identified for the picture ‘elephant in zoo’ with 5.93, ‘rural road’ with 5.48’ and traffic modern city’ with 3.00.

Table 23 Overview of results all depicted natural surroundings Durban.

Durban	Nature picture	Mean score
1	Elephant in the wilderness	8.76
2	Mountains	8.39
3	River	8.34
4	Agricultural land	8.29
5	Beach	8.08
6	Mountain stream	8.07
7	Soccer field	6.82
8	City park	7.27
9	Organic garden	7.15
10	Dam	6.60
11	Playground	6.09
12	Elephant in zoo	5.93
13	Rural road	5.48
14	Traffic modern city	3.00

Regarding the depicted natural surroundings, three different categories could be identified comparing the results from group Bremen with the result Durban which are presented in the following.

4.15.2.1 Group of very similar rating

The first category consists of nine pictures that have been perceived and rated very similarly in comparison of both groups.

Picture 1

In Bremen 835 and in Durban 806 participants responded to the picture ‘elephant in the wilderness’ as seen below in figure 37.



Figure 37 Picture of ‘elephant in the wilderness’ (own visual material).

In both groups, the biggest value can be found in level 10, which is 73.6% in Bremen and 57.6% in Durban. All other levels are comparatively represented (see table 24).

Table 24 Overview of results ‘elephant in the wilderness’.

Level	Bremen	Durban
1	0.8%	1.8%
2	1.0%	0.9%
3	0.4%	1.1%
4	0.7%	2.8%
5	0.6%	2.6%
6	2.0%	2.8%
7	2.3%	6.0%
8	6.0%	7.7%
9	12.6%	11.9%
10	73.6%	57.6%

Mean score in Bremen is 9.35 (SD = 1.54) and in Durban 8.76 (SD = 2.10). The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.32 (Cohen's d) can be identified.

Picture 2

In Bremen 835 and in Durban 804 participants responded to the picture 'mountains' as seen in figure 38.



Figure 38 Picture of 'mountains'.

In both groups, the biggest value can be found in level 10, which is 67.0% in Bremen and 46.5% in Durban. All other levels are comparatively represented (see table 25).

Table 25 Overview of results 'mountains'.

Level	Bremen	Durban
1	1.7%	2.0%
2	0.2%	1.8%
3	1.1%	1.3%
4	0.8%	2.5%
5	2.0%	4.7%
6	2.5%	4.4%
7	3.0%	6.1%
8	7.7%	11.3%
9	13.9%	14.3%
10	67.0%	46.5%

Mean score in Bremen was measured to be 8.39 (SD = 1.79) and in Durban 9.12 (SD = 2.27).

The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.36 (Cohen's d) can be identified.

Picture 3

In Bremen 834 and in Durban 814 subjects responded to the picture 'mountain stream' as seen in the figure 37 below.



Figure 39 Picture of 'mountain stream'.

The highest value can be identified in level 10, which is 71.2% in Bremen and 48.1% in Durban. All other levels are rather underrepresented (see table 16).

Table 26 Overview of results ‘mountain stream’.

Level	Bremen	Durban
1	1.3%	4.4%
2	0.5%	2.8%
3	0.5%	2.6%
4	1.3%	4.0%
5	1.6%	3.9%
6	1.8%	4.0%
7	2.5%	5.4%
8	3.9%	8.7%
9	15.2%	12.2%
10	71.2%	48.1%

Mean score in Bremen was measured to be 9.27 (SD = 1.67) and in Durban 8.07 (SD = 2.71).

The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.53 (Cohen’s d) can be identified.

Picture 4

In Bremen 834 and in Durban 813 subjects responded to the picture ‘river’ as seen in figure 49 below.



Figure 40 Picture of 'river'.

In this case the biggest value can be identified in level 10, which is 34.1% in Bremen and 46.3% in Durban. Other significant numbers in Bremen can be found in level 8 and 9 with 16.0% and respectively 16.7% (see figure 27).

Table 27 Overview of results 'river'.

Level	Bremen	Durban
1	1.1%	2.1%
2	1.2%	1.3%
3	3.0%	1.9%
4	4.8%	2.5%
5	6.7%	5.2%
6	7.3%	4.5%
7	8.9%	6.4%
8	16.0%	12.6%
9	16.7%	13.2%
10	34.1%	46.3%

Mean score in Bremen was measured to be 7.93 (SD = 2.24) and in Durban 8.34 (SD = 2.27). The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.18 (Cohen's d) can be identified.

Picture 5

In Bremen 834 and in Durban 812 subjects responded to the picture 'beach' as to be seen in figure 41 below.



Figure 41 Picture of 'beach'.

The biggest value can be found in level 10, which is 49.4% in Bremen and 45.3% in Durban. In both cities, level 8 and 9 also have a mentionable value of 12.7% and 19.7% in Bremen and 10.1% and 15.6% in Durban (see figure 28).

Table 28 Overview of results 'beach'.

Level	Bremen	Durban
1	1.8%	4.8%
2	0.4%	1.2%
3	1.8%	2.5%
4	1.6%	2.8%
5	2.3%	6.2%
6	4.2%	4.2%
7	6.0%	7.3%
8	12.7%	10.1%
9	19.7%	15.6%
10	49.4%	45.3%

Mean score in Bremen was measured to be 8.68 (SD = 1.97) and in Durban 8.08 (SD = 2.58).

The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.26 (Cohen's d) can be identified.

Picture 6

In Bremen 834 and in Durban 812 subjects responded to the picture 'organic garden' as seen below in figure 42.



Figure 42 Picture of 'organic garden'.

The biggest value in Bremen can be identified in level 7 (16.9%), level 6 (15.4%), level 8 (15.0%) and level 10 (11.5%). In Durban the highest level can be found in level 10 with 46.5% (see table 29).

Table 29 Overview of results 'organic garden'.

Level	Bremen	Durban
1	2.0%	2.0%
2	3.2%	1.8%
3	5.5%	1.3%
4	9.3%	2.5%
5	11.0%	4.7%
6	15.4%	4.4%
7	16.9%	6.1%
8	15.0%	11.3%
9	9.9%	14.3%
10	11.5%	46.5%

Mean score in Bremen was measured to be 6.53 (SD = 2.57) and in Durban 7.15 (SD = 2.29).

The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.25 (Cohen's d) can be identified.

Picture 7

In Bremen 834 and in Durban 806 subjects responded to the picture 'agricultural land' as seen in figure 43 below.



Figure 43 Picture of 'agricultural land'.

In Bremen the highest values that can be identified are in level 10 (23.4%), in level 7 (12.1%), level 9 (11.7%) and level 8 (11.0%). In Durban the biggest value can identified in level 10 (48.5%) (see table 30).

Table 30 Overview of results 'agricultural land'.

Level	Bremen	Durban
1	3.8%	2.4%
2	3.8%	2.1%
3	5.1%	2.5%
4	10.0%	2.7%
5	9.1%	4.3%
6	9.7%	5.3%
7	12.1%	6.0%
8	11.0%	9.2%
9	11.7%	12.3%
10	23.4%	48.5%

Mean score in Bremen was measured to be 6.84 (SD = 1.79) and in Durban 8.29 (SD = 2.27).

The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.71 (Cohen's d) can be identified.

Picture 8

In Bremen 834 and in Durban 812 subjects responded to the picture ‘playground’ as seen in figure 44 below.



Figure 44 Picture of ‘playground’.

In Bremen, the biggest value can be identified in level 4 (16.3%), level 5 (14.1%) and level 6 (14.0%). In Durban the biggest values can be identified in level 10 (15.4%), level 7 (11.8%) and level 6 and 8 both 10.5%) (see table 31).

Table 31 Overview of results 'playground'.

Level	Bremen	Durban
1	6.2%	7.2%
2	6.0%	6.3%
3	13.4%	5.9%
4	16.3%	9.2%
5	14.1%	10.9%
6	14.0%	10.5%
7	11.6%	11.8%
8	9.1%	10.5%
9	3.7%	7.4%
10	5.5%	15.4%

Mean score in Bremen was measured to be 5.21 (SD = 2.80) and in Durban 6.09 (SD = 2.37).

The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.34 (Cohen's d) can be identified.

Picture 9

In Bremen 834 and in Durban 814 subjects responded to the picture 'traffic modern city' as seen in figure 45 below.



Figure 45 Picture of 'traffic modern city'.

In Bremen the biggest value can be found in level 1 with 75.8% and as well as in Durban with 52.5% (as seen in table 32).

Table 32 Overview of results 'traffic modern city'.

Level	Bremen	Durban
1	75.8%	52.5%
2	6,1%	8.4%
3	3.6%	4.6%
4	28%	5.9%
5	2.8%	4,3%
6	1.4%	3.2%
7	1.7%	1.7%
8	0.5%	2.4%
9	1.6%	1.5%
10	3.6%	8.9%

Mean score in Bremen was measured to be 1.98 (SD = 2.25) and in Durban 3.00 (SD = 2.97).

The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.39 (Cohen's d) can be identified.

Summary

The first seven pictures have very high and rather similar mean scores and the two sample t-test proves a highly significant difference between both groups. All effect sizes range from small to average. The last two pictures have very low and rather similar mean scores and the two sample t-test proves a highly significant difference between both groups. Both effect sizes are small.

4.15.2.2 Group rather different rating

The second category consists of three pictures that have been perceived and rated rather differently in comparison of both groups.

Picture 1

In Bremen 834 and in Durban 814 subjects responded to the picture 'city park' as seen in figure 46 below.

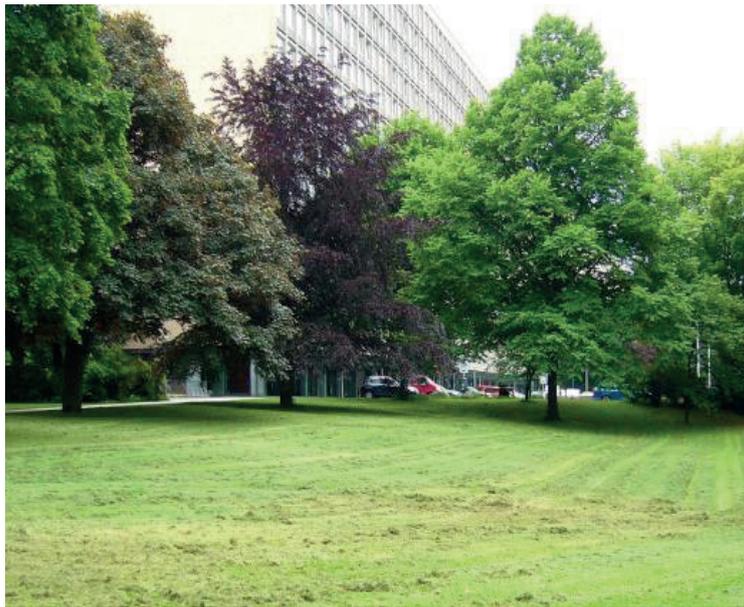


Figure 46 Picture of 'city park'.

The biggest values can be identified in Bremen in level 5 (18.8%), level 4 (14.6%) and in level 6 (13.8%). In Durban the highest values are in level 10 (24.9%), level 8 (13.7%) and in level 7 (12.5%) (see table 33).

Table 33 Overview of results 'city park'.

Level	Bremen	Durban
1	28.0%	2.2%
2	3.7%	1.9%
3	11.6%	3.2%
4	14.6%	7.4%
5	18.8%	8.4%
6	13.8%	10.6%
7	11.8%	12.5%
8	10.2%	13.7%
9	6.5%	11.2%
10	6.1%	24.9%

Mean score in Bremen was measured to be 5.65 (SD = 2.25) and in Durban 7.27 (SD = 2.43).

The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.69 (Cohen's d) can be identified.

Picture 2

In Bremen 834 and in Durban 811 subjects responded to the picture 'soccer field' as seen in figure 47 below.



Figure 47 Picture of 'soccer field'.

In Bremen the highest values can be identified in level 4 (16.3%), level 5 (14.8%) and level 3 (13.2%) and in Durban in level 10 (26.2%), level 5 (9.8%) and level 7 (9.7%) (see table 34).

Table 34 Overview of results 'soccer field'.

Level	Bremen	Durban
1	8.3%	4.7%
2	11.1%	4.1%
3	13.2%	5.1%
4	16.3%	8.3%
5	14.8%	9.8%
6	7.8%	9.6%
7	9.1%	9.7%
8	5.9%	8.9%
9	4.4%	9.5%
10	9.1%	26.2%

Mean score in Bremen was measured to be 4.98 (SD = 2.64) and in Durban 6.82 (SD = 2.81).

The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.68 (Cohen's d) can be identified.

Picture 3

In Bremen 834 and in Durban 811 subjects responded to the picture 'rural road' as seen in figure 48 below.



Figure 48 Picture of 'rural road'.

The biggest values can be identified in Bremen for level 1 (15.0%), level 3 (14.0%) and level 2 (13.3%) and in Durban for level 10 (13.5%), level 4 (12.3%) and level 5 (12.1%) (see table 35).

Table 35 Overview of results 'rural road'.

Level	Bremen	Durban
1	15.0%	9.6%
2	13.3%	7.7%
3	14.0%	9.9%
4	13,4%	12.3%
5	11.6%	12.1%
6	9.6%	8.6%
7	9.3%	9.2%
8	4.9%	7.8%
9	4.3%	5.6%
10	4.4%	13.5%

Mean score in Bremen was measured to be 4.41 (SD = 2.87) and in Durban 5.48 (SD = 2.58). The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.62 (Cohen's d) can be identified.

Summary

The three pictures have rather mediocre mean scores and the two sample t-test proves a highly significant difference between both groups. All effect sizes are average.

4.15.2.3 Group of very different rating

The third category consists of two pictures that have been perceived and rated very differently in comparison of both groups.

Picture 1

In Bremen 835 and in Durban 804 subjects responded to the picture 'elephant in zoo' as seen in figure 49 below.



Figure 49 Picture of 'elephant in zoo'.

The highest values can be found in Bremen in level 1 (36.9%), level 2 (15.4%) and level 3 (10.8%) and in Durban in level 10 (18.2%), level 1 with 11.9% and level 6 and 8 (both 9.3%) (see table 36).

Table 36 Overview of results 'elephant in zoo'.

Level	Bremen	Durban
1	36.9%	11.9%
2	15.4%	6.6%
3	10.8%	6.3%
4	10.0%	8.9%
5	7.1%	8.5%
6	6.2%	9.3%
7	4.1%	7.9%
8	3.1%	9.3%
9	2.2%	8.3%
10	4.2%	18.2%

Mean score in Bremen was measured to be 3.28 (SD = 2.60) and in Durban 5.93 (SD = 3.10).

The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.93 (Cohen's d) can be identified.

Picture 2

In Bremen 835 and in Durban 804 subjects responded to the picture 'dam' as seen in figure 50 below.



Figure 50 Picture of 'dam'.

The biggest values in Bremen can be found in level 1 (16.7%), level 2 (14.7%) and level 4 (14.2%) and in Durban in level 10 (22.7%), level 7 (11.8%) and 8 (10.4%) (see table 37).

Table 37 Overview of results 'modern city'.

Level	Bremen	Durban
1	16.7%	7.1%
2	14.7%	4.5%
3	12.8%	4.8%
4	14.2%	7.6%
5	10.6%	9.3%
6	7.9%	8.0%
7	6.9%	11.8%
8	6.1%	10.4%
9	3.9%	8.7%
10	5.9%	22.7%

Mean score in Bremen was measured to be 4.34 (SD = 2.69) and in Durban 6.6 (SD = 2.89). The two sample t-test proves a highly significant difference between the group in Bremen and in Durban ($p = .000$). An effect size of 0.81 (Cohen's d) can be identified.

Summary

The two pictures rather have small to mediocre mean scores and the two sample t-test proves a highly significant difference between both groups. All effect sizes are strong.

4.16 Key messages

Understandings of nature

Bremen/ Durban

- Especially, similarities regarding the categories ‘living nature’ followed by ‘untouched nature’ can be identified with the highest scores in Bremen and Durban.
- Small scores in both groups can be seen e.g. in the categories ‘threatened nature’ and ‘beloved nature’.
- The biggest differences can be shown in the category ‘honoured nature’ which is underrepresented in Bremen but a super ordinate category in Durban.
- Categories ‘free and open nature’ and ‘green nature’ also represent differences in which participants from Bremen are stronger represented.

Grade

- The greatest similarities in the group of grade 8-10 participants can be seen in the category of ‘living nature’ with high scores and e.g. ‘ruled nature’ and ‘threatened nature’ with small scores in both countries.
- The biggest differences can be seen in the category ‘free and open nature’ and ‘green nature’ that grade 8-10 participants from Bremen represent stronger.

Sex

- The biggest similarities in the group of subdivided male and female participants can be shown in the category of ‘living nature’.
- On the one hand, the biggest differences can be seen in the category ‘honoured nature’ which the male and female participants from Durban excessively represent and on the other hand the categories ‘free and open nature’ and ‘green nature’ that the male and female participants from Bremen do dominate.

Socio-economic status

- On the one hand, the biggest similarities in the group of strong and weak socio-economic status the category 'living nature' can be seen with high scores in both cities and on the other hand 'ruled nature' and 'threatened nature' as categories of low scores.
- The biggest differences can be seen in the category 'honoured nature' which especially female participants from weak socio-economic status in Durban represent.

Depicted natural surroundings

- Three different categories can be identified regarding the perception of depicted natural surroundings.
 1. Very similar understanding of nature with high mean scores related to pictures that show rather untouched and generally idealized and romantic surroundings.
 2. Rather different understanding of nature with mediocre mean scores related to pictures that show balanced, near-natural surroundings that integrate human-beings and his intervention in nature.
 3. Very different understanding of nature with small and mediocre mean scores related to pictures that show the human-being as a 'planer' in as well as a negative influencing and limiting factor for nature. Participants from Durban tend to perceive these pictures as more natural than participants from Bremen.

4.17 How do the learners' experience of nature, their connectedness to nature and their environmental identity correlate with their intention to act nature-orientated and sustainable?

In the following, the results of the correlation analysis as well as two different regression analyses are presented.

4.17.1 Correlation analysis

For the correlation analysis, only the most important constructs get closer to the object of observation, namely experiences of nature (encounters with nature intensity and frequency), connectedness to nature, environmental identity and the intention to act in a pro-environmental manner (intention to act nature-orientated and the intention to act sustainable). Particularly, the correlations between the encounters with nature intensity and frequency and all other constructs are on a weak and moderate positive relationship and all in all on a reliable level ($r = .19 - .55$) (see table 38 below).

Table 38 Overview of the correlation coefficient (Pearson) of the main constructs.

	Encounters with nature (intensity)	Encounters with nature (frequency)	Connect- edness to nature	Environ- mental identity)	Intention to act na- ture- orientated	Intention to act sus- tainable)
Encounters with nature (intensity)	1	$r = .55$	$r = .19$	$r = .30$	$r = .27$	$r = .19$
Encounters with nature (frequency)		1	$r = .21$	$r = .33$	$r = .30$	$r = .22$
Connect- edness to na- ture			1	$r = .73$	$r = .62$	$r = .60$
Environ- mental iden- tity				1	$r = .82$	$r = .74$
Intention to act nature- orientated					1	$r = .73$
Intention to act sustain- able						1

In order to emphasize the relationships of the different constructs, the theoretical model for the quantitative study is used in the figure 51. Especially, the positive relationships between the constructs connectedness of nature, environmental identity, and the intention to act nature-orientated and the intention to act sustainable are very strong ($r = .60 - .82$). The correlation coefficients in the red boxes show the relationship between the main constructs; the first number in the box is linked to the intention to act nature-orientated scale, and the second number is linked to the intention to act sustainable scale.

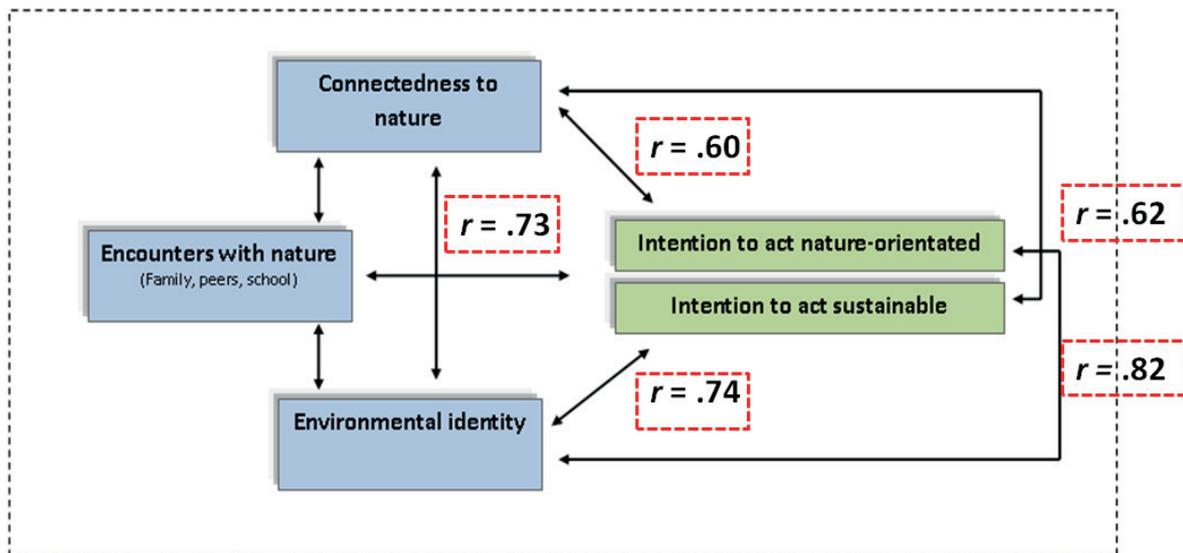


Figure 51 Overview of the correlation coefficients (Pearson) linked to the theoretical model of the quantitative study.

In particular, the environmental identity scale shows the strongest positive relationships with the other scales (connectedness to nature $r = .73$; intention to act nature -orientated $r = .74$; intention to act sustainable $r = .82$).

4.17.2 Regression analysis

For the regression analysis, two different models have been calculated: one model using the intention to act nature-orientated scale and the other one using the intention to act sustainable scale as the dependent variable that is supposed to be declared. In both cases, the background factors (sex, grade, socio-economic background, and city factor), as well as the encounters with nature (intensity and frequency), the connectedness to nature scale and the environmental identity scale are being considered to be explanatory variables.

Regression model one

The first regression model uses the intention to act nature-orientated scale as the dependent variable (see model overview in table 39).

Table 39 Overview of regressive model using intention to act nature-orientated scale as dependent variable.

Model	R	R ²	Adjusted R ²	Standard error of the estimation
1	,820 ^a	,672	,672	,47463
2	,829 ^b	,687	,687	,46413

Only the adjusted R² values are relevant. The regressive model uses the explanatory variables a) environmental identity and b) city factor as the most important variables to explain the dependent variable intention to act in a nature-orientated way. The first model only included the environmental identity which can explain the intention to act nature-orientated with 67%, and model two uses the environmental identity and additionally the city factor. In model two, an unnoticeable difference compared with the first model can be measured (69%). As a main result, it can be said, that the environmental identity scale declares the intention to act nature-orientated the most.

