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**Connection with nature as an indicator for
the Eco-Schools programme: Development,
test and evaluation of a survey-based tool
for Spanish-speaking countries.**

MSc in Nature Management

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Abstract

English

The increased urban population growth together with the nowadays time allocation preferences are separating people from nature. In the light of the actual climate crisis humanity is facing, promoting a more environmental conscious society is crucial. Environmental education programmes have the potential to reconnect society with nature, but for doing it that it is necessary to be able to measure this connection.

In this thesis, the main benefits from the connection with nature were identified, as well as a measurement tool identified, translated, and tested in Spanish-speaking countries participating in the Foundation for Environmental Education (FEE) Eco-Schools programme. An analysis of the potentials of this measurement tool and the Spanish speaking teachers view on the human-nature connection was executed, showing both positive and promising results.

Español

El incremento de la población urbana, junto con las preferencias actuales de dedicación de nuestro tiempo están separando a las personas de la naturaleza. A la luz de la crisis climática a la que la humanidad se enfrenta actualmente, es primordial promover una sociedad más consciente desde el punto de vista medioambiental. Los programas de educación ambiental tienen el potencial para reconectar a la sociedad con la naturaleza, pero para poder hacerlo es necesario ser capaces de medir esta conexión.

En esta tesis, los principales beneficios de la conexión con la naturaleza han sido identificados, así también, una herramienta para medir la conexión con la naturaleza ha sido identificada, traducida y testeada en países hispanohablantes que participan en el programa Eco-Schools de la Fundación de Educación Ambiental (FEE en inglés). Un análisis de los potenciales de esta herramienta de medida, así como de la visión de los profesores hispanohablantes acerca de la conexión entre humanos y naturaleza fueron desempeñados, mostrando ambos resultados prometedores y positivos.

Preface.

Writing this thesis in this convulsive and challenging 2020 was not always an easy task. I am very grateful to all the people that supported me in this process and inspired me to overcome the difficulties that I faced academically and personally. From the academical perspective, this thesis was possible thanks to the support of my two supervisors Anton & Søren, who trusted me and guided me during the whole process. Their knowledge, closeness, and challenging questions highly contributed to the quality of this thesis.

I had the great opportunity to be part of FEE (Foundation for Environmental Education) as an intern during the whole year. Even if it was not an easy year for everyone, I had an incredible experience to which I will always be grateful to and feel proud of. FEE's workers inspired me in many ways. This people are putting all their neurones and spirit to reverse the environmental degradation as well as raising environmental awareness and connecting people with nature worldwide. They are great professionals, but on top of that, they are nice people to share an office, or at least a Zoom meeting with.

I would like to thank Johann for teaching me how to be more politically polite, for his constant support, and for friendly sharing his knowledges with me. I'm thankful for having the chance to work closely with FEE's CEO, Daniel, who always had his door open, and with who I had enjoyable conversations that enriched me professionally and personally. Nicole, Laura, Nikos, Nora, Pramod, Isi, Finn, Sophie, Rikke, Shimon, Bjarke are some of the names of the great and helpful people working at FEE, who I already miss.

One of the main pillars of this thesis were the teachers and students who answered the surveys. Thanks to more than 500 students, and dozens of teachers who were involved in this project. Without their appreciated time, this thesis would not have been possible.

Thanks to my parents for teaching me that the most important things in life, are not things, and to my sister, for being the best sister that one could ask for. I'm extremely lucky to have such a encouraging and caring family, who accompanied me during my whole student life. Also, thanks to my friends, here and there, for their time and for their friendship. Bob, thanks for making Copenhagen feel like home, and thanks to Domingo and Duna, for teaching me about nature connection many years ago.

Index.

1. Introduction.	7
1.1 Research questions.	12
2. Background information and theory.	15
2.1 Benefits from the connection with nature.	15
2.2 Conservationism behavioural models. Attitudes and Cognition.	22
2.3 Nature connection during childhood.	25
2.4 Review of different tools to measure nature connection.	29
2.5 Foundation for Environmental Education (FEE) and Eco-Schools.	32
3. Methods.	39
3.1 Students' survey.	39
3.1.1 Selecting a connection with nature measurement tool.	40
3.1.2 Translating the Connection to Nature Index (CNI) tool.	43
3.1.3 Students' survey data collection.	44
3.1.4 Students' data analysis.	45
3.2 Teachers' survey.	46
3.2.1 Teachers' survey design.	46
3.2.2 Teachers' data collection and analysis.	49
4. Results.	51
4.1 Students' survey.	51
4.2 Teachers' survey.	67
5. Discussion.	75
6. Conclusion.	84
7. Bibliography.	85
Appendix I. Spanish-speaking students' survey (Spanish version).	90

1. Introduction.

During the last three centuries, human beings have negatively affected the environmental conditions on Earth to an extent that it now is accepted to refer to this period as the Anthropocene geologic epoch (Crutzen, 2002). This new terminology comes from the Greek "Anthropos" (human being) and "-cene" that comes also from the Greek word "kainos" (new). Global concentrations of carbon dioxide rising, connected with the tenfold population increment in these centuries, are a serious threat for the future of humankind.

It has been suggested that the Earth's climate is close to a threshold due to the climate overwarming produced by negative direct and indirect humans' impact. Once this climate system threshold is crossed, global temperature will increase more than in the previous 1.2 million years of interglacial records. According to the authors (Steffen et. al, 2018) overcoming this situation will require "a deep transformation based on a fundamental reorientation of human values, equity, behaviour, institutions, economies and technologies".

Global biodiversity is declining with estimations of an average of 68% decrease in population sizes of mammals, amphibians, reptiles, and fish between 1970 and 2016, (WWF, 2020). Biodiversity loss has direct consequences resulting in the ecosystems functions decline (Keesing et. al, 2010) which might have contributed to the emergence of the SARS-CoV-2 (COVID-19) pandemic that in 2020 is affecting almost every corner of the world.

COVID-19 pandemic could be understood as a predicted consequence of how people negatively altered environments, trade animals and source their food among many negative human impacts, but it has highlighted the direct connection of humans and nature, and the importance of healthy ecosystems for healthy people. (UNEP, 2020)

According to the UN in 1950 one-third of the population was living in urban areas, 100 years later, in 2050, estimations suggest that the urban population will reach 68% of the global population (United Nations, 2018).

The increment in the urban population implies that most of the human population will have limited and less contact with natural environments in their daily life. This situation

has a potentially dramatic consequence: billions of people may lose the opportunity to benefit from or develop an appreciation for nature (Turner et. al, 2004).

Nature experiences are becoming rare events in the Anthropocene epoch; fewer people, especially children, are being in contact with nature over the years. This alienation of nature experiences has been named "extinction of experience" (Soga et. al. 2016). Several factors aggravate this disconnection with nature apart from the urbanisation growth, such as the sedentary pastime children's preferences in urban settings. Nowadays, most children, especially from industrialised countries, spend most of their leisure time in screen-based entertainment (Soga et. al. 2016, Singer et. al., 2009).

According to Singer et. al, (2009), globalization is homogenising the tendency of children reducing their time playing outside, due to the increased similarities in the use of electronic media, and because of the associated safety concerns that living in a city entails, such as criminality, or lack of open areas deprived of traffic in where children can freely play.

In Canada and United States, a citizen survey studied the amount of time people were outside and indoors. According to their data, people spent 86% of their time indoor inside buildings plus 7% inside vehicles. Only the remaining 7% of people's daytime is spent outdoors (Klepeis et. al 2001). This situation has worsened to some extent in many countries during the COVID-19 outbreak, as governments imposed restrictive measures that forbid going outside. When restrictions were lifted there have been publications pointing the fact that people are visiting more often natural places than previous of the appearance of the COVID-19 outbreak. These increased visits together with the greater awareness of nature reported by Rousseau & Deschacht (2020) shows a difference with the tendencies expected, which might be positive for both the environment and for people.

Human-Nature Connection.

Research on Human-Nature connection is receiving increased interest during the last years, with many researchers pointing to the necessity to increase or to re-establish the human-nature connection as a sustainability science approach to preserve nature.

In relation to the different studies and perspectives looking together at the human-nature connection, Ives et. al, (2017) did a comprehensive research where they gathered and studied the articles focusing on this topic. In their research, based on 475 papers, they found that the publications were increasing rapidly, as can be observed in Figure 1 below. The authors divided the connection with nature literature into three categories, being 1) "Human Nature Connection" (HNC) as a place, 2) HNC as a mind and 3) HNC as experience, these different categories will be explained in the following chapters.