Regression model two

The second regression model uses the intention to act sustainable scale as the dependent variable (see model overview in table 40).

Table 40 Overview of regressive model using intention to act sustainable scale as dependent variable.

Model	R	R ²	Adjusted R ²	Standard error of the estimation
1	,742 ^a	,551	,550	,61854
2	,759 ^b	,576	,576	,60092

Once again in this case, the regressive model uses the explanatory variables a) environmental identity and b) city factor as the most important variables to explain the dependent variable intention to act in a sustainable way. The first model only included the environmental identity which can explain the intention to act nature-orientated with 55%, and model two uses the environmental identity and additionally the city factor. Once more, an unnoticeable difference compared with the first model can be measured (58%) in model two. As a main result, it can be noted, that the environmental identity scale declares the intention to act sustainable the most.

4.18 Key messages

Correlations

- The environmental identity scale shows the strongest positive relationships with the other scales (connectedness to nature, intention to act nature -orientated, and intention to act sustainable).

Regression

- In both regression analyses the environmental identity and the city factor are the most important variables to explain the dependent variable intention to act in a nature-orientated way and to act in a sustainable way.

4.19 Participants of the qualitative study

All in all, twenty participants were interviewed in the qualitative survey, ten in each city. The participants were between the ages of 13-16 (M=14.45). Altogether, 50% (10) female and 50% (10) male participants contributed in this part of the study. The participants were in grade eight to ten.

Selection of the participants

The interview followed a certain structure starting from the selection of the participants for which was conducted randomly sometimes with the help of a teacher. These three selected participants were asked to use the inclusion of nature in self scale by Schultz (2001) to identify their current level of connectedness to nature. Moreover, the participants had to tell the researcher about their level and had to explain their decision. After that one participant with a rather high respectively low level of connectedness to nature was selected for the main interview. In the beginning of the main interview the participant was asked to paint his or her nature picture. The participant was allowed to use crayons if needed and wanted. After that the semi-structured interviews began.

4.20 Findings of the qualitative study: Bremen

In the following, two contrasting examples of interviews in Bremen are presented. In Bremen the chosen examples are contrasting regarding their sex (Jacqueline¹², Robert) female), their socioeconomic status (Waldorfschule an der Touler Straße [strong], Gesamtschule Bremen West [weak]), and their level of connectedness to nature (high, low).

4.20.1 Participant one: Jacqueline

Jacqueline is 15 years old and visits the Waldorfschule an der Touler Straße in grade 8. The school is located in a strong socio-economic area. Jacqueline seems to be a very shy and calm individual. Sometimes the researcher has to wait a rather long time to get an answer and the

¹² All names have been changed in order to protect the participant's anonymity.

given answers are rather short and elliptic. The first part of the interview is conducted in the cafeteria and after an interruption it was continued in another smaller room. All in all, the interview with Jacqueline lasted 20:22 min. Her level of connectedness to nature was '6' following the inclusion of nature in self scale (Schultz 2001). In figure 52 below, the nature picture of Jacqueline is illustrated. Main aspects of her picture are the sun, some green mountains in the background, three trees, and a small lake. Jacqueline's nature picture indicates a limited perception of untouched, self-regulated nature. An idealized and alienated understanding of nature with the exclusion of human-being can be identified.



Figure 52 Nature picture Jacqueline at Waldorfschule an der Toulser Straße.

Text unit 1:

Researcher: *Würdest du den Ort an dem du wohnst eher als städtisch oder eher als ländlich bezeichnen?*

[...] Wo ich wohne, da ist ganz in der Nähe ein Park- der Bürgerpark. Da sind auch viele Tiere und so. ' (Jaq_Toul_2:07)

Researcher: *Kannst du den Park kurz beschreiben und vielleicht auch die Tiere die dort leben?*

'Ja, Rehe, Hasen, Kaninchen, Füchse- aber die sieht man kaum. Und auch Vögel. ' (Jaq_Toul_2:30)

Researcher: *Und welche Dinge gehören eher zum Stadtleben dazu?*

'In der Nähe ist auch der Hauptbahnhof mit den ganzen Zügen, die nicht ganz umweltfreundlich sind. Und Autos. ' (Jaq_Toul_2:48)

Translation:

How would you describe the area in which you live?

The place very close to where I live, there is a park- the Bürgerpark. There you can find many animals and stuff.

Can you please describe the park and maybe the animals that live there?

Yes, deer, rabbits, bunnies, foxes, but you rarely see them. And birds too.

And where do you see things that are linked to city life?

Nearby there is the central station with many trains, which are not quite environmentally friendly. And cars.

Text unit 2:

Researcher: *Wenn du mit deinen Eltern in den Urlaub fährst, gibt es da irgendwelche Orte, an denen du viel in der Natur bist?*

'Ja, auf dem Biobauernhof in Österreich. ' (Jaq_Toul_5:16)

Researcher: *Kannst du darüber berichten?*

'Da waren wir mit meiner Familie, mit meinen Eltern. Da waren wir wandern durch die Berge. ' (Jaq_Toul_5:27)

Researcher: *Was zeichnet so einen Biobauerhof aus? Was habt ihr da gemacht?*

'Die haben natürlich viele Tiere- ziemlich viele Katzen, die laufen da auf den Feldern rum. ' [...] (Jaq_Toul_6:56)

Researcher: *Was passiert da mit den Tieren? Werden die Kühe gemolken?*

'Die Kühe werden gemolken, wenn man da mit Kindern hinfährt. Da kannst du Stalldienst machen. Da kannst du mitmachen. Da kannst du die Tiere füttern. [...] (Jaq_Toul_7:23)

Translation:

If you are on holiday with your parents, are there some places where spend a lot of time in nature?

Yes, there is an organic farm in Austria.

Can you report about that?

We were there together with my family, with my parents. There we were hiking in the mountains.

What is so special about that organic farm? What did you do there?

Obviously, they have a lot of animals, plenty of cats that run across the fields.

What happens with the animals. Are the cows being milked?

The cows are being milked, when you go there with children. There you can work in the stable. There you can participate. There you can clean feed the animals.

Text unit 3:

Researcher: *Hast du irgendwann mal gehört oder mitbekommen, dass Natur oder die Umwelt um dich herum zerstört wurde? Vielleicht auch über das Fernsehen, das Internet oder Nachrichten?*

'Ja, über die Nachrichten.' (Jaq_Toul_11:15)

Researcher: *Kannst du kurz darüber berichten?*

'Da ging es um die Wirbelstürme- wo waren die noch? Ich weiß es gar nicht mehr. Auf jeden Fall in Süddeutschland.' (Jaq_Toul_11:26)

Researcher: *Was ist da genau passiert? Was haben die Wirbelstürme dort mit dem Land gemacht?*

'Die Slums oder die Häuser sind da weggeweht worden.' (Jaq_Toul_11:37)

Translation:

Did you ever hear or witness destruction of nature? Maybe via television, the internet or news?

Yes, from the news.

Can you report about that shortly?

It was about cyclones- where was that again? I don't know anymore. In any case in Southern Germany.

What happened there?

The slums or the houses were blown away.

Text unit 4:

Researcher: *Wo kriegst du dein Wissen über die Natur und Umwelt her? Ist das eher die Schule oder vielleicht deine Eltern?*

'Meine Eltern beeinflussen mich da eigentlich gar nicht. Das ist die Schule und ich lese auch sehr viel. Da kommt sowas in den Büchern halt auch vor.'
(Jaq_Toul_12:30)

Researcher: *Gibt es irgendwelche Aktivitäten die die Schule auf dem Gelände anbietet? Gartenarbeit oder ähnliches?*

'Wir haben ein Fach, das nennt sich Gartenbau. [...] Wir pflanzen da Salat und Kartoffeln an und kümmern uns um die Beete, die wir anpflanzen.'
(Jaq_Toul_13:40)

Researcher: *Welche Bücher liest du und was für Informationen sind da drin, was mit Natur und Umwelt zu tun hat?*

'Ich lese auch viele Tierbücher. Da ist natürlich viel über die Tiere drin, ihre Lebensräume und ob die gerade bedroht sind oder nicht.'
(Jaq_Toul_12:30)

Translation:

Which sources do you use to get to know more about environmental topics? Is that your school or maybe your parents?

My parents don't influence me at all. It's school and I also read a lot. The books deals with such things.

Are there any activities that are offered on the school ground? Gardening or something else?

We have a subject which is called gardening course. [...] We plant lettuce and potatoes and we care for the beds which we build.

Which books do you read and what information is given regarding nature and the environment?

I read a lot of animal books. There you can find a lot about the animals, their natural habitats and if they are endangered or not.

4.20.2 Interview analysis: Jacqueline

The first text unit is closely connected to the category *'lived experiences'*. Jacqueline talks about Bremen's mixture of the subcategories *'rural'* and *'urban'* areas that are very close together. One example for a rather rural and near-natural place is 'the Bürgerpark', which is located in the heart of the city. This place can be considered as a very *'special geographic location'*. Jacqueline defines the Bürgerpark and the animals that live there as nature. An example for a place where you can find urban elements in the city of Bremen seems to be the central station, which is busy and pollutes the air. The description of the central station can be subcategorized as *'witnessing destruction of natural environment'* and a clear contrast compared with the nature-near Bürgerpark.

In the second text unit Jacqueline reports about another *'special geographic location'*, which is an organic farm in Austria in a rather *'rural'* area of the country. In Austria she was close to animals and was caring for them together with her family. These are activities that she does not do in her daily-life at all. The participants and the family members seem to do different outdoor activities like hiking mountains or caring for animals. This text unit serves as an example for the category *'lived experiences'* and *'parental recreation choice'* and *'vacations'*.

The third text unit deals with the participant's description of environmental issues concerning thunderstorms. Her parents do not influence her regarding environmental topics. Nevertheless, she describes television as a source of information about weather events although she does not really remember where it actually occurred. Furthermore, her knowledge about that incident is not elaborate because she talks about 'slums' and 'houses' which does not really sound like a German area. Jacqueline is aware of such weather events because of consuming *'news media'* in this case television (category *'prior knowledge'*). Hence, television broadcast informed her about the cyclones in Southern Germany, the destruction of houses and added knowledge to her self-concept.

In the last text unit Jacqueline reveals to also be informed about endangered species and environmental issues by reading non-fictional 'books' about animals, which one again emphasizes her information source in the category 'prior knowledge'. Although Jacqueline attends at a Waldorf school that offers nature-based activities like gardening, preparing plant beds or agriculture internships she does not seem to be affected by that.

In the figure 53 below, the findings of the interview with Jacqueline can be seen. The red boxes indicate the addressed subcategories that could be identified in the interview.

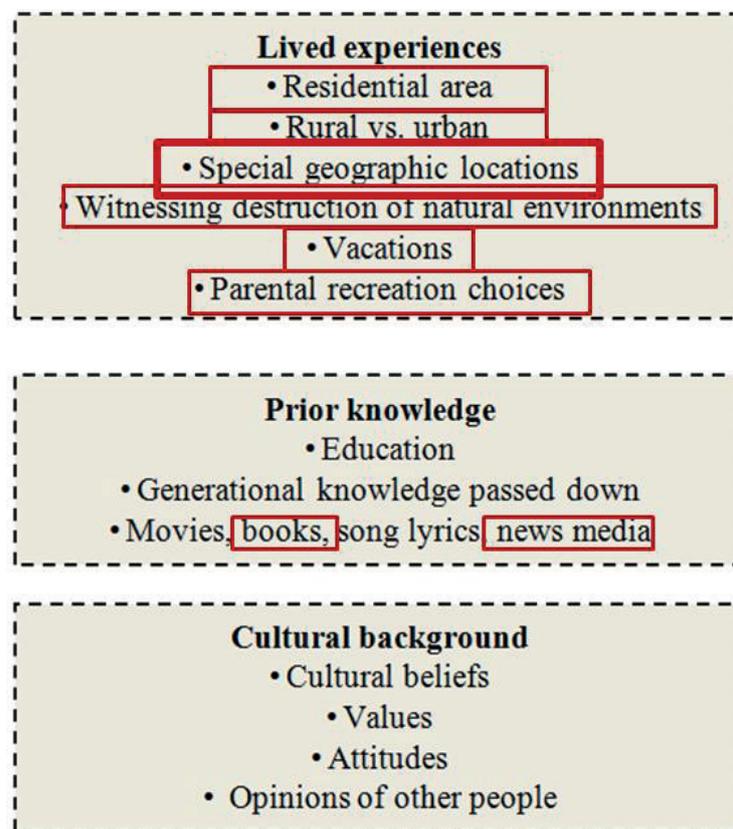


Figure 53 Summary of interview with Jacqueline's at the Waldorfschule an der Toulter Straße in Bremen.

Conclusion

Jacqueline (14) seems to be a type of learner that has a rather alienated and idealized understanding of nature excluding herself and human-beings in general. Furthermore, she reports about few experiences with nature, which are mainly connected to the subcategory 'special

geographic locations' and are rather one-dimensional. Her *'prior knowledge'* is closely connected to the subcategories *'books'* and *'news media'*. Her school is located in a strong socio-economic area and she reports having a rather high level of connectedness to nature which is not represented in the interview. No cultural related background information regarding nature or the environment is reported.

4.20.3 Participant two: Robert

The second participant is called Robert (15 years of age). He visits the Gesamtschule Bremen West in grade 10. This school has a rather weak socio-economic background. Robert seems to be very self-confident and open-minded. The interview was conducted in a small class room, nevertheless the interview was interrupted by a teacher entering the room and asking for someone. During the interview the atmosphere was quite relaxed. Robert's level of connectedness to nature was '2' following the inclusion of nature in self scale (Schultz 2001). All in all, the length of the interview with Robert was 14:17 min. In the figure 54 below, the nature picture of the subject is illustrated. As main characteristics the sun, a blue sky, a rather big tree and a patch of grass. Robert's nature picture is very similar compared with Jacqueline's emphasizing a rather idealized and alienated understanding of nature and he excludes himself from his nature picture.

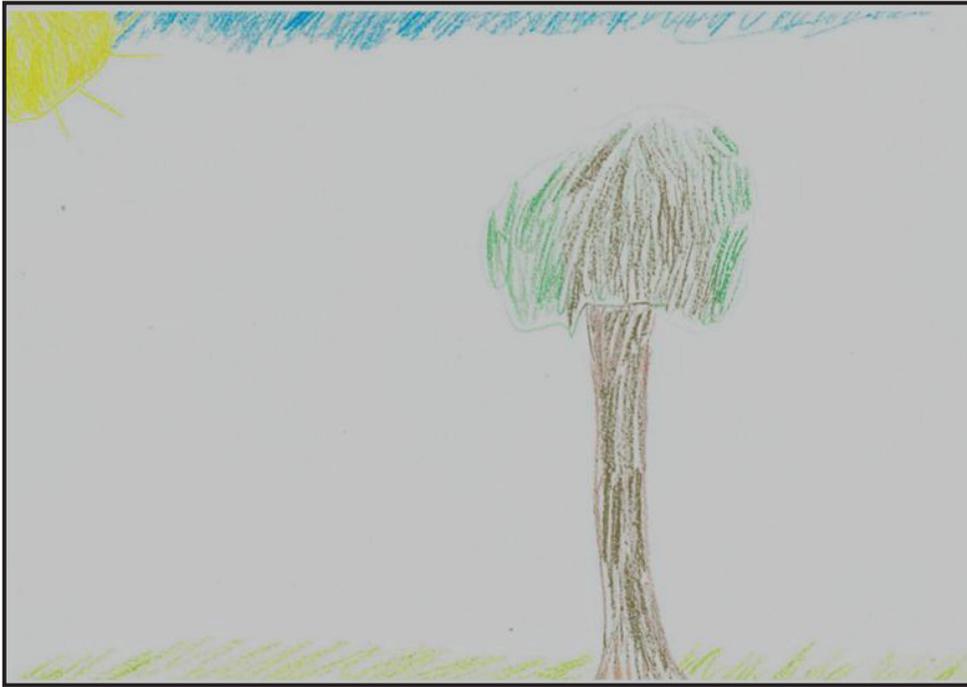


Figure 54 Nature picture of Robert at Gesamtschule West Bremen.

Text unit 1:

Researcher: *Würdest du deine Umgebung in der du wohnst, ländlich oder eher städtisch bezeichnen?*

'Ja, städtisch.' (Rob_GSW_2:30)

Researcher: *Was ist daran genau städtisch?*

'Viele Straßen, viele Häuser, nah an nah und nicht überall Bäume.'
(Rob_GSW_2:40)

Researcher: *Gibt es da irgendwelche Parks?*

'Ja, da ist ein Park direkt in der Nähe von mir. [...] Da ist ein Grünstrich, der ist ziemlich lang, da sind Bäume und eine Wiese. [...] Da gehen Leute joggen, da spielen manchmal Leute, Kinder spielen Fußball.'
(Rob_GSW_3:04)

Translation:

Would you consider the place where you live as rural or urban?

Yes, urban.

What is urban about that?

Many roads, many buildings close together and just a few trees.

Are there any parks?

Yes, there is a park very close to me. [...] There is a grass strip which is quite long, there are trees and a meadow. [...] People go there to jog, sometimes you can find people, children that play football there.

Text unit 2:

Researcher: *Gibt es Orte mit denen du dich verbunden fühlst, die nicht in deiner direkten Umgebung sind?*

'Ja, im Urlaub war das. In Österreich. [...] Wir sind in Österreich gewesen. Das heißt meine Familie, meine Mutter und mein Vater. Dann sind wir halt dort wandern gegangen auf den Bergen und haben manche Wasserfälle und sowas gesehen, was ich ziemlich cool fand. Die Fernsicht ist super.'
(Rob_GSW_4:01)

Researcher: *Was für ein Gefühl hast du, wenn du da gerade drüber sprichst?*

'Das ist atemberaubend und ich fühle mich frei.' (Rob_GSW_5:03)

Translation:

Are there some special places that you have a connection with, which are not close to the place where you live?

Yes, that was during the holidays in Austria. [...] We have been to Austria that means my family, my mother and my father. Then we were hiking in the mountains and were looking at some waterfalls, that was quite cool.

What kind of feeling do you have while telling this story?

That is breathtaking and I feel free.

Text unit 3:

Researcher: *Hast du schon mal erlebt, dass Natur zerstört wurde? Über die Nachrichten oder Erzählungen?*

'Ja, in den Nachrichten mit Waldbränden und jetzt auch Brandrodung. [...] Das war über das Fernsehen mit der Brandrodung. Und auch im Geschichts- und Politikunterricht. [...] Da wurde viel Holz gerodet, um Landwirtschaft zu machen.' (Rob_GSW_7:28)

Translation:

Did you ever witness destruction of nature? In the news or stories?

Yes, in the news there were forest fires and even fire clearance. [...] That was via television about fire clearance. And also in the history and politics lessons. [...] A lot of wood was grubbed to do agriculture.

Text unit 4:

Researcher: *Von wo bekommst du Informationen über Umweltthemen? Aus Büchern oder durch das Internet?*

'Im Internet gibt es eine News-Sendung und die gucke ich mir zweimal die Woche an. [...] Der heißt LeFloid, das ist ein berühmter YouTuber. Er thematisiert so Sachen, die er selber für wichtig hält.' (Rob_GSW_9:23)

Translation:

Where do you get information regarding environmental topics? Books or the internet?

On the internet there is a news show and I watch it twice a week. He is called LeFloid that is a famous YouTuber. He talks about things that he finds important.

Text unit 5:

Researcher: *Gibt es kulturelle oder religiöse Ansichten, die etwas mit Natur und Umwelt zu tun haben?*

'Nee, eigentlich nicht.' (Rob_GSW_12:11)

Translation:

Are there some cultural or religious beliefs that have something to do with nature or the environment?

No, not at all.

4.20.4 Interview analysis: Robert

In text unit one Robert gives a description of the environment in his *'residential area'*. He emphasizes the contrasting features of a rather *'urban'* landscape and a rather *'rural'* one. The rural part of his neighbourhood has a park where community members can do outdoor activities like sports. These descriptions can be categorized as *'lived experiences'*

In the second text unit, Robert talks about *'special geographic locations'*, in this case a place in Austria. Together with his family, he did different outdoor activities like mountain hiking and looking at sceneries like waterfalls. This *'parental recreation choices'* during his *'vacations'* seems to have a great impact on Robert still as he describes his feeling regarding the natural environment as *'breathtaking'* and a feeling of freedom, which can be seen as a description of his level being connectedness to a very *'special geographic location'*. Robert seems to define a grass strip and a meadow as nature. This perception correlates with his nature picture. His descriptions are closely connected with the category *'lived experiences'*. This indeed is a unique description of his connectedness to a very special place in nature that does not correlate with his low level of connectedness to nature at all.

The third text unit focuses on Robert's *'prior knowledge'*. He reports about the topic of environmental damage in the rainforest which was study theme in his *'education'* classes. Besides the lesson based activities, the biggest part of his knowledge is closely connected to *'news media'* in this case television where complex interrelations of slash-burn-farming were presented. These parts of the interview are closely linked to the category *'prior knowledge'*. Robert reports about *'destruction of nature'* but he does not address this incident as a real environmental issue.

In text unit four, Robert relates to the category *'prior knowledge'* and reports about a programme on the internet which can be watched two times a week. This German 'YouTube channel' is called 'LeNews' by the web-video-maker 'LeFloid' and deals with a lot of different topics like day-to-day-politics, current fashion or even music. This online channel reaches the target group aged between 14 and 29 and has 2.779.774 'followers' on YouTube that watch it on a regular basis (Spiegel Online 2015). The subcategory *'news media'* seems to have an impact on his way to catch up on different topics.

Robert has no cultural background that has specific connection with nature and environmental topics. In the figure below, the addressed categories (see figure 55).

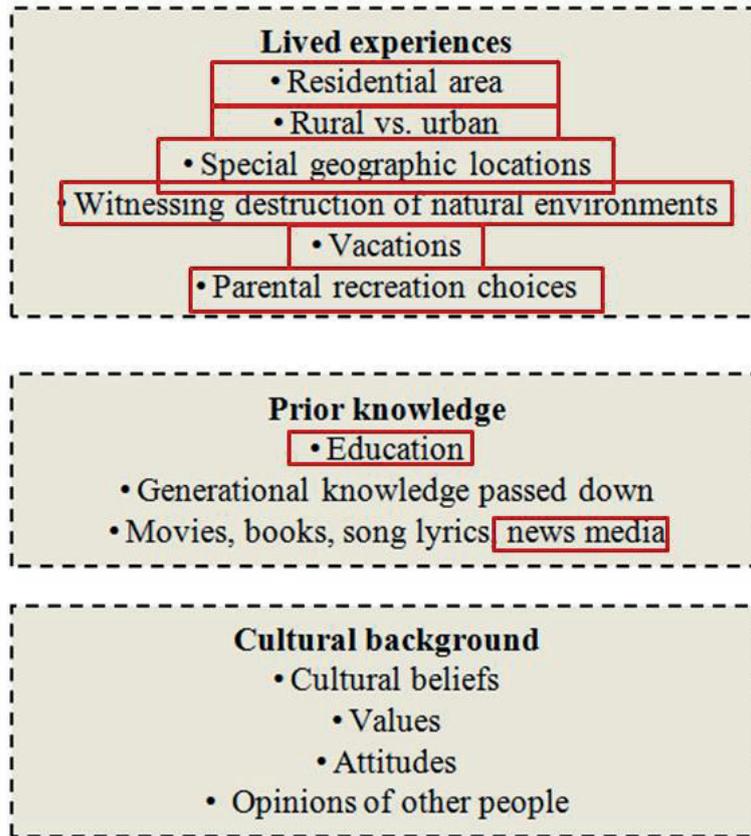


Figure 55 Summary of interview with Robert at Gesamtschule West in Bremen.

Conclusion

Robert (15) seems to be a type of learner that has a rather alienated and idealized understanding of nature excluding human-beings. His reports concerning nature and the environment are closely connected with the category *'lived experiences'*. In particular, his *'prior knowledge'* is linked to the subcategories *'education'* and *'news media'*. No cultural related background information regarding nature or the environment is reported.

4.21 Findings of the qualitative study: Durban

The two participants selected in Durban (Patricia and Sibunela) are contrasting types concerning their socioeconomic status (Fairvale Secondary School [strong], Chesterville Secondary School [weak]), grade (9 and 10) and their level of connectedness to nature (high, low).

4.21.1 Participant one: Patricia

The first participant is called Patricia and she is 14 years old. Patricia seemed to be very happy to be chosen for the interview and was quite relaxed. The interview was conducted in a big lecture hall of the school and unfortunately the location was quite busy and noisy, because in the middle of the interview chairs and tables were removed. The interview with Patricia has a length of 14:46 min. Patricia visits the Fairvale Secondary School and is in grade 9. The school is located in an area with a rather strong socio-economic background. Her level of connectedness to nature was '2' following the inclusion of nature in self scale (Schultz 2001). In figure 56, the nature picture of Patricia is illustrated. Patricia's main features of her nature picture are the sun, two clouds in the sky, two different kind of trees, flowers, a small house, a bicycle, a dog, and the dog's kennel. Patricia placed herself in the middle of the picture while watering plants with a watering pot. All in all, the design and style of painting is rather simple. The picture illustrates Patricia's understanding of nature, which seems to be idealized, idyllic and well-balanced.



Figure 56 Nature picture of Patricia at Fairvale Secondary School.

Text unit 1:

Researcher: *Would you describe your picture, please?*

'I have a little cottage. I have a little dog and a kennel for himself. I have trees, a garden and a bicycle because I really don't like motor vehicles because they pollute. Just simple stuff, nothing that takes up too much.'
(Pat_fair_0:47)

Text unit 2:

Researcher: *Are there some special places in your community where you can be outdoors?*

'Yes, there are parks outside. We also have a nice yard. There is space in and there are natural things that you can play with. We actually do gardening in the back.' (Pat_fair_2:16)

Researcher: *So, do you plant vegetables?*

'Yes, we are currently planting vegetables. They did turn out to be good and we did use quite a few of them which was tomatoes and some potatoes.'
(Pat_fair_2:47)

Text unit 3:

Researcher: *Would you say that a lot of your friends like gardening and would you say that a lot of your friends have close relationships to animals?*

'To me is quite special to have an animal as a friend. They are actually like a men's best friend. Actually, there is two of my friends that help me gardening. We have two gardens in our school at the back. Every day we take the wheat out and we water the garden once in a while. There is actually vegetables growing from there now.' (Pat_fair_4:23)

Text unit 4:

Researcher: *Do you go on vacations once in awhile and if so, to which places do you normally go to?*

'Yes, recently we went to Port Shepstone. It was a like a family thing. [...] We normally go to my Grannies farm which is in the Eastern Cape. It is actually quite nice there, because the city is very far from where we are living.' (Pat_fair_3:10)

Text unit 5:

Researcher: *Is there a cultural background that might influence your connection to the environment or nature?*

'Well, I am Christian. But there is not much of environmental stuff going on in church. But we are told to take care of the earth, because there are going to come other people to live in it. [...] I have heard a lot of tales that people tell: by 2030 people will fight over water. Seriously: That's just ridiculous.' (Pat_fair_8:10)

Researcher: *Where do you learn all these facts? At school?*

'Well, our parents. My mother works for the Department of Labour. [...]

Text unit 6:

Researcher: *Where does all your knowledge come from?*

'Mostly, it is from the elderly, because that's where I like to go to. I like to go to my Granny and my parents to ask for most information, because they know a lot and they have been through the earth longer than us. And I also get it from the television. But I don't really watch it a lot. I also get it from books, magazines and the internet. [...]' (Pat_fair_10:13)

4.21.2 Interview analysis: Patricia

In the first unit Patricia describes her nature picture and she indicates having a little cottage somewhere. In this case she reports about the relationship with an animal as well as about a certain feeling concerning the difference between a bicycle and a motor bike. It seemed as though Patricia wanted to commend on the fact that she is aware of the negative effects of exhaust gases on the climate and the environment. It could be that in this case her statement was caused by social desirability. In the last part of this text unit she indicates her degree of refusal regarding motor vehicles (subcategory '*witnessing destruction of the natural environment*') and in the last part she emphasizes her willingness to live a simple life.

In the second paragraph Patricia talks about her experiences with the family's garden, in which they grow different vegetables (tomatoes and potatoes). She describes a '*special geographic locations*' that is closely linked to gardening.

In text unit three, she underlines that gardening seems to be a special peer-group-based activity in nature, because her friends accompany her while taking care of the garden which seems to be a school-based activity too.

In the fourth text unit Patricia talks about her time together with her family in Port Shepstone and her time together with her grandmother being on '*vacation*' in a province called Eastern Cape in South Africa. All in all, following the model at least three different categories can be

identified: *'vacation'*, *'parental recreation choices'* as well as *'special geographic locations'* in connection with activities in nature and close family members. Furthermore, the category *'lived experiences'* can be identified in her reports (*'rural'*, *'urban'*).

In the fifth text unit, Patricia reports about *'cultural beliefs'* regarding nature and the environment. From here point of view Christianity stands for protecting the world and natural life resources, but this does not seem to have great impact on her behaviour patterns. Nevertheless she has a certain future perspective regarding the inclusion of human needs of the next generation. The *'opinions of other people'* seem having an important impact on her while she addresses the topic of water shortage in the year 2030 and occurring conflicts of the near future. She addresses that topic as a severe environmental issue and a big problem for human-beings. Additionally, her mother is staff member of the Department of Labour which seems having an influencing factor on her *'prior knowledge'*.

The last text unit Patricia reports about a long list of things regarding the source of information and knowledge regarding nature and the environment from: (category *'prior knowledge'*). A very interesting aspect is addressed by Patricia when she reports about her grandmother and older people in general as a reliable source of information regarding nature and the environment (subcategory *'opinions of other people'* as well as *'generational knowledge passed down'*). It might be that old woman have a special status in the South African community regarding decision-making processes or receiving advice by a wise person. Modelled after the South African expression *'gogo'* for the term grandmother the researcher calls this the *'gogo effect'*. A summary of the identified categories can be seen in figure 57.

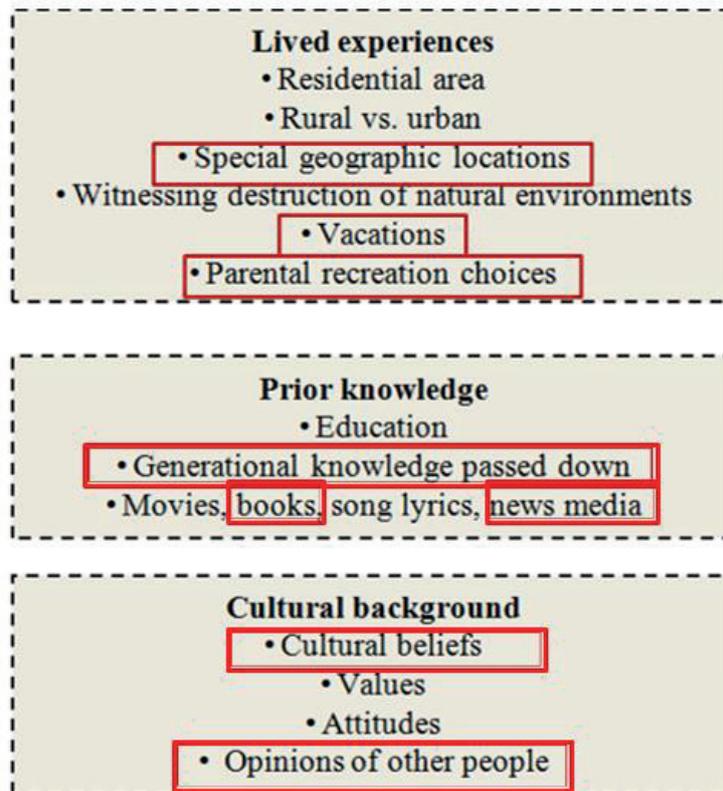


Figure 57 Summary of the interview with Patricia at Fairvale Secondary School in Durban.

Conclusion

Patricia (14) seems to be a type of learner that has an idealized and idyllic understanding of nature, although she integrates herself into her perception of the natural world. Her reports regarding nature and the environment are closely linked with the category ‘*lived experiences*’ subcategories ‘*special geographic locations*’, ‘*vacations*’ and ‘*parental recreation choices*’. In the category ‘*prior knowledge*’ the subcategories ‘*generational knowledge passed down*’ and ‘*news media*’ are considered. The importance of her grandmother as a reliable source of knowledge and information is also expressed in the category ‘*cultural background*’ (‘*cultural beliefs*’ and ‘*opinions of other people*’).

4.21.3 Participant two: Sibunela

The second participant is called Sibunela (15 years of age). Sibunela seemed to be very happy to be part of the interview and more or less enthusiastic about the possibility to talk to a researcher that comes from another country. The interview was conducted in a calm room and has a length of 13:13 min. Sibunela visits the Chesterville Secondary School in grade 10. This school has a rather weak socio-economic background. Sibunela's level of connectedness to nature was '6' following the inclusion of nature in self scale (Schultz 2001). In the figure 58, the nature picture of Sibunela is illustrated. Main features of her nature picture are the sun, a rather dark sky, two trees, a blue building in the background and an elephant in the middle of the picture. An extraordinary of this nature picture is that one of the trees is cut down and one tusk of the elephant has been cut out. Blood is coming out of the elephant's wound. Sibunela seems having a rather elaborate and comprehensive understanding of nature in which trees and animals are presented but the major aspect is set on the negative influence human-beings have on the environment.

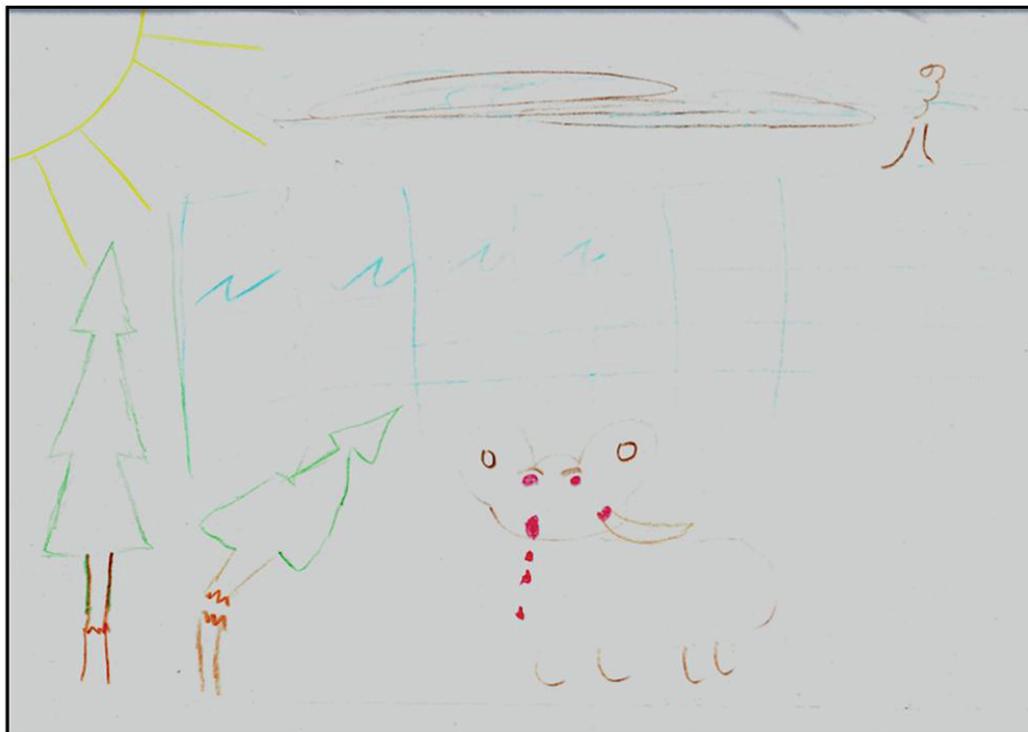


Figure 58 Nature picture of Sibunela at Chesterville Secondary School.

Text unit 1:

Researcher: *Would you like to describe your picture please?*

'Okay, in this picture I have a tree. Well, the tree has been cut down. A building is build where the tree was. An elephant that has one tusk removed. Air pollution. This is how I see my environment today compared to what it was in the past. To me this is how mankind sees nature. Pollution, black clouds. Cutting down trees. There is no conscience.' (Sib_ches_0:24)

Researcher: *Just to make it clear: This is nothing that you made up, but something that you see in your every-day life?*

'Yes.' (Sib_ches_1:58)

Text unit 2:

Researcher: *Would you say that it is common practise that people do not care about the natural world?*

'Yes, it is common practice that you find dump places everywhere and no one really cares.' (Sis_ches_2:32).

Text unit 3:

Researcher: *Do you have very special places where you go to with your parents or with close members of your family?*

'I have a home at Empangeni in the North of Durban. This place is really rural area where the urban area is like hours away. We go there and there is soil and trees. And everything is perfect.' (Sib_ches_3:01)

Researcher: *What else do you do there? What kind of activities?*

'My younger sister goes out and plays in the sand. We go out and we collect wood to make a fir and to cook. We go to the river and collect water.' (Sib_ches_3:38)

Text unit 4:

Researcher: *Would you say that there are certain cultural beliefs that you have been taught? Values, attitudes or opinions of your family for example?*

'When I was a child I grew up in a very traditional way. We believe a lot in culture and stuff. So, my grandmother used to tell me that: If I dump our seed packets in the garden, the cabbages will actually talk to us in our sleep. [...]. That is what I grew up with, that's what I grew up believing' (Sib_ches_5:45).

Researcher: *Is that a very special thing that your grandma made up or is that a thing a lot of other young people experience in their own childhood, too?*

'No, I would say that is a very special thing that my grandma made up.' (Sib_ches_6:54).

Text unit 5:

Researcher: *Where does all your knowledge come from? Is that from movies, maybe from books or even song lyrics?*

'I would say music and music videos.' (Sib_ches_7:27)

Researcher: *Could you say: What kind of songs is this?*

'There is a particular song. Michael Jackson's 'Heal the World' and I cannot remember this other one.' (Sib_ches_7:47)

Text unit 6:

Researcher: *Would you say that knowledge that has been passed along from generations and generations has a big influence on you and especially young people in South Africa?*

'Well, it does have a big influence, in isiZulu we say: The way forward should be asked from the people that are already old. So, when my grandmother told me that cabbages start talking to me she was actually trying to protect her garden, her own territory. When doing that she knew that I would be like frightened to throw my garbage anywhere. And I would not do it to the environment. It starts from little things that you are taught and your mind grows.' (Sis_ches_8:43)

Text unit 7:

Researcher: *If you were able to change people's behaviour, what would you do to implement such ideas?*

'[...] Last week we had a drought here in KZN [KwaZulu-Natal]. People experienced this in the rural area and people did not experience this in the urban area. We have supply of water and electricity. The crops were affected. People here in the urban area don't really see what is happening to our world. Everything is just given to them. Water, electricity. People in the rural area see what's happening like my grandmother and her garden. They see what's happening and try to prevent it. You should go to the rural area and see how clean it is compared with an urban area.' (Sib_ches_11:16)

4.21.4 Interview analysis: Sibunela

In the first text unit Sibunela describes her nature picture and her experience regarding destruction of natural surroundings, in which trees are cut down and animals are beings harmed. In her description of her nature picture she even includes a perspective of how the world was in the past. Nowadays the environment is harmed and this did not occur in the past. From her point of view this development is closely linked to human-beings. The participant indicates

that this is how human beings see nature and the environment at the moment and very importantly that human-beings have ‘no conscience’. She reflects human behaviour and one can feel that she is very serious about that topic. It seems as though she is very aware of human-being’s destructive momentum regarding nature and the environment. The following subcategories can be identified in this text unit: ‘*witnessed destruction of natural environment*’ as well as ‘*opinions of other people*’ and their ‘*attitudes*’. Besides the category ‘*lived experiences*’ the category ‘*cultural background*’ is emphasized. Furthermore, her picture is nothing that she made up but is part of her ‘*lived experiences*’.

In the second text unit Sibunela focuses on experience concerning pollution of her immediate environment and that human-beings do not care about dumping of the environment. Following the model the participant indicates at least three different subcategories: primarily ‘*witnessed destruction of natural environment*’, ‘*opinions of other people*’ and their ‘*attitudes*’.

In text unit three, the participant describes ‘*vacation*’ experiences in Empangeni in the Northern part of Durban together with her sister doing different outdoor activities. She reports about the contrasting types of locations comparing ‘*urban*’ and ‘*rural*’ areas. She likes being outdoors and has a certain emotional connection with the natural world (‘soil’, ‘trees’). She describes this place as ‘perfect’. The participant mainly focuses on ‘*recreation choices*’ and a very ‘*special geographic location*’ which is closely connected to activities in nature in a ‘*rural*’ place together with family members. The category ‘*lived experiences*’ is in focus.

In text unit four, Sibunela talks about a saying that her grandmother used to tell her. This story includes a family member and ‘*opinions of other people*’, and in particular ‘*values*’, ‘*attitudes*’ or even ‘*cultural beliefs*’. She believes in the story her grandmother told her while knowing that cabbages cannot talk at all. But she really understands the meaning of implementing sustainable behaviour patterns and promoting awareness for sustainable use of the natural environment. In this case the subcategory ‘*generational knowledge passed down*’ from

the grandmother to the participant and the category *'prior knowledge'* in combination with category *'cultural background'* can be identified.

In the fifth text unit, the participant indicates that even a *'song lyric'* by Michael Jackson (*'Heal the World'*) is part of her *'prior knowledge'* concerning environmental issues.

In text unit six Sibunela talks about her *'cultural background'* in this case a certain Zulu¹³ saying (*'cultural belief'*) that important topics should be asked from old people because they have gathered a lot of useful knowledge regarding environmental issues. She really emphasizes that a cultural identity has large *'value'* in the Zulu culture, which is transported in sayings. She highlights that a little idea given by important community members or the family has a large impact on people's behaviour. Very similar to the text units before *'generational knowledge is passed down'* and *'opinions of other people'* can be identified (categories *'prior knowledge'* and *'cultural background'*).

In text unit seven, the participant talks about a dry period (*'witnessed destruction of natural environment'*) that occurred in the province of KwaZulu-Natal in which the different perception of people living in *'urban'* areas compared with *'rural'* areas is described (category *'lived experiences'*). She is aware of the fact that there is a different way of perceiving the world between urban and rural people. Rural people are closer to nature because they feel how they are affected by a drought, because there is no water supply. Sibunela indicates that even a shortage of water supply does not affect people that live in *'urban'* areas, because everything is given to them (*'attitudes'* and *'values'* of community members of the *'residential area'* as well as *'cultural beliefs'*, *'opinions of other people'*). Again, the category *'lived experiences'* and *'cultural beliefs'* can be identified.

The following figure the findings of subject two in Durban are highlighted (see figure 61).

¹³ Note Zulus are traditional indigenous people and are the largest population group in South Africa (Akrofi 2001).

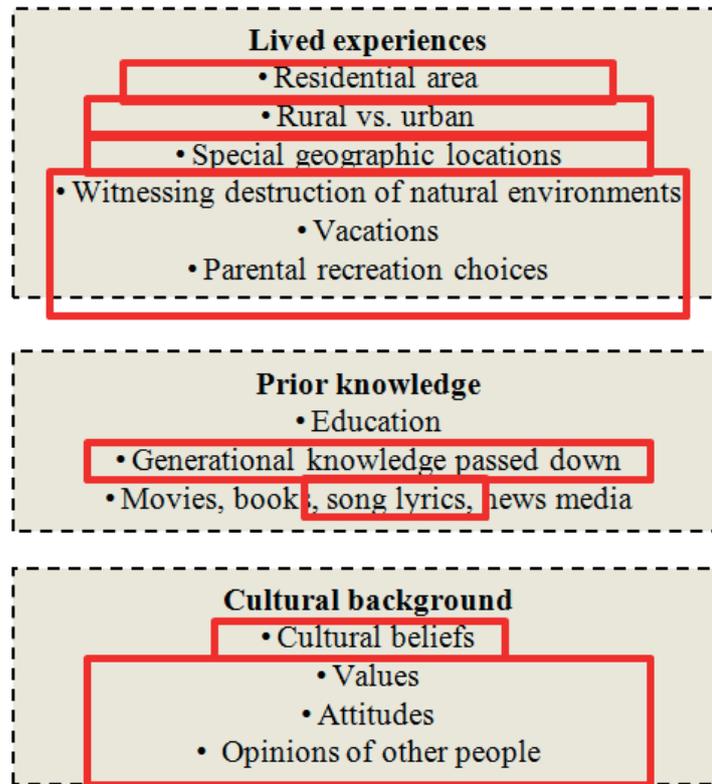


Figure 59 Summary of the interview with Sibunela at Chesterville Scondary School in Durban.

Conclusion

Sibunela (15) seems to be a type of learner that has a rather elaborate, integrated and comprehensive understanding of nature regarding which the impact of human-beings is emphasized. In her picture nature is not considered to be idealized, idyllic and well-balanced but rather realistic. She is a very aware, focused and interested young individual who has multi-layered points of references regarding nature and the environment. Her reports regarding nature and environmental topics are multifaceted. All categories (*‘lived experiences’*, *‘prior knowledge’*, *‘cultural background’*) are considered. As a main conclusion, one can say that *‘generational knowledge passed down’* from the elderly, in this case the grandmother (*‘gogo effect’*) has a very large impact on Sibisisu’s environmental awareness.

4.22 Key messages

- The two participants of both cities have contrasting features regarding their socio-economic status and in particular the level of connectedness to nature and in Bremen the participants sex as well.

Qualitative interviews Bremen

- Jacqueline has high level of connectedness to nature and principally responds to the categories ‘lived experiences’ and ‘prior knowledge’ by indicating contrasting features of the city (urban, rural) and a description of special geographic locations linked to recreation choices with the parents. Statements concerning ‘prior knowledge’ are closely linked to books and news media.
- Robert has a rather low connectedness to nature and principally responds to the categories ‘lived experiences’ and ‘prior knowledge’ by indicating urban and rural features of his residential area by describing special geographic locations linked to parental recreation choices. Statements regarding ‘prior knowledge’ are linked to news media (internet) and in particular a YouTube channel.
- Considering the nature pictures, both participants have a very similar rather alienated and idealized understanding of nature which excludes human-beings.
- Although the Gesamtschule West has the weakest and the Waldorfschule an der Toulter Straße the strongest socio-economic background no significant differences between the participants can be identified.