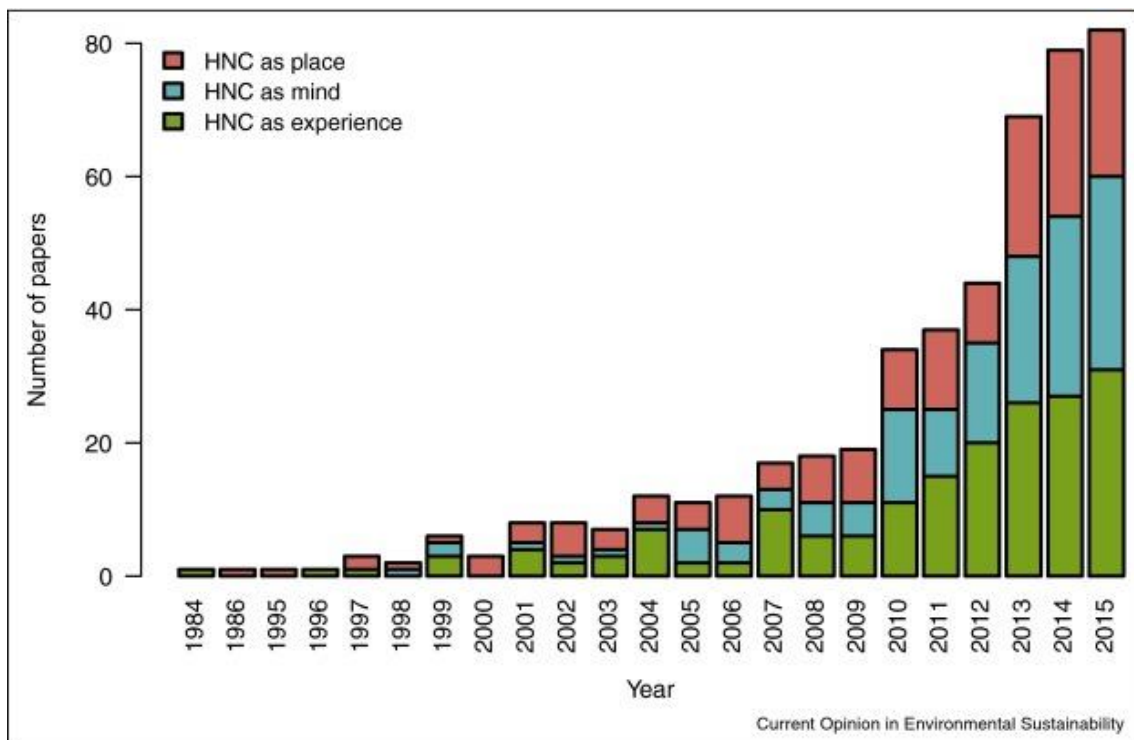


Figure 1. obtained from Ives et. al, 2017. The number of published studies on the human-nature connection by year. Coloured in the bars the three different categories in which the 451 articles were clustered.

There have been diverse ways of studying the Human-Nature connection in the literature, with some publications focusing on the benefits of this interaction, and others looking at the consequences of the disconnection with nature (e.g. "nature deficit disorder") (Louv, 2013).

Numerous authors have worked in trying to explain and understand this relation focusing on the history and types of human relations with nature, with researches in sustainability science, sustainable education, conservation biology, environmental education and environmental psychology among others. (Hughes et. al, 2018, Schultz, 2001, Nisbet et. al, 2009).

These human-nature concepts and ideas are the basis of the tools developed to quantitative and/or qualitatively measure the connection with nature. As one of the main objectives of this thesis is to investigate if these tools could be used in Spanish-speaking countries, distant from the western countries context where they were created and tested, it is relevant to explain the main ideas mentioned earlier that provided the ground for the development of the measurement tools.

Relevant to the Human-Nature connection literature and its terminology is the fact that for this thesis and aligned with the literature, the term used to refer to the Human-Nature relation, will be "Nature connection" or "Connection with nature". In the Human-Nature literature, it has been recognised that adopting this term, concretely the word "connection" could be understood as if it was implicit the disconnection between humans and nature. We believe this is not the case as we consider that humans are just a part of nature or the biosphere and that clarifying our position is necessary before progressing with the thesis.

For this thesis, we will use the following definition for "nature connection" proposed by Salazar et. al. (2020): "We define the connection to nature as the way people identify with predominantly natural landscapes and the relationships they form with these elements in those environments" (p. 6)

Frequently cited for being the earliest theory respecting the human-nature connection is Wilson's (1984) biophilia hypothesis. He proposed that the tendency of humans to focus and create an affiliation with nature and other life forms has a