Qualitative interviews Durban

- Patricia has a low connectedness to nature and principally responds to the categories ‘lived experiences’, ‘prior knowledge’ and ‘cultural background’ by indicating special geographic locations that are parental recreation choices. Statements concerning ‘lived experiences’ are closely linked to garden activities.

- The '*gogo effect*' can be identified in which the grandmother has certain impact on Patricia's environmental awareness by passing down generational knowledge.
- Sibunela has a high connectedness to nature and principally responds to all three categories. By referring to 'witnessing destruction of the natural environment' Sibunela emphasizes how community members see the world.
- On the one hand, 'parental recreation choices' linked to diverse outdoor activities in nature in 'special geographic locations' and in the other hand the influencing factor of 'generational knowledge passed down' or even 'song lyrics' seem to have a big impact Sibunela's understanding of nature.
- The '*gogo effect*' can be identified in which Sibunela's grandmother has a large impact on her level of environmental awareness by passing down generational knowledge. She asks her grandmother for advice because she considers her being wise and competent even if nature and environmental topics are concerned.
- The inclusion of nature in self scale by Schultz (2001) does not seem to be an appropriate instrument to predict environmental awareness.

5. CHAPTER FIVE- DISCUSSION

5.1 Introduction

In order to give meaning to the findings described in chapter four and to answer the question if the results support the research questions and how they fit in with literature and existing knowledge on the topic, the hypotheses of each construct that the researcher wants to test and answer will be re-stated. This is followed by an interpretation of the findings by reference to other studies, their results and conclusions. In the beginning, the researcher reviews the construct of understanding of nature, firstly the open question and secondly the perception of depicted natural surroundings (chapter 5.2). Afterwards the patterns and forms of encounters with nature (chapter 5.4), followed by the connectedness to nature (chapter 5.6), environmental identity (chapter 5.8), intentions to act nature-orientated and sustainable (chapter 5.10) will be considered. Chapter 5.12 examines the correlations between the main constructs, a reflection of the background factors (sex, grade, socio-economic background, and city factor) (chapter 5.14) followed by a consideration of the limitations of the study (chapter 5.16), and suggestions for further research (chapter 5.18).

5.2 Understanding of nature

Hypothesis 5	Acceptance
South African and German learners from Durban and Bremen have an alienated and idealized understanding of nature [Brämer 2011; Kollender & Zabel 2013].	Accepted

5.2.1 Findings of the open question

On one hand, the manifestation of the aspect of ‘untouched nature’ (Bremen 33%, Durban 23%) and ‘living nature’ (Bremen 60%, Durban 41%) is overrepresented in both geographical and cultural areas. The category ‘living nature’ is closely connected with flora and fauna de-

scriptions like trees, plants and animals. In both cases human beings are excluded from the ways to perceive nature. On the other hand, categories like ‘required nature’ (Bremen 8%, Durban 10%) which describe the necessity of the existence of the natural world for the benefits of human beings and their basis of existence is on a rather mediocre level in both cities.

Another very important aspect emphasizing a rather alienated and idealized understanding of nature is that the categories ‘ruled nature’ (Bremen 0%, Durban 2%) and ‘threatened nature’ (Bremen 3%, Durban 6%) are extremely underrepresented. Such categories include human beings and highlight their large, in many cases, negative impact on nature.

A further surprising aspect of the understanding of nature findings is that learners from Durban have an intensive religious association with nature which is closely connected with the category ‘honoured nature’ (Bremen 1%, Durban 20%). A very large gap between the learners in Bremen and Durban of 19% can be identified. Hence, they have creationist associations with nature as God’s creation most likely caused by religious thoughts and values by individuals of the learner’s microsystem (family, friends, and school).

The fact that the learners from Bremen have a ‘free and ‘open and ‘green’ understanding of nature (Bremen 12% and 13%, Durban both 2%) cannot be explained easily. Bremen has a large area of green space within the urban area (Bürgerpark and Specklenbüttler Park in Bremerhaven). Durban also has large areas of open space types like grasslands and forests with large corridors of habitats (chapter 3.2.3). Hence, certain areas seem to be rather green in both cities. However, Durban is a large agglomeration area in which 3.2 million people live (Bremen 657.965) and there is a different philosophy of public transport compared to Bremen where sorts of all places can be easily reached by eco-friendly trams, busses or trains. This is not the case in Durban where you can find mini bus taxis as the main public transport causing more pollution as in Bremen. Similar findings can be identified in the comparison of the grade eight to ten learners.

The socioeconomic background has an impact on the category 'recreational nature' in Bremen (strong 16%, weak 8%). This can be explained by the fact that learners from a strong socioeconomic background can afford more costly vacation trips for recreational purposes on a regular basis than learners from a weak socioeconomic background. The same tendency can be found in Durban (strong 11%, weak 3%) caused by the same reason.

Besides that an interesting result can be identified in the category 'honoured nature' in Durban (strong 13%, weak 29%). Relating to the Department of Government Communication and Information System (2015), 79.8% of all inhabitants are Christian people, 15.1% have no religion, and 15.1% are undetermined only to name the three largest groups. In Germany, the three largest groups are unaffiliated with any religion (33.06%), Roman Catholic (30.15%), and Protestant (29.23%). Based on these numbers, one can say that religion has a different level of importance in South Africa which has an influence on the described results. Learners from a rather weak socio-economic background tend to be more religious than learners from a strong background.

Additionally, differences can be found in the category 'experienced nature' in Durban (strong 26%, weak 11%). This category is defined as an extremely dichotomous way to understand nature in which nature is connoted with the unknown and threatening wilderness where animals live that can cause distasteful feelings. It might be that the rather luxurious and slightly 'spoiled' lifestyle of learners with a strong socio-economic background causes this effect. Learners from weak backgrounds seem to have a more elaborate understanding of nature in this category.

5.2.2 Extension of Kattmann's (1994) model of ways to understand nature

Kattmann's (1994) model of ways to understand nature consists of seven different categories required nature, beloved nature, honoured nature, lived nature, ruled nature, threatened nature, and experienced nature as described in chapter 2.4. This model had to be extended after data

collection and analysis to reflect the full degree of given responses in this open question. The following categories have been added to Kattmann's (1994) model: Untouched nature, recreational nature, living nature, free and open nature, and green nature (chapter 4.15.1).

5.2.3 Findings of the rating of depicted natural surroundings

In connection with the findings and conclusions of the open questions of understanding of nature, it is not surprising that the 'elephant in the wilderness' has the highest mean score in Bremen (9.35) and in Durban (8.76) of all 14 pictures (chapter 4.15.2.1). The 'elephant in the wilderness' symbolises the beauty of nature which quite clearly represents and underlines a limited perception of nature. This untouched self-regulating system (Margadant-van-Arcken 1995) is a perfect example for a nature perception excluding human beings in their entirety. All other pictures of the group of similar rating are 'mountains' (Bremen M=9.12, Durban M=8.39), 'mountain stream' (Bremen M=9.27, Durban M=8.07), 'river' (Bremen M=7.93, Durban M=8.34), 'beach' (Bremen M=8.68, Durban M=8.08), 'organic garden' (Bremen M=6.53, Durban M=7.15), and 'agricultural land' (Bremen M=6.84, Durban M=8.29) which can be analysed in the same way. Some pictures of this first group like 'beach' can also be considered as a good example for a romanticised and idyllic way to perceive nature. The only two pictures of this group with very low mean scores are 'playground' (Bremen M=5.21, Durban M=6.09) and 'traffic modern city' (Bremen M=1.98, Durban M=3.00). Both pictures include human beings and can be considered to be comprehensive regarding biotic and abiotic factors and they emphasize the role of human beings as dominator as well as shaper of the world.

In the group of rather different rating (chapter 4.15.2.2) the pictures 'city park' (Bremen M=5.65, Durban M=7.27), 'soccer field' (Bremen M=4.98, Durban M=6.82), and 'rural road' (Bremen M=4.41, Durban M=5.48) can be found. South African learners from Durban seem to perceive these three examples of rather comprehensive nature pictures in which human beings are integrated as more natural than German learners from Bremen. The first picture

shows a 'city park' in Hamburg (Germany). The other two pictures illustrate surroundings in South Africa (Eastern Cape, KwaZulu-Natal). It is assumed that learners from Durban are influenced by a common sight at public green spaces to perceive these pictures as more natural than learners from Bremen. In turn, this argument would not work out for the first picture.

The group of very different ratings includes two pictures (chapter 4.15.2.3): the 'elephant in zoo' (Bremen $M=3.28$, Durban $M=5.93$), and 'dam' (Bremen $M=4.34$, Durban $M=6.60$). Those very different mean scores of the picture 'elephant in zoo' can be explained by the fact that the elephant represents a typical South African mammal and is part of the big five game (African lion, African bush elephant, African Cape buffalo, African leopard, and White/Black rhinoceros) (Caro & Riggio 2014). The elephant can be seen as an 'advertising medium' of the South African country. You can assume that German learners from Bremen connote the picture with a mammal that is kept in captivity and has a restriction of freedom.

The different scores of the picture 'dam' could be caused by a different level of awareness regarding the environmental impact on dam projects on marine habitats.

5.2.4 Literature about understanding of nature

The concept of alienation in connection with the natural world is not a new topic in research. Zinn (1989) already stated that due to constant consumption of television, video games and computers children end up living in an artificial world. He comes to the conclusion that children that are raised in an environment surrounded by technology and machines that can be controlled easily with the push of a button can lead children to a dichotomous and dominating attribution of human beings in general regarding the natural world. Kollender & Zabel (2013: 1) emphasise a grave 'alienation of young people from nature' in their comparative study of the countries Peru and Germany. Although the researchers suspected that the learners from Peru could have a different and even comprehensive concept of nature, their spontaneous as-

sociations with nature were more ‘idealized’ and ‘romanticised’ (Kollender & Zabel 2013: 4) than the German learners.

In Jugendreport Natur (1997), in which 2500 grade five to twelve learners participated, the most common spontaneous association with nature were ‘alive and green’ and ‘forests and trees’. The most infrequent answer was the beneficial aspects of nature like ‘crop plants’ that are used to provide food products for feeding human beings. Brämer (1998: 5) calls such idealised tendencies of the perception of nature ‘Bambi syndrom’ in which children perceive nature as very beautiful, important and well-balanced and where nature should be protected at all stages. However, Brämer’s (1998) investigations reveal that young people have no idea regarding the concept of sustainability or practical environmental protection.

In Jugendreport Natur 2005 the most relevant aspects for the 2200 participating grade six to nine learners were ‘forest’ and ‘nature reserves’. Brämer (2005) summarizes that such results are caused by the fact that young people live in an artificial world. Hence and very similar to Zylstra (2014: 39) who states to ‘reconnect with nature’, Brämer (2006) emphasizes the need to go back to nature.

Instead of calling these previously mentioned tendencies alienation, Louv (2005) identifies a ‘nature deficit disorder’ and highlights a grave marginalisation of nature in the lives of children and juvenile people in his book ‘Last Child in the Woods: Saving Our Children from Nature-Deficit Disorder’. The largest part of the findings are very similar to knowledge that can be found in previous and present literature.

5.3 Key messages

- South African and German learners from Durban and Bremen have an alienated and idealized understanding of nature.
- The largest part of the findings are very similar to the knowledge that can be found in previous and present literature like Zinn (1989), Jugendreport Natur (1997), Louv (2005), Brämer (2006), Kollender & Zabel (2013) and Zylstra (2014).
- The categories ‘untouched nature’ (Bremen 33%, Durban 23%) and ‘living nature’ (Bremen 60%, Durban 41%) are overrepresented in both geographical and cultural areas. In both cases human beings are excluded from the ways to understand nature.
- The categories ‘ruled nature’ (Bremen 0%, Durban 2%) and ‘threatened nature’ (Bremen 3%, Durban 6%) are extremely underrepresented. Such categories include human beings and highlight their large, in many cases, negative impact on nature.
- Learners from Durban have a religious understanding of nature (‘honoured nature’) (Bremen 1%, Durban 20%) in which God created nature. This understanding is caused by thoughts and values by individuals of the learner’s microsystem (family, friends, and school).
- In both cities learners with a strong socio-economic background have a ‘recreational’ understanding of nature (Bremen strong 16%, weak 8%); Durban strong 11%, weak 3%) assumedly caused by the possibility to have costly vacation trips for recreational purposes.
- In Durban learners from a rather weak socio-economic background tend to be more religious than learners from a strong background (‘honoured nature’) (strong 13%, weak 29%).
- In Durban learners from a strong socio-economic background have a dichotomous understanding of nature (strong 26%, weak 11%) which is assumedly caused by a rather

luxurious and slightly ‘spoiled’ lifestyle compared with learners with a weak socio-economic background.

- Kattmann’s (1994) model of ways to understand nature was extended by five categories to reflect the full degree of given responses in this open question.
- Margadant-van-Arcken’s (1995) model can be applied. To underline the limited sense of nature perception the untouched self-regulating system of the picture ‘elephant in the wilderness’ can be seen. The picture ‘beach’ can also be considered as a good example for romanticized and idyllic way to perceive nature.

5.4 Encounters with nature

Hypothesis 1	Acceptance
South African and German learners from Durban and Bremen do not spent time in direct contact with nature on a frequent and regular basis [Karlegger 2010; Klassen 2010].	Refused

5.4.1 Frequency and intensity

If the encounters with nature are considered, 61.6% of all participants in Bremen and 74.0% in Durban answered that they have contact with nature on a regular basis together with their family (chapter 4.5). A difference of 12.4% between the two groups can be identified. 59.7% of all learners in Bremen and 65.2% in Durban answered that they have encounters with nature on a regular basis with their friends. To summarise the encounters together with family and friends, one can say that both groups have encounters regularly but the learners in Durban leave it more often. Only 20.5% in Bremen and 39.0% in Durban answered that they have encounters with nature on a regular basis together with their school. A difference of 18.5% can be identified. Learners from Bremen have rather infrequent encounters with nature together with their school, learners from Durban more often but both on a rather low level.

These tendencies are also supported by the frequency and intensity (chapter 4.6) of encounters with nature because learners from Durban have encounters with nature longer and more often.

5.4.2 Reference systems: Family, friends, and school

The influence of the reference system family can be described as very similar between Bremen (M=3.72) and Durban (M=3.74) (chapter 4.7). Friends seem to have a larger influence on the learners in Durban (M=3.51) and Bremen (M=3.21). Even school has a larger impact on the encounters with nature in Durban being on a rather high level (Durban M=3.26). The level in Bremen is rather low (Bremen M=2.76).

5.4.3 Activities and locations: Family

In Bremen the most popular activities in nature together with the family are ‘cycling tours’ (26.1%), ‘water sports’ (31.6%) and ‘hiking’ (54.2%), in Durban ‘water sports’ (19.6%), activities during the ‘vacation’ (29.7%), and ‘camping’ (18.3%). ‘Water sports’ like swimming seem to be popular in both cities because of the availability of open waters (e.g. River Weser in Bremen, the North Sea in Bremerhaven, Empangeni River and the Atlantic Ocean in Durban). ‘Camping’ is more popular in Durban than in Bremen, which can be caused by a higher average temperature in Durban compared with Bremen. ‘Cycling tours’ are extremely popular in Bremen but an inconsiderable number of participants in Durban do cycling. This can be caused by the fact that Bremen has rather well-maintained cycling routes which makes cycling comfortable and more attractive than in Durban. Obviously, the factors temperature and cycle tracks can also be applied to the reference systems friends and school, and will not be mentioned again to interpret these findings (chapter 5.4.4 and 5.4.5). 30.0% of all learners in Bremen have encounters with nature together with their family at least once a month (Durban 19.6%), and 43.4% at least once a week (Durban 56.0%). 30.1% of all learners in Bremen state that they engage in encounters with nature together with their family 2-3 hours a week (Durban 23.2%), and 11.2% between 4-5 hours (Durban 11.5%).

‘Mountains’ (Bremen 22.2%, Durban 28.7%), ‘forest’ (Bremen 33.5%, Durban 22.1), and ‘beach’ are the most important locations for activities with the family. Durban has a long coastline with the Indian Ocean which can be considered as one of the main features of the city. For this reason, ‘beach’ seems to be the most popular location. Differences can be seen in the category ‘lake’ (Bremen 27.3%, Durban 14.4%), probably caused by the fact that Bremen has a couple of lakes where people can swim and practice different activities. That the learners in Bremen spent more time in parks (13.9%) and on meadows (16.6%) and learners from Durban in fields (23.8%) can simply be clarified by the different availabilities of these locations in the two cities. Obviously, this last factor of availability of free space can also be

applied to the reference systems friends and school, and will not be mentioned again to interpret the findings (chapter 5.4.4 and 5.4.5). A big difference can be identified in the category ‘vacation destination’ (Bremen 21.8%, Durban 0.2%). It might be that learners from Bremen travel more for recreation purposes where they engage in direct contact with nature than learners from Durban.

5.4.4 Activities and locations: Friends

In Bremen the most important activities in nature spent together are ‘ball sports’ (24.8%), ‘hiking’ (26.2%), and ‘water sports’ (41.5%), in Durban ‘hiking’ (19.0%), ‘ball sports’ (19.9%), and ‘water sports’ (24.6%). Learners from Bremen and Durban share very similar popular outdoor activities together with their friends. Very similar to the reference system family differences can be found in the categories ‘camping’ (Bremen 4.2%, Durban 12.3%) and ‘cycling tours’ (Bremen 19.6%, Durban 1.3%). 10.2% of all learners in Bremen have encounters with nature together with their friends at least once a week (Durban 18.2%), 17.7% at least once a month (Durban 18.86%), and 63.7% less often than once a month (Durban 52.1%). 26.0% of all learners in Bremen state that they engage in encounters with nature together with their friends 2-3 hours a week (Durban 23.5%), and 12.6% between 4-5 hours (Durban 12.8%).

In Bremen these activities are most commonly carried out at ‘lakes’ (47.1%), in ‘parks’ (24.7%), on ‘meadows’ (27.8%), and in the ‘forest’ (31.6%). In Durban the most popular locations ‘beach’ (40.4%) and ‘field’ (31.6%) can be identified. In almost all categories differences between Bremen and Durban can be found: e.g. ‘mountains’ (Bremen 2.6%, Durban 14.2%), ‘beach’ (Bremen 13.2%, Durban 40.4%), or ‘park’ (Bremen 24.7%, Durban 9.9%). The substantial differences between the activity patterns in Bremen and Durban might also be influenced by the availability of the different locations in the area surrounding of the schools.

5.4.5 Activities and locations: School

In Bremen the most popular activities in contact with nature spent together with the school are ‘excursions’ (43.5%) followed by ‘hiking’ and ‘gardening’ (both 18.0%), in Durban ‘ball sport’ (18.0%) and ‘excursions’ (19.7%). In Bremen ‘excursions’ seem to be an appropriate instrument for outdoor activities in both cities but they are carried out a lot more in Bremen. An interesting fact is that 7.7% of the learners in Durban take part in a school based activity in contact with nature, i.e. caring for animals. Learners in Bremen never take part in such activities at all because such projects are not offered at school. 85.9% of all learners in Bremen have encounters with nature together with their school less often than once a month (Durban 72.0%). 81.3% of all learners in Bremen state that they engage in encounters with nature together with their school less than 1/2 an hour (Durban 68.8%) a month.

Mostly school activities in nature are carried out on ‘school’ grounds (Bremen 22.1%, Durban 22.3%) in both cities. In Bremen nearby ‘parks’ seem to be attractions for outdoor activities for educational purposes due to their availability. Very often urban schools in South Africa are fenced areas which might be a reason why the activities are primarily located on the school grounds. In Durban the ‘fields’ (39.4%) is a suitable location for outdoor activities because they are located on the school premises. Once again, it is recognizable that ‘excursions’ are conducted more frequently in Bremen than in Durban (Bremen 22.8%, Durban 5.3%).

5.4.6 Literature about encounters of nature

In retrospective about research focusing patterns and forms of encounters with nature, Lude sums up the findings of Rost, Gresele & Martens (2001), Lude & Bogner (2001), Remes & Lude’s (2006) coming to the conclusion that children mostly have their encounters with nature in social dimensions like the relationship with animals, in the aesthetic dimension on connection with the beauty of nature as well as for relaxation and recreational purposes. Very rarely dimensions of encounters with nature are nature protection related or destructive di-

mensions. Lude (2006) results regarding very rare encounters with nature organized by school are very similar to the findings described in chapter 5.4.5.

If encounters with nature are considered Jugendreport Natur (2010) emphasises that children like to be outdoors and generally speaking nature still attracts them. Almost 40% of all learners in the study state that they do not engage in activities in connection with school related activities. In this present study 80% of all learners in Bremen answer that they do not have encounters with nature together with their school on a regular basis. Brämer (2006) comes to the conclusion that learners have encounters with nature rather frequently mostly in ‘gardens’, in ‘fields’ and in the ‘forest’. Nevertheless, encounters with nature seem to be closely connected with activities like ‘paddling’, ‘climbing’ and also ‘hiking’ instead of profound activities like ‘observing wildlife animals’ or ‘catching small insects like bugs or butterflies’. Gebhard (1998) states that encounters with nature always require a social perspective and human relationship to become meaningful and useful, which can be seen in the findings. Mostly the encounters with nature are carried out together with the family and friends.

5.5 Key messages

- South African and German learners from Durban and Bremen spend time in direct contact with nature on a frequent and regular basis together with their family and friends. Learners from Bremen rarely engage with encounters with nature together with their school, learners from Durban occasionally.
- The largest part of the findings are very similar to the knowledge that can be found in previous and present literature like Gebhard (1998), Lude & Bogner (2001), Brämer (2006), Lude (2006), and Jugendreport Natur (2010).
- The biggest influence on the learners' encounters with nature have the reference systems family and friends. The influence of the reference system school is insignificant.
- Together with their family learners from Bremen most commonly engage in outdoor activities like cycling tours, water sports and hiking in mountains. Locations are the forest and the beach. Most frequently learners from Durban engage in activities like water sports, activities in their vacation and camping that are mostly carried out on the beach.
- Together with their friends learners from Bremen most commonly engage in outdoor activities like ball sports, hiking and water sports. Locations are lakes, parks and meadows. Most frequently learners from Durban engage in activities like hiking, ball and water sports that are carried out in parks, on meadows and in the forest.
- Together with their school learners from Bremen most commonly engage in outdoor activity excursions. Most frequently learners from Durban engage in activities like ball sports and excursions. Usually both groups carry out their activities on school grounds.
- All in all, nature-orientated activities like observing wildlife animals or catching small insects like bugs or butterflies are very rare.

5.6 Connectedness to nature

Hypothesis 2	Acceptance
South African and German learners from Durban and Bremen have a low level of connectedness to nature. [Mayer & Frantz 2004; Karlegger 2010]	Refused

5.6.1 Connectedness to nature scales

All in all, a mean score of 3.14 (SD=.64) in Bremen and of 3.59 (SD=.54) can be measured (difference of 0.45). This is a significant difference ($p=0.000$) with a mediocre but almost strong effect size of 0.76 (Cohen's d)¹⁴. A significant difference between the two groups can be identified in almost every item of the scale except items 4, 12, and 13 (see chapter 4.11.). As a main result one can say that the learners from Durban respond differently to the connectedness to nature scale and are deeper connected to nature than learners from Bremen. Considering the single-item connectedness to nature scale, a very similar tendency can be found. The learners from Bremen have a mean score of 6.17 (SD=1.97) and the learners from Durban 6.69 (SD=2.27), which is a difference of 0.52 on a scale between 1-10. In this case a significant difference ($p=0.000$) and a small effect size of 0.25 (Cohen's d) can be identified. In both groups the level of connectedness to nature is on a rather high level.

5.6.2 Literature about connectedness to nature

Mayer & Frantz (2004) conducted a multi-phased research project in which their connectedness to nature instrument was used the first time. In their studies, the researchers used US American students and revealed a mean score of the male participants of 3.54 (SD=.74) and female participants of 3.76 (SD=.47). Although a difference of 0.22 can be identified, Mayer & Frantz (2004) do not report a significantly divergence between these groups. Furthermore, they consider their results significant by comparing the findings of the two groups of environmental students ($M=3.82$, $SD=.48$), chemistry students ($M=3.37$, $SD=.55$), and psychology

¹⁴Most commonly a large sample size very likely leads to significant differences that can be measured. That is the reason why the p-value of significance level has to be supplemented by the effect size. The effect size gives meaning to the recognized statistical results and provides magnitude of the differences between the groups.

students ($M=3.37$, $SD=.62$). Klassen (2010) investigated connectedness to nature by comparing rural and urban learners from Canada. As a main result the researcher reveals a mean score of 3.30¹⁵ for children with a rather rural background and 3.41 for urban children. Although the results only differ by 0.11, Klassen (2010) considers this effect to have a significant impact. Cervinka & Karlegger (2009) tested children from Austria with the help of the connectedness to nature scale. As a result the female participants in their study have a mean score of 3.00 ($SD=.68$), the male participants 2.90 ($SD=.78$) and lower as in the present study. In their study Oblivos, Aragonés & Amerigo (2011) compared a group of university students and a group of the general population of the city of Madrid in Spain. As their main findings they found the students to have a mean score of 3.51 ($SD=.36$) and the inhabitants from Madrid of 3.58, $SD=.34$). These reported scores are very similar to those presented in this study. Karlegger (2010) investigated the connectedness to nature of learners and their families in which the children have a rather low mean score of 2.97 ($SD=.72$) and the parents a mean score of 3.37 ($SD=.73$). Compared with Karlegger's (2010) study the findings of this present study are on a rather high level.

¹⁵ Standard deviation was not reported.

5.7 Key messages

- South African and German learners from Durban and Bremen have a rather high level of connectedness to nature. The level of connectedness to nature of the learners from Durban is significantly higher compared with the learners from Bremen.
- This conclusion is supported by a significant difference between the two groups ($p=0.000$) and a mediocre but almost strong effect size of 0.76 (Cohen's d).
- The largest part of the findings regarding connectedness to nature scale reveal a very similar level (Mayer & Frantz 2004; Klassen 2010; Oblivos, Aragonés & Amerigo 2011).

5.8 Environmental identity

Hypothesis 3	Acceptance
South African and German learners from Durban and Bremen have a low level of environmental identity [Clayton & Opatow 2003; Oskamp & Schultz 2005].	Refused

5.8.1 Environmental identity scale

Considering the scores of the environmental identity of the learners from Bremen and Durban, a significant difference ($p=0.000$) and a mediocre but almost strong effect size of 0.79 (Cohen's d) can be identified. Mean score of the participants in Bremen is 3.15 ($SD=.71$) and in Durban 3.69 ($SD=.65$). A difference of 0.54 on a scale between 1-5 can be found. Almost all items of the environmental identity scale show a significant difference between the two groups except item 1, 15 and 16. As a main finding one can say that the learners from Durban respond differently to the environmental identity scale and have a stronger identity than the learners from Bremen. In both groups the environmental identity is on a rather high level.

5.8.2 Literature about environmental identity

Hinds & Sparks (2009) used the environmental identity scale in a study design with psychology students from the UK trying to set light on the correlation between environmental identity on one hand, and the well-being of individuals on the other. The researchers identified a mean score of 3.33 ($SD=0.46$) amongst the university students which was simply considered to be above the average. Olivos & Aragonés (2011) examined a group of Spanish male and female university students with the result of the whole group of 3.58 ($SD=.50$). The researchers conclude that the participants identify with their environment. Karlegger (2010) tested the environmental identity of Austrian children and concluded a rather low level of environmental identity ($M=2.95$, $SD=.70$).

5.9 Key messages

- South African and German learners from Durban and Bremen have a rather high level of environmental identity. The level of environmental identity of the learners from Durban is significantly higher compared with the learners from Bremen.
- This conclusion is supported by a significant difference between the two groups ($p=0.000$) and a mediocre but almost strong effect size of 0.79 (Cohen's d).
- The largest part of the findings regarding environmental identity scale reveal a very similar level (Hinds & Sparks 2009; Karlegger 2010; Olivos & Aragonés 2011).

5.10 Intention to act nature-orientated and sustainable

Hypothesis 4	Acceptance
South African and German learners from Durban and Bremen have a low level of nature-orientated and sustainable intentions to act in the future.	Partially accepted

In Bremen a mean score of 3.04 (SD=.47) and in Durban 3.23 (SD=.43) could be measured for the intention to act nature-orientated scale. This is a difference of 0.19 in a scale from 1-5. A significant difference ($p=0.000$) and a mediocre effect size of 0.42 (Cohen's d) can be identified. In all items of this scale a significant difference between the two groups can be found (see chapter 4.13.1). In Bremen the level of the intention to act nature-orientated is average and in Durban a bit above average. Learners from Durban have a slightly higher intention to act nature-orientated in the future compared with learners from Bremen.

In Bremen a mean score of 2.87 (SD=.90) and in Durban of 3.67 (SD=.75) could be identified for the intention to act sustainable scale. This is a difference of 0.80 in a scale from 1-5. A significant difference ($p=0.000$) and strong effect size of 0.97 (Cohen's d) can be measured. In all items of this scale a significant difference between the two groups can be identified (see chapter 4.13.2). In Bremen the level of the intention to act sustainable is rather low, and high in Durban. Learners from Durban have a higher intention to act sustainable in the future.

The findings of the intention to act nature-orientated scale of the two groups only slightly differ although a significant difference can be measured. As a conclusion it can be said that the intentional nature-orientated behaviours linked to statements like 'During the next year I intend to spend more time doing activities in nature' the learners from Durban have a greater motivation to do so. The findings of the intention to act sustainable scale are easier to interpret and a clear hint that learners from Durban have a significantly higher motivation to behave sustainable in the future (e.g. 'In the future, I will look for ways to re-use things.'). Due to the

fact that these two scales were developed and introduced for this research project, no other findings are available to determine the present measurement values.

5.11 Key messages

- South African and German learners from Durban and Bremen have a rather similar and mediocre level of intention to act nature-orientated in the future. Durban learners' level of intention to act nature-orientated of the learners is significantly higher compared with the learners from Bremen.
- This conclusion is supported by a significant difference between the two groups ($p=0.000$) but only a mediocre effect size of 0.42 (Cohen's d) can be measured.
- South African and German learners from Durban and Bremen have a different level of intention to act sustainable in the future. Durban learners' level of intention to act sustainable is significantly higher compared with the learners from Bremen.
- This conclusion is supported by a significant difference between the two groups ($p=0.000$) and a very strong effect size of 0.97 (Cohen's d) can be identified.

5.12 Correlations

As presented and discussed in chapter 4.17, the theoretical model for the quantitative research was considered to reveal the significant correlations between the main constructs of the study: encounters with nature, connectedness to nature, and the intention to act nature-orientated and the intention to act sustainable.

Figure 60 Overview of the correlation coefficients (Pearson) linked to the theoretical model of the quantitative study.

Hypothesis	Acceptance
6) The more frequent and regular South African and German participants from Durban and Bremen have encounters with nature, the higher is their level of connectedness with nature [Hinds & Sparks 2008; Cervinka et al. 2009].	Refused
7) The more frequent and regular South African and German learners from Durban and Bremen have encounters with nature, the higher is their level of environmental identity [Clayton 2003; Menzel & Bögeholz 2009].	Refused
8) A positive and significant correlation between the connectedness to nature and the environmental identity can be identified [Raudsepp 2005; Karlegger 2010;].	Accepted
9) A positive significant correlation between the constructs 1. encounters with nature, 2. connectedness nature, 3. environmental identity and 4. the intention to act nature-orientated and sustainable can be identified.	Partially accepted

5.12.1 Encounters with nature and the connectedness to nature, environmental identity and the intention to act nature-orientated and sustainable

A positive correlation between the encounters with nature and the connectedness to nature, environmental identity and the intention to act nature-orientated and sustainable was hypothesized but been confirmed ($r=.19-.30$). This very unusual finding can only be explained by synthesizing the different results of encounters with nature with the family, friends and school

and additionally that the frequency and intensity scales have been summed up. Hinds & Sparks (2009) found a moderate positive correlation between the frequency of nature experience ($r=.42$) and the environmental identity which was also not a significant level. Additionally, in Karlegger's (2010) study the encounters with nature positively correlate with the connectedness to nature ($r=.49$).

5.12.2 Connectedness to nature and intention to act nature-orientated and sustainable

A strong positive correlation between the connectedness to nature scale by Mayer & Frantz (2004) and the intention to act nature-orientated and sustainable scales could be identified ($r=.60$; $r=.62$). In their study Hoot & Friedmann (2001) tried to reveal a correlation between the connectedness to nature scale (Mayer & Frantz 2004) and the new environmental paradigm scale by Dunlap, vanLiere, Mertig & Jones (2000) that measures environmental-responsible behaviour patterns for future actions ($r=.35$)¹⁶. As a conclusion Hoot & Friedmann (2001) could illustrate a moderate positive correlation between the two scales. Very similar findings could be achieved in the research project by Geng, Xu, Ye, Zhou & Zhou (2015) who revealed a weak positive correlation ($r=.39$) between the connectedness to nature scale (Mayer & Frantz 2004) and an environmental behaviours scale by Kaiser, Oerke & Bogner (2007). Hence, the correlations between the connectedness to nature scale (Mayer & Frantz 2004) and the intention to act nature-orientated and sustainable scales used in this study are consistent with previous research.

5.12.3 Environmental identity and intention to act nature-orientated and sustainable

A very strong positive correlation between the environmental identity scale (Clayton 2003) and the intention to act nature-orientated and sustainable scale could be measured ($r=.82$; $r=.74$). In Gaterleben, Murtagh & Abrahamse's (2012) studies different levels of correlations

¹⁶ It is very important to emphasize that the mentioned references are not related to the intention to act in the future scales used in this study. In the described examples similar scales were used.

between the environmental identity scale by Clayton (2003) could be measured; in three studies ($r=.19-.32$). A very similar positive correlation was revealed by Sanvichith (2011). The researcher tested the correlation between the environmental identity scale (Clayton 2003) and a scale consisting of eleven different questions regarding pro-environmental behaviours. The correlation was $r=.46$. The measured correlations of this study are mainly consistent with previous research.

5.12.4 Connectedness to nature and environmental identity

As expected, a positive correlation between the connectedness to nature and the environmental identity scale could be measured ($r=.73$). This could also be highlighted by Karlegger (2010), Olivos, Arangos & Amerigo (2011), Olivos & Arangones (2011) and Tam (2013) where the connectedness to nature scale significantly correlated with the environmental identity scale ($r=.78$; $r=.61$; $r=.68$; $r=.81$). The correlations measured in this study are consistent with the findings of previous research.

5.12.5 Regression models

The environmental identity scale (Clayton 2003) can be seen as a powerful dependent variable to explain intentional nature-orientated as well as sustainable behaviour ($r^2=.67$ and $.55$) (chapter 4.17.2). This scale seems to be a very comprehensive and elaborate instrument not only to define an individual's level of environmental identity but also a forecasting tool for intended nature-orientated and sustainable behaviour patterns.

5.13 Key messages

- Unexpectedly no positive correlation between the encounters with nature, the connectedness to nature, environmental identity and the intention to act nature-orientated and sustainable could be measured ($r=.19-.30$) (Karlegger 2010: $r=.49$; Hinds & Sparks 2009: $r=.42$).
- A strong positive correlation between the connectedness to nature scale by Mayer & Frantz (2004) and the intention to act nature-orientated and sustainable scales could be identified ($r=.60$; $r=.62$). A much weaker positive correlation can be found in Geng, Xu, Ye, Zhou & Zhou's study (2015) ($r=.39$).
- A very strong positive correlation between the environmental identity scale (Clayton 2003) and the intention to act nature-orientated and sustainable scale could be measured ($r=.82$; $r=.74$). A much weaker correlation could be found by Sanvichith (2011) ($r=.46$).
- As expected (Karlegger 2010, Olivos, Arangos & Amerigo 2011, Olivos & Arangones 2011, Tam 2013), a positive correlation between the connectedness to nature and the environmental identity scale could be measured ($r=.73$).
- The environmental identity scale (Clayton 2003) is a powerful dependent variable to explain intentional nature-orientated and sustainable behaviour (regression analysis $r^2=.67$ and $.55$).

5.14 Background factors: sex, grade, socio-economic background and city factor

The background factors sex, grade and socioeconomic background of the participants had no significant impact on the encounters with nature, the connectedness to nature, the environmental identity and the intention to act nature-orientated and sustainable. The city factor of Durban and Bremen has a significant impact on the learners' level of connectedness to nature (Bremen M=3.14, Durban M=3.59), environmental identity (Bremen M=3.15, M=3.69) and intentions to act nature-orientated (Bremen M=3.04, Durban M=3.23) and sustainable (Bremen M=2.87, Durban M=3.67).

The Socio-economic background, the participant's sex as well as their grade do not have significant impact on the main constructs. Concerning this research findings like *Naturbewusstsein Report* (Bundesministerium für Naturschutz 2010) can be considered in which no gender-specific differences regarding the level of a connection to nature, encounters with nature or even intended nature-conservation behaviour patterns could be identified. Additionally, in their study Mayer & Frantz (2004) did not identify a gender-specific difference regarding the connectedness to nature. If environmental attitudes are considered Zelensky, Chua & Aldrich (2000) could discover a gender-specific difference. In their study the researchers could reveal that female participants are more environmentally aware than male participants. Karlegger (2010) emphasizes a not yet verified positive correlation between connectedness of nature and environmental behaviours in her study.

Hornberg, Buinge & Pauli (2011) emphasise the important indication of disadvantageous and underprivileged life situations within the research topic of environmental justice. A negative impact of the socio-economic background of the participants on the individuals' possibilities to have encounters with nature or to be intended to have sustainable could not be identified.

The most important background factor is the city variable. A possibility of interpretation could be that the two different groups of learners have a different connotation regarding the intention to act nature-orientated and sustainable scales. The significant differences might be caused by a altered connotation of the statements. Learners from Bremen might define or connect the intentions as real behaviour patterns for future actions and the learners from Durban might define it as environmental attitudes regarding certain behaviour patterns.

5.15 Key messages

- The background factor city has the largest impact on the level connectedness to nature, environmental identity, and intention to act nature-orientated and sustainable.

5.16 Limitations of this study

There are certain aspects that have to be mentioned if a standardized questionnaire is used in a research study. Generally, questionnaires are limited in the width of possible answers that can be given by the participants regarding their feelings, opinions or ideas on a certain topic. All the answers are more or less restricted and predetermined. As a general rule, one can say that the abstraction of data gathered with a standardized questionnaire to mere numbers leads to a loss of information. Additionally, it is likely that the researcher does not notice a certain important phenomena, because of excessive focusing on used theory or hypothesis.

For data collection in Durban, an equal number of English and IsiZulu questionnaires were printed. Surprisingly, the largest part of participating learners in Durban refused to complete the isiZulu questionnaire although their native language is isiZulu. Mainly, this was caused by the fact that the participants are able to speak but can hardly read and write isiZulu. Only a number of 28 isiZulu questionnaires were handed out. Furthermore, the researcher can never be sure that all statements or questions mean the same to all participants particularly in the context of two different geographical and cultural backgrounds. Although the researcher gave the exact same instruction in German and in English language but you can never be sure that no misinterpretations or understanding problems occur during the completion the questionnaire.

Only a small amount of data gathered with the help of the interviews could be analysed. A further analysis of all existing qualitative data would be very interesting but would have gone far beyond the scope of this research project. Hence, a large amount of data was not being considered but will be analysed in a follow-up study (see chapter 5.18).

Information regarding the main research topics was gathered with the help of quantitative and qualitative methods. As highlighted while considering the findings, just a very small part of

the complexity and richness of individual's thoughts, ideas and behaviour patterns can be put into focus.

5.17 Key messages

- The researcher can never be sure that all statements or questions mean the same to all participants particularly in the context of two different geographical and cultural backgrounds.
- Only a small number of four contrasting interviews could be analysed caused by the focus on the quantitative research.

5.18 Suggestions for future research

Among other aspects this present research project revealed some differences but also some similarities between the two tested groups in Bremen and in Durban. On one hand, clear divergence on the level of connectedness to nature, environmental identity and the intention to act nature-orientated and sustainable could be identified. The city factor seems to have a very large impact on these constructs. On the other hand, the understanding of nature is generally speaking, very similar in Bremen and in Durban: alienated and idealized. Regarding these two aspects, it can be seen as the main conclusions of this research study, further research questions and two differing approaches for future research will be suggested.

- South African and German learners from Bremen and Durban have an alienated and idealized understanding of nature. *How can an integrated and comprehensive understanding of nature be promoted from early childhood to adulthood?*

The researcher suggests an experimental approach using a pre-test post-test design in order to compare the participant's degree of modification after conducting of intervention or special educational treatment. A teaching intervention can be applied to dealing with the concept of understanding of nature as a topic following a constructivist teaching model. This study can be conducted with the help of the conceptual change theory by Posner & Strike (1992). Generally, the conceptual change theory focuses on cognitive processes and on the observation of the participant's idea changes. This specific change should be closely related to a context-dependent content: the understanding of nature.

- South African learners from Durban have a higher level of connectedness to nature, environmental identity and the intention to act nature-orientated and sustainable compared with learners from Bremen. *What is the level of the described constructs regarding learners from other geographical and cultural locations?*

In connection with the need for more evidence, regarding the level of intention to act sustainable for example which is significantly different in Bremen and Durban, the researcher suggests further international comparative wide-ranging surveys. Restell & Conrad (2015) state that 27% of all publications regarding connectedness to nature are US American followed by 17% Australian. Hence, additional networking and collaboration regarding the research topic described in this thesis could be an appropriate intervention.

As a third suggestion for a future research project is to focus on the remaining part of the conducted interviews and gathered qualitative data.

5.19 Key messages

- The researcher suggests an experimental approach that uses a pre-test post-test design with a teaching intervention dealing with the concept of understanding of nature in order to compare the participant's degree of modification of this construct.
- The researcher suggests further international comparative wide-ranging surveys regarding connectedness to nature, environmental identity and the intention to act nature-orientated and sustainable.

6. CHAPTER SIX- IMPLICATIONS FOR EDUCATION

As described in the chapters before, a gap between encounters with nature and the understanding of nature could be identified regarding learners from Bremen and Durban. The participants commonly have encounters with nature together with their family and their friends but very rarely together with their school. Particularly, this tendency can be seen in Bremen. Furthermore, the categories of encounters with nature are mostly closely related to a social dimension as well as to a recreational dimension (e.g. ball and water sports). As a main implication for educational programmes the focus should be set on more and diverse patterns and forms of encounters with nature on a regular basis. A variety of examples for such projects can be found in Lindau, Finger & Lindner (2015) who emphasize the added value of digital media in connection with outdoor education in order to promote an adventurous and exploring category of encounters with nature. Moreover, concepts like integrated school gardening projects (Klingenberg & Rauhaus 2005; Pütz 2012) or even in projects during the learners' free time (Clayton 2007) can help to foster nutritional category of encounters with nature as well as impact on the individuals and the ecosystem. Hence, connections with nature are the basis for a sustainable development and they should have a solid and permanent place in every concept of environmental education starting during the learners' childhood. As a further step, encounters with nature help to connect or reconnect individuals with the natural environment and fostering an environmental identity.

Educational systems and in particular natural sciences and biology didactics should try to integrate the learners experiential world, their perceptions and conceptions or even religious thoughts regarding the natural world to enhance a understanding of nature. An example for such overall approaches is the integration of specific contents into the educational plans of Bremen in which the ecosystems forests and lake (Senatorin für Wissenschaft und Bildung 2010) have an inherent part while dealing with ecosystems. Such implementations are rele-

vant because these ecosystems are well-known to the learners and they are helpful to emphasize the place of human-beings within existing environmental interrelationships. Using this framework could assumedly be easier to come from facts to connections between these facts, and to develop comprehensive concepts.

Additionally, it should be considered that the educational system, in this case school, might not be the right institution to connect learners with nature and to enhance their environmental identity. Hence, a didactic implication for school curriculums could be to primarily out-source encounters with nature and to extensively cooperate with extracurricular education organisations.

The theory of planned behaviour by Ajzen (1991) or models to explain and describe the development of pro-environmental behaviour by Kollmuss & Agyeman (2002), that consists of a classical three-step (1. environmental knowledge followed by 2. environmental attitude and 3. pro-environmental behaviour), might be one-dimensional and reciprocal. Various other important influencing variables are not mentioned in these concepts. Moreover, sometimes such variables can be considered as barriers for individual behaviour changes or even the mere intention to act nature-orientated and sustainable in everyday situations (e.g. external variables like infrastructure, political, and social factors as well as internal variables like personality traits or existing value systems). Hence, a progressive and sustainable-orientated educational system can be considered to have a significant impact on an individual, just a little impact on a single individual can have a significant impact on a whole society. Consequently, all areas of everyday life should focus on sustainable development projects.

In particular, it needs the involvement of the individual's 'thoughts, feelings, values, and affiliations' (Clayton, Goldman & Celio 2012: 45) in order to create reflected and sustainable environmental awareness.

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8. APPENDIX

8.1 Approval letter of Senatorin für Bildung und Wissenschaft in Bremen (Germany) to conduct research at schools

Die Senatorin für Bildung und Wissenschaft	 Freie Hansestadt Bremen				
<small>Die Senatorin für Bildung und Wissenschaft Rembertiring 8-12 · 28195 Bremen</small>	Dr. Thomas Bethge Referatsleiter				
An Herrn Ansgar Gräntzdörffer Universität Bremen, Institut für Didaktik der Naturwissenschaften Leobener Straße N2 28359 Bremen	Auskunft erteilt Heiko Winkler Zimmer 313 Tel. (0421) 361 18381 Fax (0421) 496 18381 E-Mail heiko.winkler@bildung.bremen.de Org.-Z.: 20-13 (bitte bei Antwort angeben) Bremen, 18.02.2014				
Genehmigung einer Dissertation zum Thema					
„Einstellungen und Erfahrungen Jugendlicher zu Natur und Umwelt aus südafrikanischer und deutscher Perspektive“					
- Erhebungszeitpunkt: ab März 2014 -					
Ihr Antrag vom 18.01.2014 ID 2014-03					
Sehr geehrter Herr Gräntzdörffer,					
ich freue mich, Sie bei der Durchführung Ihrer Dissertation unterstützen zu können.					
Die durchzuführende Befragung der Schülerinnen und Schülern an Grund- und Sekundarschulen I in der Stadtgemeinde Bremen genehmige ich unter folgenden Voraussetzungen:					
<ol style="list-style-type: none">1. Die auszuwählenden Bremer Schulen und alle zu befragenden Personen nehmen freiwillig teil. Bei einer Nichtteilnahme entstehen keine Nachteile. Jede/r Untersuchungsteilnehmer/in kann auch während oder nach einer Teilnahme das Einverständnis mit der Datenverwertung ohne Angabe von Gründen und ohne Konsequenzen widerrufen. Es liegt in der Entscheidung der Teilnehmenden, ob sie einzelne Auskünfte, z. B. durch Nichtbeantwortung von Einzelfragen, verweigern. Die Untersuchungsteilnehmer/innen erhalten auf Wunsch eine Ergebnisrückmeldung und werden über die Weiterverwendung der Daten informiert.2. Es ist sicher zu stellen, dass die betroffenen Schülerinnen und Schüler sowie deren Eltern in geeigneter Weise über Zweck und Nutzen der Datenerhebung und -verarbeitung umfassend informiert werden. So insbesondere auch über die Erhebung von personenbezogenen Daten.3. Es ist zu gewährleisten, dass alle Angaben streng vertraulich behandelt werden, des Weiteren die Daten in pseudonymisierter Form von Ihnen weiterverarbeitet werden und					
 Eingang: Rembertiring 8-12	Dienstgebäude: Rembertiring 8-12 28195 Bremen	Bus / Straßenbahn: Haltestellen Hauptbahnhof	Sprechzeiten: montags bis freitags von 9:00 - 14:00 Uhr	Bankverbindungen: Bremer Landesbank Konto-Nr. 1070115000 BLZ 290 500 00	Sparkasse Bremen Konto-Nr. 1090653 BLZ 290 501 01

die Ergebnisse der Untersuchung keine Einzelmerkmale enthalten, die einen Rückschluss auf die Identität einzelner Personen zulassen. Durch die Erhebung darf nicht in die schutzwürdigen Rechte der Betroffenen eingegriffen werden, zum Beispiel darf die Erhebung nicht zur Diskriminierung von einzelnen Personen führen.

4. Die gesetzlichen Bremer Datenschutzbestimmungen werden verpflichtend eingehalten. Insbesondere garantieren Sie, dass mit Beginn der Durchführung (schon bei der Datenerhebung und insbesondere bei der Datenverarbeitung) sichergestellt ist, dass Ihre Sicherheits- und Datenschutzkonzepte den für das Land Bremen gültigen Datenschutzgesetzen entsprechen. Die Konzepte sind im Falle einer Überprüfung vorzulegen.

5. Das Ergebnis der Untersuchung wird dem Land Bremen zeitnah zur Verfügung gestellt.

Bitte denken Sie daran, dass vor der Untersuchung der Elternbeirat und die Schülerversvertretung der Schulen zu unterrichten sind.

Die Gesamtvertretungen: Zentralelternbeirat, Gesamtschülerversvertretung und der Personalrat Schulen sowie der behördliche Datenschutzbeauftragte werden von mir benachrichtigt.

Die zur Durchführung der Erhebung in den Schulen erforderlichen organisatorischen Maßnahmen sind jeweils mit der Schulleitung abzustimmen und bedürfen deren Zustimmung.

Ihre Untersuchung wird unter der ID-Nr. 2014-03 geführt. Bitte geben Sie bei Rückfragen und der weiteren Bearbeitung diese Kennnummer an.

Für Ihre Arbeit wünsche ich Ihnen viel Erfolg!

Mit freundlichen Grüßen
Im Auftrag



Dr. Bethge

8.2 Approval letter of Department of Education Province of KwaZulu-Natal (South Africa) to conduct research at schools in KwaZulu-Natal



education

Department:
Education
PROVINCE OF KWAZULU-NATAL

Enquiries: Nomangisi Ngubane

Tel: 033 392 1004

Ref.:2/4/8/250

A Grantzdorffer
PO Box 68088
UMZUMBE
4225

Dear Sir/Madam

PERMISSION TO CONDUCT RESEARCH IN THE KZN DoE INSTITUTIONS

Your application to conduct research entitled: **"INVESTIGATION OF LEARNERS' EXPERIENCES OF NATURE: A SOUTH AFRICAN AND GERMAN PERSPECTIVE"**, in the KwaZulu-Natal Department of Education Institutions has been approved. The conditions of the approval are as follows:

1. The researcher will make all the arrangements concerning the research and interviews.
2. The researcher must ensure that Educator and learning programmes are not interrupted.
3. Interviews are not conducted during the time of writing examinations in schools.
4. Learners, Educators, Schools and Institutions are not identifiable in any way from the results of the research.
5. A copy of this letter is submitted to District Managers, Principals and Heads of Institutions where the intended research and interviews are to be conducted.
6. The period of investigation is limited to the period from 01 September 2014 to 31 November 2015.
7. Your research and interviews will be limited to the schools you have proposed and approved by the Head of Department. Please note that Principals, Educators, Departmental Officials and Learners are under no obligation to participate or assist you in your investigation.
8. Should you wish to extend the period of your survey at the school(s), please contact Miss Connie Kehologile at the contact numbers below.
9. Upon completion of the research, a brief summary of the findings, recommendations or a full report / dissertation / thesis must be submitted to the research office of the Department. Please address it to The Office of the HOD, Private Bag X9137, Pietermaritzburg, 3200.
10. Please note that your research and interviews will be limited to schools and institutions in KwaZulu-Natal Department of Education (Umlazi District).

Nkosinathi S.P. Sishi, PhD
Head of Department: Education
Date: 15 September 2014

KWAZULU-NATAL DEPARTMENT OF EDUCATION

POSTAL: Private Bag X 9137, Pietermaritzburg, 3200, KwaZulu-Natal, Republic of South Africa ...dedicated to service and performance
PHYSICAL: 247 Burger Street, Anton Lembede House, Pietermaritzburg, 3201. Tel. 033 392 1004 **beyond the call of duty**
EMAIL ADDRESS: kehologile.connie@kzndoe.gov.za / Nomangisi.Ngubane@kzndoe.gov.za
CALL CENTRE: 0860 596 363; Fax: 033 392 1203 WEBSITE: www.kzneducation.gov.za

8.3 Sources of nature pictures used for the questionnaire

1. Organic garden
http://www.zuidafrikaspecialist.nl/app/webroot/upload/harties_2.jpg (retrieved 10.03.2013)
2. Stream
<http://www.widescreen-wallpapers.de/wallpapers/2454-parkanlage-1.jpg> (retrieved 22.03.2013)
3. City park
<http://www.hamburg.de/contentblob/3115586/data/image009.jpg> (retrieved 10.03.2013)
4. Soccer field
http://www.gocolumbiamo.com/ParksandRec/Images/Parks/cosmo_soccer_13-15.jpg (retrieved 22.03.2013)
5. Mountain stream
http://4.bp.blogspot.com/SVZ99jquGt8/S7ORtjLsDkI/AAAAAAAAAEE/ifwKWufoj3U/s1600/BayWald_web_1172579967.jpg (retrieved 22.03.2013)
6. Elephant zoo
http://upload.wikimedia.org/wikipedia/commons/d/d1/Elephant_Zoo_Muenster.JPG (retrieved 10.03.2013)
7. Country road
<http://www.capespirit.com/resources/roadsouthafricacarrental.jpg> (retrieved 22.03.2013)
8. Beach
<http://www.99hdwallpaper.com/nature/images/beach-wallpaper7.jpg> (retrieved 10.03.2013)
9. Traffic modern city
<http://www.autozeitung.de/sites/default/files/images/bildergalerie/2013/02/Laermentwicklung-Gro%25C3%25Fstadt-Autos.jpg> (retrieved 22.03.2013)
10. Playground
<http://www.offenbach.de/stepone/data/images/4d/21/00/spielplatz-e.v.rochow-str.034.jpg> (retrieved 25.03.2013)
11. Mountains
<http://www.hotel-hubertus.cc/images/bergbach.jpg> (retrieved 10.03.2013)
12. Field
http://portfolios.chuckhaney.com/data/photos/416_1sugarbeet_field_copy.jpg (retrieved 27.03.2013)
13. Dam
<http://topdownview.de/wp/wp-content/uploads/2014/01/service-drone-photo-51bf2e9795b20-moehnetalsperre-staudamm-am-moehnesee-in-nordrhein-westfalen-1024x768.jpg>
http://danesafari.com/wpcontent/gallery/naturschonheiten_sudafrikas/sunway_south_africa_drakensberg_lotheni_sandra_jacobs_20111024_1074849344.jpg (retrieved 10.03.2013)
14. Elephant nature
http://www.zuidafrikaspecialist.nl/app/webroot/upload/harties_2.jpg (retrieved 22.03.2013)

8.4 Results of the frequencies encounters with nature: family, friends, and school

		land			
		Germany		South Africa	
		Anzahl	Gültige Anzahl als Spalten%	Anzahl	Gültige Anzahl als Spalten%
Frequency of encounters with nature family	Never	0	0,0%	7	0,8%
	Less often	147	17,6%	156	18,4%
	At least once a month	164	19,6%	254	30,0%
	At least once a week	468	56,0%	367	43,4%
	Daily	56	6,7%	62	7,3%
Frequency of encounters with nature peer group	Never	0	0,0%	5	0,6%
	Less often	90	10,8%	154	18,2%
	At least once a month	148	17,7%	159	18,8%
	At least once a week	532	63,7%	441	52,1%
	Daily	65	7,8%	87	10,3%
Frequency of encounters with nature school	Never	1	0,1%	11	1,3%
	Less often	82	9,8%	112	13,2%
	At least once a month	23	2,8%	53	6,3%
	At least once a week	716	85,9%	609	72,0%
	Daily	12	1,4%	61	7,2%
land	Germany	836	100,0%	0	0,0%
	South Africa	0	0,0%	846	100,0%

8.5 Results intensity encounters with nature: family, friends, and school

	land			
	Germany		South Africa	
	Anzahl	Gültige Anzahl als Spalten%	Anzahl	Gültige Anzahl als Spalten%
Intensity of encounters with 0 nature peer group	337	40,3%	294	34,8%
Less than 1/2 an hour	39	4,7%	107	12,6%
1/2 hour to 1 hour	106	12,7%	85	10,0%
2-3 hours	252	30,1%	197	23,3%
4-5 hours	94	11,2%	97	11,5%
More than five hours	8	1,0%	66	7,8%
Intensity of encounters with 0 nature family	321	38,4%	220	26,0%
Less than 1/2 an hour	70	8,4%	168	19,9%
1/2 hour to 1 hour	116	13,9%	108	12,8%
2-3 hours	217	26,0%	199	23,5%
4-5 hours	105	12,6%	108	12,8%
More than five hours	6	0,7%	43	5,1%
Intensity of encounters with 0 nature school	664	79,6%	513	60,6%
Less than 1/2 an hour	14	1,7%	69	8,2%
1/2 hour to 1 hour	21	2,5%	41	4,8%
2-3 hours	54	6,5%	68	8,0%
4-5 hours	65	7,8%	84	9,9%
More than five hours	16	1,9%	71	8,4%

8.6 Results connectedness to nature scale

		land			
		Germany		South Africa	
		Anzahl	Gültige Anzahl als Spalten% in Schicht	Anzahl	Gültige Anzahl als Spalten% in Schicht
Self-identification with nature	Strongly disagree	69	8,3%	39	4,7%
	Disagree	133	15,9%	99	11,9%
	Neutral	307	36,8%	206	24,8%
	Agree	258	30,9%	311	37,4%
	Strongly agree	68	8,1%	175	21,1%
	11	0	0,0%	1	0,1%
Self-identification with nature	Strongly disagree	92	11,0%	23	2,7%
	Disagree	152	18,2%	60	7,2%
	Neutral	272	32,5%	154	18,4%
	Agree	232	27,8%	318	38,0%
	Strongly agree	88	10,5%	282	33,7%
Self-identification with nature	Strongly disagree	46	5,5%	14	1,7%
	Disagree	66	7,9%	48	5,7%
	Neutral	162	19,4%	106	12,7%
	Agree	342	41,0%	307	36,7%
	Strongly agree	219	26,2%	360	43,1%
	11	0	0,0%	1	0,1%
Emotional bonding with nature	Strongly agree	28	3,4%	76	9,2%
	Agree	104	12,5%	154	18,6%
	Neutral	301	36,0%	154	18,6%
	Disagree	252	30,2%	247	29,8%
	Strongly disagree	150	18,0%	199	24,0%
Self-identification with nature	Strongly disagree	127	15,2%	48	5,8%
	Disagree	158	18,9%	75	9,0%
	Neutral	218	26,1%	218	26,2%
	Agree	207	24,8%	257	30,9%
	Strongly agree	126	15,1%	232	27,9%
	9	0	0,0%	1	0,1%
Emotional bonding with nature	Strongly disagree	227	27,2%	36	4,4%
	Disagree	182	21,8%	112	13,6%
	Neutral	214	25,6%	220	26,7%
	Agree	137	16,4%	269	32,6%
	Strongly agree	75	9,0%	185	22,4%
	9	0	0,0%	2	0,2%
	13	0	0,0%	1	0,1%
Self-identification with nature	Strongly disagree	99	11,8%	34	4,1%

	Disagree	121	14,5%	57	6,9%
	Neutral	261	31,2%	156	18,8%
	Agree	228	27,3%	281	33,8%
	Strongly agree	127	15,2%	302	36,3%
	9	0	0,0%	1	0,1%
Self-identification with nature	Strongly disagree	44	5,3%	24	2,9%
	Disagree	102	12,2%	83	9,9%
	Neutral	219	26,2%	154	18,4%
	Agree	320	38,3%	287	34,4%
	Strongly agree	150	17,9%	286	34,3%
	9	1	0,1%	1	0,1%
Self-identification with nature	Strongly disagree	90	10,8%	29	3,5%
	Disagree	174	20,8%	100	12,1%
	Neutral	286	34,3%	225	27,3%
	Agree	200	24,0%	296	35,9%
	Strongly agree	84	10,1%	173	21,0%
	9	1	0,1%	1	0,1%
Self-identification with nature	Strongly disagree	100	12,0%	52	6,2%
	Disagree	141	16,9%	80	9,6%
	Neutral	247	29,5%	188	22,6%
	Agree	230	27,5%	269	32,3%
	Strongly agree	118	14,1%	243	29,2%
	9	0	0,0%	1	0,1%
Self-identification with nature	Strongly disagree	105	12,6%	38	4,5%
	Disagree	187	22,4%	82	9,8%
	Neutral	263	31,5%	226	27,0%
	Agree	202	24,2%	261	31,2%
	Strongly agree	78	9,3%	228	27,3%
	9	0	0,0%	1	0,1%
Self-identification with nature	Strongly disagree	127	15,2%	142	16,9%
	Disagree	172	20,6%	189	22,5%
	Neutral	274	32,8%	187	22,3%
	Agree	185	22,2%	177	21,1%
	Strongly agree	77	9,2%	143	17,0%
	9	0	0,0%	1	0,1%
Self-identification with nature	Strongly agree	72	8,6%	94	11,2%
	Agree	196	23,5%	167	19,9%
	Neutral	271	32,5%	246	29,3%
	Disagree	183	21,9%	196	23,4%
	Strongly disagree	113	13,5%	135	16,1%
	9	0	0,0%	1	0,1%

8.7 Results connectedness to nature single item

Single item connectedness to nature

land			Häufigkeit	Prozent	Gültige Prozent	Kumulative Prozente
Germany	Gültig	1	30	3,6	3,6	3,6
		2	61	7,3	7,3	10,9
		3	131	15,7	15,7	26,6
		4	170	20,3	20,4	47,0
		5	131	15,7	15,7	62,7
		6	155	18,5	18,6	81,3
		7	70	8,4	8,4	89,7
		8	58	6,9	7,0	96,6
		9	15	1,8	1,8	98,4
		10	13	1,6	1,6	100,0
		Gesamtsumme		834	99,8	100,0
	Fehlend	99	2	,2		
Gesamtsumme		836	100,0			
South Africa	Gültig	1	130	15,4	16,2	16,2
		2	61	7,2	7,6	23,8
		3	108	12,8	13,4	37,2
		4	125	14,8	15,6	52,8
		5	117	13,8	14,6	67,4
		6	149	17,6	18,6	85,9
		7	53	6,3	6,6	92,5
		8	25	3,0	3,1	95,6
		9	13	1,5	1,6	97,3

	10	22	2,6	2,7	100,0
	Gesamtsumme	803	94,9	100,0	
Fehlend	99	42	5,0		
	System	1	,1		
	Gesamtsumme	43	5,1		
	Gesamtsumme	846	100,0		

8.8 Results environmental identity scale

		land			
		Germany		South Africa	
		Anzahl	Gültige Anzahl als Spalten%	Anzahl	Gültige Anzahl als Spalten%
Interaction with nature	Strongly disagree	42	5,0%	54	6,5%
	Disagree	129	15,4%	143	17,1%
	Neutral	169	20,2%	222	26,5%
	Agree	340	40,7%	252	30,1%
	Strongly agree	155	18,6%	166	19,8%
Pro-environmentalist ideology	Strongly disagree	52	6,2%	20	2,4%
	Disagree	130	15,6%	83	9,9%
	Neutral	291	34,8%	197	23,5%
	Agree	278	33,3%	331	39,5%
	Strongly agree	85	10,2%	206	24,6%
Self-identification with nature	Strongly disagree	57	6,8%	27	3,2%
	Disagree	132	15,8%	76	9,1%
	Neutral	327	39,2%	184	22,0%
	Agree	241	28,9%	297	35,6%
	Strongly agree	78	9,3%	251	30,1%
Pro-environmentalist ideology	Strongly disagree	77	9,2%	43	5,1%
	Disagree	125	15,0%	99	11,8%
	Neutral	191	22,9%	163	19,5%
	Agree	241	28,9%	257	30,7%
	Strongly agree	201	24,1%	274	32,8%
Positive feelings towards nature	Strongly disagree	71	8,5%	67	8,0%
	Disagree	105	12,6%	106	12,7%
	Neutral	173	20,7%	152	18,2%
	Agree	253	30,3%	241	28,8%
	Strongly agree	234	28,0%	269	32,2%
Positive feelings towards nature	Strongly disagree	11	0,0%	1	0,1%
	Disagree	175	20,9%	91	10,9%
	Neutral	184	22,0%	139	16,6%
	Agree	236	28,2%	193	23,0%
	Strongly agree	156	18,7%	215	25,7%
Pro-environmentalist ideology	Strongly disagree	85	10,2%	200	23,9%
	Disagree	230	27,6%	46	5,5%
	Neutral	228	27,3%	90	10,7%
	Agree	244	29,3%	215	25,6%
	Strongly agree	107	12,8%	295	35,1%
Pro-environmentalist ideology	Strongly disagree	25	3,0%	195	23,2%
	Disagree	101	12,1%	33	3,9%
	Neutral				
	Agree				
	Strongly agree				

	Disagree	147	17,6%	70	8,3%
	Neutral	226	27,1%	209	24,9%
	Agree	271	32,5%	254	30,2%
	Strongly agree	90	10,8%	275	32,7%
Self-identification with nature	Strongly disagree	171	20,5%	37	4,4%
	Disagree	202	24,2%	118	14,1%
	Neutral	244	29,3%	224	26,8%
	Agree	156	18,7%	274	32,8%
	Strongly agree	61	7,3%	182	21,8%
Pro-environmentalist ideology	Strongly disagree	136	16,3%	36	4,3%
	Disagree	185	22,1%	87	10,4%
	Neutral	262	31,3%	266	31,9%
	Agree	206	24,6%	263	31,5%
	Strongly agree	47	5,6%	180	21,6%
	7	0	0,0%	1	0,1%
	9	0	0,0%	1	0,1%
Self-identification with nature	Strongly disagree	141	16,9%	25	3,1%
	Disagree	205	24,5%	59	7,2%
	Neutral	294	35,2%	188	23,0%
	Agree	150	17,9%	257	31,4%
	Strongly agree	46	5,5%	289	35,3%
	9	0	0,0%	1	0,1%
Self-identification with nature	Strongly disagree	117	14,0%	28	3,4%
	Disagree	176	21,1%	102	12,2%
	Neutral	246	29,4%	245	29,3%
	Agree	199	23,8%	260	31,1%
	Strongly agree	98	11,7%	200	24,0%
Pro-environmentalist ideology	Strongly disagree	55	6,6%	31	3,7%
	Disagree	142	17,0%	69	8,2%
	Neutral	227	27,2%	202	24,1%
	Agree	290	34,7%	292	34,9%
	Strongly agree	121	14,5%	243	29,0%
Pro-environmentalist ideology	Strongly disagree	24	2,9%	9	1,1%
	Disagree	50	6,0%	21	2,5%
	Neutral	149	17,8%	81	9,7%
	Agree	354	42,3%	260	31,1%
	Strongly agree	259	31,0%	465	55,6%
Self-identification with nature	Strongly disagree	67	8,0%	9	1,1%
	Disagree	118	14,1%	45	5,4%
	Neutral	297	35,5%	188	22,5%
	Agree	260	31,1%	349	41,8%
	Strongly agree	94	11,2%	243	29,1%
Positive feelings towards nature	Strongly disagree	97	11,6%	69	8,3%
	Disagree	123	14,7%	101	12,1%

	Neutral	189	22,6%	188	22,6%
	Agree	215	25,7%	209	25,1%
	Strongly agree	212	25,4%	266	31,9%
Interaction with nature	Strongly disagree	119	14,2%	42	5,1%
	Disagree	146	17,5%	71	8,6%
	Neutral	171	20,5%	143	17,4%
	Agree	228	27,3%	236	28,7%
	Strongly agree	172	20,6%	330	40,1%
Self-identification with nature	Strongly disagree	138	16,5%	32	3,8%
	Disagree	149	17,9%	67	8,1%
	Neutral	204	24,5%	176	21,2%
	Agree	213	25,5%	314	37,7%
	Strongly agree	130	15,6%	243	29,2%
Self-identification with nature	Strongly disagree	65	7,8%	26	3,1%
	Disagree	105	12,6%	66	7,9%
	Neutral	172	20,6%	167	20,0%
	Agree	297	35,5%	279	33,4%
	Strongly agree	197	23,6%	298	35,6%
Interaction with nature	Strongly disagree	90	10,8%	26	3,1%
	Disagree	113	13,5%	62	7,5%
	Neutral	235	28,1%	161	19,4%
	Agree	236	28,3%	273	32,9%
	Strongly agree	161	19,3%	307	37,0%
Positive feelings towards nature	Strongly disagree	63	7,5%	18	2,2%
	Disagree	92	11,0%	65	7,9%
	Neutral	157	18,8%	131	15,9%
	Agree	248	29,7%	203	24,6%
	Strongly agree	276	33,0%	409	49,5%
Interaction with nature	Strongly disagree	250	29,9%	52	6,3%
	Disagree	179	21,4%	85	10,3%
	Neutral	180	21,6%	189	22,9%
	Agree	160	19,2%	254	30,8%
	Strongly agree	66	7,9%	244	29,6%
Positive feelings towards nature	Strongly disagree	121	14,5%	39	4,7%
	Disagree	172	20,6%	100	12,0%
	Neutral	247	29,5%	241	28,9%
	Agree	203	24,3%	246	29,5%
	Strongly agree	93	11,1%	208	24,9%
Interaction with nature	Strongly disagree	157	18,8%	63	7,5%
	Disagree	145	17,3%	111	13,3%
	Neutral	169	20,2%	181	21,7%
	Agree	230	27,5%	241	28,9%
	Strongly agree	135	16,1%	239	28,6%
land	Germany	836	100,0%	0	0,0%



8.9 Results intention to act nature-orientated scale

		land			
		Germany		South Africa	
		Anzahl	Gültige Anzahl	Anzahl	Gültige Anzahl
			als Spalten%		als Spalten%
Behavioural intention to sity encounters with nature	Strongly disagree	62	7,4%	26	3,1%
	Disagree	153	18,3%	60	7,2%
	Neutral	255	30,6%	174	20,8%
	Agree	273	32,7%	340	40,7%
	Strongly agree	91	10,9%	235	28,1%
Behavioural intention to live in a rural or urban area	Strongly disagree	100	12,0%	64	7,6%
	Disagree	120	14,4%	124	14,8%
	Neutral	241	28,9%	184	22,0%
	Agree	207	24,8%	220	26,3%
	Strongly agree	166	19,9%	245	29,3%
Behavioural intention to en- gage actively in environ- mental behaviours	Strongly disagree	67	8,0%	26	3,1%
	Disagree	169	20,3%	82	9,9%
	Neutral	266	31,9%	209	25,2%
	Agree	252	30,2%	326	39,3%
	Strongly agree	80	9,6%	187	22,5%
Behavioural intention to live not in a city	Strongly disagree	185	22,2%	65	7,9%
	Disagree	212	25,4%	130	15,7%
	Neutral	222	26,6%	219	26,4%
	Agree	133	15,9%	228	27,5%
	Strongly agree	82	9,8%	186	22,5%
Behavioural intention to do camping and hiking	Strongly disagree	158	19,0%	53	6,4%
	Disagree	199	23,9%	79	9,5%
	Neutral	220	26,4%	168	20,2%
	Agree	183	22,0%	275	33,1%
	Strongly agree	73	8,8%	255	30,7%
Behavioural intention to do more gardening	Strongly disagree	219	26,3%	48	5,9%
	Disagree	198	23,7%	60	7,3%
	Neutral	195	23,4%	186	22,7%
	Agree	158	18,9%	290	35,5%
	Strongly agree	64	7,7%	234	28,6%

8.10 Results intention to act sustainable scale

		City Bremen / Durban			
		Germany		South Africa	
		Anzahl	Gültige Anzahl als Zeilen% in Schicht	Anzahl	Gültige Anzahl als Zeilen% in Schicht
Intended responsible behaviour to reuse things	Strongly disagree	48	29,8%	113	70,2%
	Disagree	76	28,5%	191	71,5%
	Neutral	206	45,2%	250	54,8%
	Agree	265	55,9%	209	44,1%
	Strongly agree	224	75,9%	71	24,1%
Intended responsible behaviour to reject plastic bags	Strongly disagree	72	26,4%	201	73,6%
	Disagree	118	38,9%	185	61,1%
	Neutral	218	50,0%	218	50,0%
	Agree	244	63,9%	138	36,1%
	Strongly agree	172	65,2%	92	34,8%
Intended responsible behaviour to talk more about environmental issues	9	1	100,0%	0	0,0%
	Strongly disagree	45	15,4%	247	84,6%
	Disagree	95	32,3%	199	67,7%
	Neutral	207	49,2%	214	50,8%
	Agree	279	68,7%	127	31,3%
Intended responsible behaviour to recycle items	Strongly disagree	205	81,3%	47	18,7%
	Disagree	29	16,3%	149	83,7%
	Neutral	74	31,8%	159	68,2%
	Agree	208	51,5%	196	48,5%
	Strongly agree	277	56,1%	217	43,9%
Intended responsible behaviour to spend more time in nature	Strongly disagree	241	68,1%	113	31,9%
	Disagree	25	25,5%	73	74,5%
	Neutral	60	29,4%	144	70,6%
	Agree	222	54,5%	185	45,5%
	Strongly agree	287	50,4%	282	49,6%
Intended responsible behaviour to make personal sacrifices for the sake of environmental protection	Strongly disagree	238	61,3%	150	38,7%
	Disagree	24	16,1%	125	83,9%
	Neutral	59	26,3%	165	73,7%
	Agree	190	43,9%	243	56,1%
	Strongly agree	303	58,5%	215	41,5%
Intended responsible behaviour to influence future events	Strongly disagree	259	74,9%	87	25,1%
	Disagree	26	23,2%	86	76,8%
		50	28,2%	127	71,8%

ryday	Neutral	164	40,3%	243	59,7%
	Agree	315	54,8%	260	45,2%
	Strongly agree	276	69,9%	119	30,1%
	6	1	100,0%	0	0,0%
	9	1	100,0%	0	0,0%

8.11 Results two-sample t-test of all scales

Gruppenstatistik

	land	H	Mittelwert	Standardabweichung	Standardfehler Mittelwert
CNS	Germany	836	3,1445	,64119	,02218
	South Africa	843	3,5884	,54403	,01874
EID	Germany	836	3,1506	,71586	,02476
	South Africa	846	3,6872	,65291	,02245
NaP	Germany	835	3,7425	1,02180	,03536
	South Africa	821	2,9409	1,09740	,03830
IntentionToAct1	Germany	835	3,0423	,47453	,01642
	South Africa	839	3,2319	,43130	,01489
IntentionToAct2	Germany	834	2,8715	,90261	,03125
	South Africa	835	3,6723	,74935	,02593
SubNorF	Germany	836	3,7165	,87055	,03011
	South Africa	832	3,7398	,81864	,02838
SubNorS	Germany	835	2,7593	,96994	,03357
	South Africa	828	3,2603	1,03018	,03580
SubNorP	Germany	836	3,2105	1,00802	,03486
	South Africa	825	3,5073	,97633	,03399
NaCon	Germany	836	3,7494	,70859	,02451
	South Africa	846	3,2772	,79468	,02732
freq_nat	Germany	836	3,6575	,49054	,01697
	South Africa	846	3,5394	,61085	,02100
int_nat	Germany	836	1,3493	,99085	,03427
	South Africa	846	1,6785	1,17954	,04055
INT_EID_CNS	Germany	836	10,2544	4,02397	,13917

South Africa	843	13,4463	3,86632	,13316
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Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit		
		F	Sig.	t	df	Sig. (2-seitig)
CNS	Varianzgleichheit angenommen	19,800	,000	-15,301	1677	,000
	Varianzgleichheit nicht angenommen			-15,290	1629,311	,000
EID	Varianzgleichheit angenommen	8,192	,004	-16,066	1680	,000
	Varianzgleichheit nicht angenommen			-16,057	1662,150	,000
NaP	Varianzgleichheit angenommen	6,367	,012	15,387	1654	,000
	Varianzgleichheit nicht angenommen			15,378	1641,254	,000
IntentionTo-Act1	Varianzgleichheit angenommen	7,673	,006	-8,558	1672	,000
	Varianzgleichheit nicht angenommen			-8,556	1655,449	,000
IntentionTo-Act2	Varianzgleichheit angenommen	36,629	,000	-19,719	1667	,000
	Varianzgleichheit nicht angenommen			-19,717	1611,750	,000
SubNorF	Varianzgleichheit angenommen	4,620	,032	-,562	1666	,574
	Varianzgleichheit nicht angenommen			-,563	1660,677	,574
SubNorS	Varianzgleichheit angenommen	3,300	,069	-10,211	1661	,000

	Varianzgleichheit nicht angenommen			-10,208	1653,224	,000
SubNorP	Varianzgleichheit ange- nommen	2,395	,122	-6,093	1659	,000
	Varianzgleichheit nicht angenommen			-6,094	1658,421	,000
NaCon	Varianzgleichheit ange- nommen	22,146	,000	12,857	1680	,000
	Varianzgleichheit nicht angenommen			12,866	1662,587	,000
freq_nat	Varianzgleichheit ange- nommen	52,217	,000	4,369	1680	,000
	Varianzgleichheit nicht angenommen			4,374	1612,718	,000
int_nat	Varianzgleichheit ange- nommen	28,034	,000	-6,194	1680	,000
	Varianzgleichheit nicht angenommen			-6,200	1637,630	,000
INT_EID_CNS	Varianzgleichheit ange- nommen	,518	,472	-16,574	1677	,000
	Varianzgleichheit nicht angenommen			-16,572	1673,100	,000

Test bei unabhängigen Stichproben

			T-Test für die Mittelwertgleichheit			
			Mittelwertdif- ferenz	Standard- fehlerdifferenz	95% Konfidenzintervall der Differenz	
					Unterer	Oberer
CNS	Varianzgleichheit ange- nommen	-,44391	,02901	-,50082	-,38701	
	Varianzgleichheit nicht angenommen	-,44391	,02903	-,50086	-,38697	
EID	Varianzgleichheit ange- nommen	-,53664	,03340	-,60215	-,47112	
	Varianzgleichheit nicht angenommen	-,53664	,03342	-,60219	-,47109	
NaP	Varianzgleichheit ange- nommen	,80159	,05210	,69941	,90377	
	Varianzgleichheit nicht angenommen	,80159	,05213	,69935	,90383	
IntentionToAct1	Varianzgleichheit ange- nommen	-,18967	,02216	-,23314	-,14620	
	Varianzgleichheit nicht angenommen	-,18967	,02217	-,23315	-,14619	
IntentionToAct2	Varianzgleichheit ange- nommen	-,80075	,04061	-,88040	-,72111	
	Varianzgleichheit nicht angenommen	-,80075	,04061	-,88041	-,72109	
SubNorF	Varianzgleichheit ange- nommen	-,02328	,04138	-,10444	,05789	
	Varianzgleichheit nicht angenommen	-,02328	,04138	-,10443	,05788	
SubNorS	Varianzgleichheit ange- nommen	-,50098	,04906	-,59722	-,40475	

	Varianzgleichheit angenommen	nicht	-,50098	,04908	-,59724	-,40473
SubNorP	Varianzgleichheit angenommen	ange-	-,29675	,04870	-,39227	-,20122
	Varianzgleichheit angenommen	nicht	-,29675	,04869	-,39225	-,20124
NaCon	Varianzgleichheit angenommen	ange-	,47222	,03673	,40018	,54425
	Varianzgleichheit angenommen	nicht	,47222	,03670	,40023	,54420
freq_nat	Varianzgleichheit angenommen	ange-	,11809	,02703	,06507	,17112
	Varianzgleichheit angenommen	nicht	,11809	,02700	,06514	,17105
int_nat	Varianzgleichheit angenommen	ange-	-,32920	,05315	-,43345	-,22496
	Varianzgleichheit angenommen	nicht	-,32920	,05309	-,43334	-,22507
INT_EID_CNS	Varianzgleichheit angenommen	ange-	-3,19196	,19258	-3,56970	-2,81423
	Varianzgleichheit angenommen	nicht	-3,19196	,19262	-3,56976	-2,81417

8.12 Results two-sample test of all scales (sex, grade, socio-economic status)

Gruppenstatistik

	Sex	H	Mittelwert	Standardabweichung	Standardfehler Mittelwert
CNS	Male	781	3,3383	,64974	,02325
	Female	898	3,3926	,61990	,02069
EID	Male	782	3,3370	,73134	,02615
	Female	900	3,4930	,73170	,02439
NaP	Male	777	3,4142	1,15430	,04141
	Female	879	3,2840	1,11079	,03747
IntentionToAct1	Male	776	3,1119	,46563	,01672
	Female	898	3,1594	,45995	,01535
IntentionToAct2	Male	776	3,1738	,90351	,03243
	Female	893	3,3576	,92778	,03105
SubNorF	Male	773	3,7283	,82383	,02963
	Female	895	3,7279	,86312	,02885
SubNorS	Male	774	2,9128	1,03582	,03723
	Female	889	3,0922	1,02003	,03421
SubNorP	Male	773	3,3098	,99906	,03593
	Female	888	3,3998	1,00539	,03374
NaCon	Male	782	3,4565	,78947	,02823
	Female	900	3,5600	,78599	,02620
freq_nat	Male	782	3,6662	,52441	,01875
	Female	900	3,5389	,57818	,01927
int_nat	Male	782	1,3922	1,07359	,03839
	Female	900	1,6215	1,11558	,03719
INT_EID_CNS	Male	781	11,4970	4,24806	,15201

Female	898	12,1701	4,23904	,14146
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Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit		
		F	Sig.	t	df	Sig. (2-seitig)
CNS	Varianzgleichheit angenommen	,897	,344	-1,749	1677	,080
	Varianzgleichheit nicht angenommen			-1,744	1620,628	,081
EID	Varianzgleichheit angenommen	,010	,922	-4,362	1680	,000
	Varianzgleichheit nicht angenommen			-4,362	1647,588	,000
NaP	Varianzgleichheit angenommen	,687	,407	2,337	1654	,020
	Varianzgleichheit nicht angenommen			2,332	1611,833	,020
IntentionTo-Act1	Varianzgleichheit angenommen	,707	,401	-2,095	1672	,036
	Varianzgleichheit nicht angenommen			-2,093	1631,043	,036
IntentionTo-Act2	Varianzgleichheit angenommen	,430	,512	-4,087	1667	,000
	Varianzgleichheit nicht angenommen			-4,095	1645,557	,000
SubNorF	Varianzgleichheit angenommen	,448	,503	,010	1666	,992
	Varianzgleichheit nicht angenommen			,010	1649,447	,992
SubNorS	Varianzgleichheit angenommen	,205	,651	-3,553	1661	,000
	Varianzgleichheit nicht angenommen			-3,549	1622,510	,000

SubNorP	Varianzgleichheit ange- nommen	,001	,971	-1,824	1659	,068
	Varianzgleichheit nicht angenommen			-1,825	1630,340	,068
NaCon	Varianzgleichheit ange- nommen	,015	,903	-2,688	1680	,007
	Varianzgleichheit nicht angenommen			-2,687	1645,336	,007
freq_nat	Varianzgleichheit ange- nommen	16,258	,000	4,704	1680	,000
	Varianzgleichheit nicht angenommen			4,736	1676,898	,000
int_nat	Varianzgleichheit ange- nommen	2,012	,156	-4,279	1680	,000
	Varianzgleichheit nicht angenommen			-4,291	1662,572	,000
INT_EID_CNS	Varianzgleichheit ange- nommen	,001	,970	-3,242	1677	,001
	Varianzgleichheit nicht angenommen			-3,242	1643,893	,001

Test bei unabhängigen Stichproben

			T-Test für die Mittelwertgleichheit			
			Mittelwertdif- ferenz	Standard- fehlerdifferenz	95% Konfidenzintervall der Differenz	
					Unterer	Oberer
CNS	Varianzgleichheit ange- nommen	-,05426	,03102	-,11510	,00658	
	Varianzgleichheit nicht angenommen	-,05426	,03112	-,11530	,00678	
EID	Varianzgleichheit ange- nommen	-,15600	,03576	-,22614	-,08586	
	Varianzgleichheit nicht angenommen	-,15600	,03576	-,22614	-,08586	
NaP	Varianzgleichheit ange- nommen	,13022	,05571	,02095	,23950	
	Varianzgleichheit nicht angenommen	,13022	,05584	,02069	,23976	
IntentionToAct1	Varianzgleichheit ange- nommen	-,04750	,02267	-,09197	-,00303	
	Varianzgleichheit nicht angenommen	-,04750	,02269	-,09201	-,00299	
IntentionToAct2	Varianzgleichheit ange- nommen	-,18384	,04498	-,27207	-,09561	
	Varianzgleichheit nicht angenommen	-,18384	,04490	-,27191	-,09578	
SubNorF	Varianzgleichheit ange- nommen	,00040	,04150	-,08099	,08179	
	Varianzgleichheit nicht angenommen	,00040	,04136	-,08072	,08152	
SubNorS	Varianzgleichheit ange- nommen	-,17945	,05051	-,27852	-,08038	
	Varianzgleichheit nicht angenommen	-,17945	,05056	-,27862	-,08027	

SubNorP	Varianzgleichheit angenommen	ange-	-,08994	,04931	-,18666	,00678
	Varianzgleichheit angenommen	nicht	-,08994	,04929	-,18662	,00674
NaCon	Varianzgleichheit angenommen	ange-	-,10348	,03850	-,17900	-,02796
	Varianzgleichheit angenommen	nicht	-,10348	,03852	-,17902	-,02793
freq_nat	Varianzgleichheit angenommen	ange-	,12735	,02707	,07425	,18046
	Varianzgleichheit angenommen	nicht	,12735	,02689	,07461	,18009
int_nat	Varianzgleichheit angenommen	ange-	-,22932	,05359	-,33444	-,12421
	Varianzgleichheit angenommen	nicht	-,22932	,05345	-,33416	-,12449
INT_EID_CNS	Varianzgleichheit angenommen	ange-	-,67317	,20762	-1,08038	-,26595
	Varianzgleichheit angenommen	nicht	-,67317	,20765	-1,08045	-,26589

Gruppenstatistik

Socio-economic factor		H	Mittelwert	Standardabweichung	Standardfehler Mittelwert
CNS	Strong	896	3,4222	,63935	,02136
	Weak	783	3,3045	,62306	,02227
EID	Strong	897	3,4857	,72119	,02408
	Weak	785	3,3459	,74489	,02659
NaP	Strong	892	3,4496	1,11243	,03725
	Weak	764	3,2231	1,14512	,04143
IntentionToAct1	Strong	895	3,1796	,45546	,01522
	Weak	779	3,0888	,46725	,01674
IntentionToAct2	Strong	894	3,3609	,91013	,03044
	Weak	775	3,1697	,92315	,03316
SubNorF	Strong	892	3,7500	,82044	,02747
	Weak	776	3,7030	,87199	,03130
SubNorS	Strong	891	2,9714	,99832	,03345
	Weak	772	3,0518	1,06648	,03838
SubNorP	Strong	893	3,2788	1,02112	,03417
	Weak	768	3,4499	,97446	,03516
NaCon	Strong	897	3,5242	,77868	,02600
	Weak	785	3,4978	,80103	,02859
freq_nat	Strong	897	3,5095	,57169	,01909
	Weak	785	3,6994	,52265	,01865
int_nat	Strong	897	1,5845	1,06478	,03555
	Weak	785	1,4352	1,13830	,04063
INT_EID_CNS	Strong	896	12,2783	4,33871	,14495
	Weak	783	11,3749	4,10772	,14680

Test bei unabhängigen Stichproben

		Levene-Test der Varianzgleichheit		T-Test für die Mittelwertgleichheit		
		F	Sig.	t	df	Sig. (2-seitig)
CNS	Varianzgleichheit angenommen	1,824	,177	3,807	1677	,000
	Varianzgleichheit nicht angenommen			3,814	1657,235	,000
EID	Varianzgleichheit angenommen	,254	,614	3,907	1680	,000
	Varianzgleichheit nicht angenommen			3,898	1635,092	,000
NaP	Varianzgleichheit angenommen	,088	,766	4,076	1654	,000
	Varianzgleichheit nicht angenommen			4,067	1599,865	,000
IntentionTo-Act1	Varianzgleichheit angenommen	,736	,391	4,016	1672	,000
	Varianzgleichheit nicht angenommen			4,009	1627,977	,000
IntentionTo-Act2	Varianzgleichheit angenommen	,349	,555	4,253	1667	,000
	Varianzgleichheit nicht angenommen			4,249	1626,799	,000
SubNorF	Varianzgleichheit angenommen	3,671	,056	1,134	1666	,257
	Varianzgleichheit nicht angenommen			1,129	1601,941	,259
SubNorS	Varianzgleichheit angenommen	8,700	,003	-1,587	1661	,113

	Varianzgleichheit nicht angenommen			-1,580	1591,456	,114
SubNorP	Varianzgleichheit ange- nommen	2,144	,143	-3,476	1659	,001
	Varianzgleichheit nicht angenommen			-3,488	1641,159	,000
NaCon	Varianzgleichheit ange- nommen	1,570	,210	,686	1680	,493
	Varianzgleichheit nicht angenommen			,685	1637,177	,493
freq_nat	Varianzgleichheit ange- nommen	15,270	,000	-7,072	1680	,000
	Varianzgleichheit nicht angenommen			-7,115	1676,787	,000
int_nat	Varianzgleichheit ange- nommen	3,693	,055	2,778	1680	,006
	Varianzgleichheit nicht angenommen			2,765	1615,521	,006
INT_EID_CNS	Varianzgleichheit ange- nommen	3,336	,068	4,363	1677	,000
	Varianzgleichheit nicht angenommen			4,379	1666,267	,000

			T-Test für die Mittelwertgleichheit			
			Mittelwertdifferenz	Standardfehlerdifferenz	95% Konfidenzintervall der Differenz	
					Unterer	Oberer
CNS	Varianzgleichheit angenommen	,11767	,03091	,05705	,17829	
	Varianzgleichheit nicht angenommen	,11767	,03085	,05715	,17819	
EID	Varianzgleichheit angenommen	,13983	,03579	,06962	,21003	
	Varianzgleichheit nicht angenommen	,13983	,03587	,06947	,21018	
NaP	Varianzgleichheit angenommen	,22656	,05559	,11753	,33558	
	Varianzgleichheit nicht angenommen	,22656	,05571	,11728	,33583	
IntentionToAct1	Varianzgleichheit angenommen	,09072	,02259	,04642	,13503	
	Varianzgleichheit nicht angenommen	,09072	,02263	,04634	,13510	
IntentionToAct2	Varianzgleichheit angenommen	,19125	,04497	,10305	,27945	
	Varianzgleichheit nicht angenommen	,19125	,04501	,10296	,27954	
SubNorF	Varianzgleichheit angenommen	,04704	,04147	-,03430	,12838	
	Varianzgleichheit nicht angenommen	,04704	,04165	-,03465	,12872	
SubNorS	Varianzgleichheit angenommen	-,08043	,05067	-,17982	,01895	
	Varianzgleichheit nicht angenommen	-,08043	,05091	-,18029	,01943	

SubNorP	Varianzgleichheit angenommen	ange-	-,17103	,04920	-,26754	-,07453
	Varianzgleichheit angenommen	nicht	-,17103	,04903	-,26720	-,07486
NaCon	Varianzgleichheit angenommen	ange-	,02648	,03857	-,04918	,10213
	Varianzgleichheit angenommen	nicht	,02648	,03864	-,04932	,10227
freq_nat	Varianzgleichheit angenommen	ange-	-,18989	,02685	-,24255	-,13723
	Varianzgleichheit angenommen	nicht	-,18989	,02669	-,24224	-,13754
int_nat	Varianzgleichheit angenommen	ange-	,14930	,05375	,04388	,25472
	Varianzgleichheit angenommen	nicht	,14930	,05399	,04341	,25519
INT_EID_CNS	Varianzgleichheit angenommen	ange-	,90338	,20706	,49725	1,30950
	Varianzgleichheit angenommen	nicht	,90338	,20630	,49874	1,30801

8.13 Results one way ANOVA of all scale (grade)

Deskriptive Statistik

		H	Mittelwert	Standardabweichung	Standardfehler	95% Konfidenzintervall für Mittelwert	
						Untergrenze	Obergrenze
CNS	Grade 8	587	3,3773	,64089	,02645	3,3253	3,4292
	Grade 9	569	3,3797	,59794	,02507	3,3305	3,4290
	Grade 10	523	3,3427	,66520	,02909	3,2856	3,3998
	Gesamtsumme	1679	3,3673	,63434	,01548	3,3370	3,3977
EID	Grade 8	588	3,4155	,75984	,03134	3,3540	3,4771
	Grade 9	570	3,4465	,69071	,02893	3,3897	3,5033
	Grade 10	524	3,3977	,75506	,03299	3,3329	3,4625
	Gesamtsumme	1682	3,4205	,73544	,01793	3,3853	3,4557
NaP	Grade 8	576	3,2837	1,15065	,04794	3,1896	3,3779
	Grade 9	560	3,3330	1,11540	,04713	3,2405	3,4256
	Grade 10	520	3,4261	1,12926	,04952	3,3288	3,5234
	Gesamtsumme	1656	3,3451	1,13294	,02784	3,2905	3,3997
IntentionTo-Act1	Grade 8	586	3,1247	,45695	,01888	3,0877	3,1618
	Grade 9	566	3,1654	,44440	,01868	3,1287	3,2021
	Grade 10	522	3,1211	,48850	,02138	3,0791	3,1631
	Gesamtsumme	1674	3,1373	,46306	,01132	3,1151	3,1595
IntentionTo-Act2	Grade 8	583	3,3162	,91114	,03774	3,2421	3,3903
	Grade 9	565	3,2802	,89579	,03769	3,2062	3,3543
	Grade 10	521	3,2140	,95659	,04191	3,1317	3,2963
	Gesamtsumme	1669	3,2721	,92088	,02254	3,2279	3,3163

SubNorF	Grade 8	580	3,7578	,84785	,03521	3,6886	3,8269
	Grade 9	566	3,7580	,81668	,03433	3,6905	3,8254
	Grade 10	522	3,6628	,86924	,03805	3,5881	3,7376
	Gesam- tsumme	1668	3,7281	,84488	,02069	3,6875	3,7687
SubNorS	Grade 8	579	3,0959	1,05385	,04380	3,0098	3,1819
	Grade 9	564	3,0275	,97557	,04108	2,9468	3,1082
	Grade 10	520	2,8913	1,05450	,04624	2,8005	2,9822
	Gesam- tsumme	1663	3,0087	1,03099	,02528	2,9591	3,0583
SubNorP	Grade 8	582	3,3110	,99760	,04135	3,2298	3,3922
	Grade 9	561	3,3797	,98301	,04150	3,2982	3,4612
	Grade 10	518	3,3871	1,03062	,04528	3,2981	3,4760
	Gesam- tsumme	1661	3,3579	1,00315	,02461	3,3096	3,4062
NaCon	Grade 8	588	3,4158	,79710	,03287	3,3513	3,4804
	Grade 9	570	3,5167	,77325	,03239	3,4531	3,5803
	Grade 10	524	3,6145	,78527	,03430	3,5471	3,6819
	Gesam- tsumme	1682	3,5119	,78907	,01924	3,4742	3,5496
freq_nat	Grade 8	588	3,6179	,56180	,02317	3,5724	3,6634
	Grade 9	570	3,6111	,57126	,02393	3,5641	3,6581
	Grade 10	524	3,5617	,53575	,02340	3,5157	3,6077
	Gesam- tsumme	1682	3,5981	,55730	,01359	3,5714	3,6247
int_nat	Grade 8	588	1,5845	1,15070	,04745	1,4913	1,6777
	Grade 9	570	1,5538	1,11754	,04681	1,4619	1,6457
	Grade 10	524	1,3944	1,01784	,04446	1,3071	1,4818
	Gesam- tsumme	1682	1,5149	1,10189	,02687	1,4622	1,5676

Deskriptive Statistik

		Minimum	Maximum
CNS	Grade 8	,62	5,00
	Grade 9	,92	6,08
	Grade 10	1,46	4,85
	Gesamtsumme	,62	6,08
EID	Grade 8	1,25	5,00
	Grade 9	1,25	5,00
	Grade 10	1,00	5,00
	Gesamtsumme	1,00	5,00
NaP	Grade 8	,00	6,50
	Grade 9	,00	6,57
	Grade 10	,14	6,79
	Gesamtsumme	,00	6,79
IntentionToAct1	Grade 8	,30	4,30
	Grade 9	1,80	4,40
	Grade 10	1,40	4,30
	Gesamtsumme	,30	4,40
IntentionToAct2	Grade 8	1,00	5,33
	Grade 9	1,00	5,00
	Grade 10	1,00	5,00
	Gesamtsumme	1,00	5,33
SubNorF	Grade 8	1,00	5,00
	Grade 9	1,00	5,00
	Grade 10	1,00	5,00
	Gesamtsumme	1,00	5,00

SubNorS	Grade 8	1,00	5,00
	Grade 9	1,00	5,00
	Grade 10	1,00	5,00
	Gesamtsumme	1,00	5,00
SubNorP	Grade 8	1,00	5,00
	Grade 9	1,00	5,00
	Grade 10	1,00	5,00
	Gesamtsumme	1,00	5,00
NaCon	Grade 8	1,00	5,00
	Grade 9	1,25	5,00
	Grade 10	1,00	5,00
	Gesamtsumme	1,00	5,00
freq_nat	Grade 8	1,67	5,00
	Grade 9	1,67	5,00
	Grade 10	2,00	5,00
	Gesamtsumme	1,67	5,00
int_nat	Grade 8	,00	5,00
	Grade 9	,00	4,67
	Grade 10	,00	5,00
	Gesamtsumme	,00	5,00

Varianzhomogenitätstest

	Levene-Statistik	df1	df2	Sig.
CNS	4,847	2	1676	,008
EID	3,200	2	1679	,041
NaP	,221	2	1653	,802
IntentionToAct1	1,986	2	1671	,138
IntentionToAct2	3,087	2	1666	,046
SubNorF	,906	2	1665	,405
SubNorS	3,395	2	1660	,034
SubNorP	,587	2	1658	,556
NaCon	,219	2	1679	,804
freq_nat	,391	2	1679	,677
int_nat	4,870	2	1679	,008

ANOVA

		Quadratsumme	df	Mittel der Quadrate	F
CNS	Zwischen Gruppen	,463	2	,232	,575
	Innerhalb der Gruppen	674,746	1676	,403	
	Gesamtsumme	675,209	1678		
EID	Zwischen Gruppen	,671	2	,335	,620
	Innerhalb der Gruppen	908,544	1679	,541	
	Gesamtsumme	909,215	1681		
NaP	Zwischen Gruppen	5,662	2	2,831	2,209

	Innerhalb der Gruppen	2118,603	1653	1,282	
	Gesamtsumme	2124,265	1655		
IntentionToAct1	Zwischen Gruppen	,676	2	,338	1,577
	Innerhalb der Gruppen	358,061	1671	,214	
	Gesamtsumme	358,737	1673		
IntentionToAct2	Zwischen Gruppen	2,928	2	1,464	1,728
	Innerhalb der Gruppen	1411,568	1666	,847	
	Gesamtsumme	1414,496	1668		
SubNorF	Zwischen Gruppen	3,238	2	1,619	2,271
	Innerhalb der Gruppen	1186,713	1665	,713	
	Gesamtsumme	1189,951	1667		
SubNorS	Zwischen Gruppen	11,758	2	5,879	5,561
	Innerhalb der Gruppen	1754,865	1660	1,057	
	Gesamtsumme	1766,624	1662		
SubNorP	Zwischen Gruppen	1,987	2	,994	,987
	Innerhalb der Gruppen	1668,481	1658	1,006	
	Gesamtsumme	1670,468	1660		
NaCon	Zwischen Gruppen	10,958	2	5,479	8,882
	Innerhalb der Gruppen	1035,679	1679	,617	
	Gesamtsumme	1046,637	1681		
freq_nat	Zwischen Gruppen	1,021	2	,511	1,646
	Innerhalb der Gruppen	521,070	1679	,310	
	Gesamtsumme	522,092	1681		
int_nat	Zwischen Gruppen	11,317	2	5,658	4,681
	Innerhalb der Gruppen	2029,701	1679	1,209	

Gesamtsumme	2041,017	1681		
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NOVA

		Sig.
CNS	Zwischen Gruppen	,563
	Innerhalb der Gruppen	
	Gesamtsumme	
EID	Zwischen Gruppen	,538
	Innerhalb der Gruppen	
	Gesamtsumme	
NaP	Zwischen Gruppen	,110
	Innerhalb der Gruppen	
	Gesamtsumme	
IntentionToAct1	Zwischen Gruppen	,207
	Innerhalb der Gruppen	
	Gesamtsumme	
IntentionToAct2	Zwischen Gruppen	,178
	Innerhalb der Gruppen	
	Gesamtsumme	
SubNorF	Zwischen Gruppen	,103
	Innerhalb der Gruppen	
	Gesamtsumme	
SubNorS	Zwischen Gruppen	,004
	Innerhalb der Gruppen	

	Gesamtsumme	
SubNorP	Zwischen Gruppen	,373
	Innerhalb der Gruppen	
	Gesamtsumme	
NaCon	Zwischen Gruppen	,000
	Innerhalb der Gruppen	
	Gesamtsumme	
freq_nat	Zwischen Gruppen	,193
	Innerhalb der Gruppen	
	Gesamtsumme	
int_nat	Zwischen Gruppen	,009
	Innerhalb der Gruppen	
	Gesamtsumme	

8.14 Factor analysis

8.14.1 Connectedness to nature scale

Rotierte Komponentenmatrix^a

	Komponente	
	1	2
Self-identification with nature	,591	
Self-identification with nature	,704	
Self-identification with nature	,608	
Emotional bonding with nature		,703
Self-identification with nature	,604	
Emotional bonding with nature	,626	
Self-identification with nature	,683	
Self-identification with nature	,593	
Self-identification with nature	,708	
Self-identification with nature	,638	
Self-identification with nature	,700	
Self-identification with nature		-,636
Self-identification with nature		,625

Extraktionsmethode: Analyse der Hauptkomponente.

Rotationsmethode: Varimax mit Kaiser-Normalisierung.

a. Rotation konvergierte in 3 Iterationen.

8.14.2 Environmental identity scale

Rotierte Komponentenmatrix^a

	Komponente			
	1	2	3	4
Interaction with nature				,827
Pro-environmentalist ideology	,573			,457
Self-identification with nature	,560			
Pro-environmentalist ideology	,520			
Positive feelings towards nature				,561
Positive feelings towards nature				
Pro-environmentalist ideology	,599	,434		
Pro-environmentalist ideology			,524	
Self-identification with nature	,545	,416		
Pro-environmentalist ideology	,664			
Self-identification with nature	,607	,459		
Self-identification with nature	,548			
Pro-environmentalist ideology	,652			
Pro-environmentalist ideology			,605	
Self-identification with nature	,490	,465		
Positive feelings towards nature			,542	
Interaction with nature		,592		
Self-identification with nature		,600		
Self-identification with nature			,530	
Interaction with nature		,609		
Positive feelings towards nature			,708	

Interaction with nature		,665	
Positive feelings towards nature		,485	
Interaction with nature		,554	

Extraktionsmethode: Analyse der Hauptkomponente.

Rotationsmethode: Varimax mit Kaiser-Normalisierung.

a. Rotation konvergierte in 10 Iterationen.

8.14.3 Intention to act nature-orientated scale

Komponentenmatrix^a

	Komponente
	1
Intended responsible behaviour to resuse things	,709
Intended responsible behaviour to reject plastic bags	,648
Intended responsible behaviour to talk more about enviornmental issues	,739
Intended responsible behaviour recycle items	,752
Intended responsible behaviour to spend more time in nature	,608
Intended responsible behaviour to make personal sacrifices for the sake of environmental protection	,779
Intended responsible behaviour to influence future everyday	,762

Extraktionsmethode: Analyse der Hauptkomponente.

a. 1 Komponenten extrahiert.

8.14.4 Intention to act sustainable scale

Komponentenmatrix^a

	Komponente
	1
Intended responsible behaviour to resuse things	,709
Intended responsible behaviour to reject plastic bags	,648
Intended responsible behaviour to talk more about enviornmental issues	,739
Intended responsible behaviour recycle items	,752
Intended responsible behaviour to spend more time in nature	,608
Intended responsible behaviour to make personal sacrifices for the sake of environmental protection	,779
Intended responsible behaviour to influence future everyday	,762

Extraktionsmethode: Analyse der Hauptkomponente.

a. 1 Komponenten extrahiert.

8.15 English version of the questionnaire



Institute of Science Education
Biology Education

Ansgar Gräntzdörffer

Questionnaire

Dear learners,

This questionnaire is part of my doctoral dissertation at the Institute of Didactics of Natural Sciences at the University of Bremen in Germany.

With this survey I want to find out more about your attitudes, feelings and thoughts regarding nature and the environment. Please take your time and answer the given questions truthfully. In this context there is no right or wrong answer to the following questions. Keep in mind that you participate voluntarily. All information provided will be treated as confidential.

Thank you very much for your attention and your time!

Contact and ©: Professor Doris Elster, IDN, University of Bremen,

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tel: +49 421 218 63260, fax: +49 421 218 63274, e-mail: doris.elster@uni-bremen.de

Please read the following question. Think carefully and try to answer as precisely as possible.

1. What is nature for you?

Please answer the following questions regarding your contact to nature.

2. Do you engage in any activities together with your **family, where you are in contact with nature (woods, mountains, field, lake, and ocean)?**

- Yes
- No



If you answered no, continue with question no. 7!

3. What activities in nature do you engage with, together with your family?

4. Where do you do these activities in nature? (woods, mountains, field, lake, ocean)

5. How often on average did you do such activities in nature during the past year?

- Daily
- At least once a week
- At least once a month
- Less often
- Never

6. How many hours on average did you invest in such activities in nature? (How long?)

- Less than 1/2 an hour
- 1/2 an hour to 1 hour
- 2 – 3 hours
- 4 – 5 hours
- More than 5 hours

7. Do you engage in any activities together with your **friends, where you are in contact with nature (woods, mountains, field, lake, and ocean)?**

- Yes
- No



If you answered no, continue to question no. 12!

8. In which activities in nature do you engage together with your friends?

9. Where do you do these activities in nature?

10. How often on the average did you do such activities in nature during the past year?

- Daily
- At least once a week
- At least once a month
- Less often
- Never

11. How many hours on the average did you invest in such activities in nature?

- Less than 1/2 an hour
- 1/2 an hour to 1 hour
- 2 – 3 hours
- 4 – 5 hours
- More than 5 hours

12. Do you engage in any activities together with your **school**, where you are in contact with nature (woods, mountains, field, lake, and ocean)?

- Yes
- No

 **If you answered no, continue with question no. 17!**

13. In which activities in nature do you engage together with your school? Write the answer in the space below.

14. Where do you do these activities in nature?

15. How often on the average did you do such activities in nature during the past year?

- Daily
- At least once a week
- At least once a month
- Less often
- Never

16. How many hours on the average did you invest in such activities in nature?

- Less than 1/2 an hour
- 1/2 an hour to 1 hour
- 2 – 3 hours
- 4 – 5 hours
- More than 5 hours

17. How connected are you to nature? Please answer the question using the following scale, whereas 10 mean “very high” and 1 “very low”. Tick off!

- 10 = very high
- 9
- 8
- 7
- 6
- 5
- 4
- 3
- 2
- 1 = very low

18. Who are the close people who accompany you during your time spent in nature? Please answer the following questions using the scale on the right side.

	strongly agree	agree	neutral	disagree	strongly disagree
(1) The time spent with my family in contact with nature is very important for me.	<input type="radio"/>				
(2) My family encourages the time I spend in nature.	<input type="radio"/>				
(3) The time spent with my friends in contact with nature is very important for me.	<input type="radio"/>				
(4) Friends who mean the most to me encourage my time spent in nature.	<input type="radio"/>				
(5) The time spent with my teachers in contact with nature is very important for me.	<input type="radio"/>				
(6) My teachers encourage the time I spend in nature.	<input type="radio"/>				
(7) During my childhood I spent a large part of my time in direct contact with nature.	<input type="radio"/>				
(8) During my childhood I spent a large part of my time in direct contact with nature with my family involved.	<input type="radio"/>				
(9) During my childhood I spent a large part of my time in direct contact with nature with my friends involved.	<input type="radio"/>				
(10) During my childhood I spent a large part of my time in direct contact with nature with my teachers involved.	<input type="radio"/>				

19. Please answer the following questions in terms of the way you generally feel. There are no right or wrong answers.

		strongly agree	agree	neutral	disagree	strongly disagree
(1)	I often feel a sense of oneness with the natural world around me.	<input type="radio"/>				
(2)	I think of the natural world as a community to which I belong.	<input type="radio"/>				
(3)	I recognize and appreciate the intelligence of other living organisms.	<input type="radio"/>				
(4)	I often feel disconnected from nature.	<input type="radio"/>				
(5)	When I think of my life, I imagine myself to be part of a larger cyclical process of living.	<input type="radio"/>				
(6)	I often feel a kinship with animals and plants.	<input type="radio"/>				
(7)	I feel as though I belong to the Earth as equally as it belongs to me.	<input type="radio"/>				
(8)	I have a deep understanding of how my actions affect the natural world.	<input type="radio"/>				
(9)	I often feel as part of the web of life.	<input type="radio"/>				
(10)	I feel that all inhabitants of Earth, human, and non-human, share a common 'life force'.	<input type="radio"/>				
(11)	Like a tree can be part of a forest, I feel part of the broader natural world.	<input type="radio"/>				
(12)	I often feel like I am only a small part of the natural world around me, and that I am no more important than the grass on the ground or the birds in the trees.	<input type="radio"/>				
(13)	My personal welfare is not connected to the welfare of the natural world.	<input type="radio"/>				

20. Thank you very much for your help and the information given so far. Please answer a few questions about your actions and your way of thinking, by rating the extent to which you agree or disagree with the following statements.

		strongly agree	agree	neutral	disagree	strongly disagree
(1)	I spend a lot of time in natural settings (woods, mountains, fields, desert, meadow, ocean).	<input type="radio"/>				
(2)	Engaging in environmental behaviours is important to me.	<input type="radio"/>				
(3)	I think of myself as a part of nature, not separated from it.	<input type="radio"/>				
(4)	If I had enough time or money, I would certainly devote some of it to working for environmental causes.	<input type="radio"/>				
(5)	When I am upset or stressed, I feel better after spending some time “communing with nature”.	<input type="radio"/>				
(6)	Living near wildlife is important to me; I would not want to live in a city all the time.	<input type="radio"/>				
(7)	I have a lot in common with environmentalists (people who act in good ways/care for the environment).	<input type="radio"/>				
(8)	I believe that some of today’s social problems could be cured by returning to a more rural lifestyle in which people live in harmony with the land.	<input type="radio"/>				
(9)	I feel that I have a lot in common with other species (living organisms).	<input type="radio"/>				
(10)	My own interests in nature usually seem to coincide with caring for nature, like the environmentalists.	<input type="radio"/>				
(11)	Being a part of nature is an important part of who I am.	<input type="radio"/>				
(12)	I feel that I have roots (connections) to a particular geographical location (place) that had a significant impact on my development.	<input type="radio"/>				
(13)	Behaving responsibly toward the earth – living a sustainable lifestyle – is a part of my moral code.	<input type="radio"/>				

strongly agree	agree	neutral	disagree	strongly disagree
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(14)	Learning about the natural world (environmental education) should be an important part of every child's upbringing.	<input type="radio"/>				
(15)	In general, being part of the natural world is an important part of my self-image.	<input type="radio"/>				
(16)	I would rather live in a small room or house with a nice, wide view than a bigger room or house with the view of buildings.	<input type="radio"/>				
(17)	I really enjoy camping and hiking.	<input type="radio"/>				
(18)	Sometimes it seems like parts of nature – certain trees, storms or mountains – have a personality of their own.	<input type="radio"/>				
(19)	I would feel that an important part of my life was missing if I was not able to get out and enjoy nature from time to time.	<input type="radio"/>				
(20)	I am proud of the fact that I could survive in nature on my own for a few days.	<input type="radio"/>				
(21)	I have never seen a work of art that is as beautiful as a work of nature, like a sunset or a mountain range.	<input type="radio"/>				
(22)	I love to garden.	<input type="radio"/>				
(23)	I believe that I receive spiritual strengthening from nature.	<input type="radio"/>				
(24)	I collect accessories, which I find outdoors like shells, rocks or feathers.	<input type="radio"/>				

21. In the following there will be a few questions about your future behaviour.

	strongly agree	agree	neutral	disagree	strongly disagree
(1) During the following year I intend to spend activities in na-	<input type="radio"/>				

	ture more often.					
(2)	During the following year I intend to spend more time doing activities in nature.	<input type="radio"/>				
(3)	When I am grown up I would rather live in a small room or house with a nice, wide view than having a bigger room or house with a view facing other buildings.	<input type="radio"/>				
(4)	I intend to be more actively engaged in environmental behaviours.	<input type="radio"/>				
(5)	In the future I intend to live near wildlife and not in the city.	<input type="radio"/>				
(6)	In the future I intend to do camping and hiking more often.	<input type="radio"/>				
(7)	In the future I intend to garden more often.	<input type="radio"/>				
(8)	In the future I intend to spend more time in contact with nature with my family .	<input type="radio"/>				
(9)	In the future I intend to spend more time in nature with my friends .	<input type="radio"/>				
(10)	In the future I intend to spend more time in nature with my teachers .	<input type="radio"/>				
(11)	In the future, I will look for ways to reuse things.	<input type="radio"/>				
(12)	In the future, when I am offered a plastic bag in a store I will not take it.	<input type="radio"/>				
(13)	In the future, I will often talk with friend about problems related to nature the environments.	<input type="radio"/>				
(14)	In future, I will recycle newspapers, glass, or other items on a regular basis.	<input type="radio"/>				
(15)	If I wanted to, I could spend time in nature more regularly.					
(16)	In future, I would be willing to make personal sacrifices for the sake of slowing down pollution even though the immediate results may not seem significant.	<input type="radio"/>				
(17)	I try to positively influence the future through my personal actions.	<input type="radio"/>				

22. Please state your feeling towards the depicted surroundings, using the scale from 10 “very natural” to 1 “very unnatural” and tick off!



very natural very unnatural
⇒ 10 - 9 - 8 - 7 - 6 - 5 - 4 - 3 - 2 - 1 ⇐



very natural very unnatural
⇒ 10 - 9 - 8 - 7 - 6 - 5 - 4 - 3 - 2 - 1 ⇐



very natural very unnatural
⇒ 10 - 9 - 8 - 7 - 6 - 5 - 4 - 3 - 2 - 1 ⇐



very natural very unnatural
⇒ 10 - 9 - 8 - 7 - 6 - 5 - 4 - 3 - 2 - 1 ⇐

**Super, you finally did it! Thank you so much that you filled
in the questionnaire!**

Thumbs up!



If you want to, you can leave a personal statement below:
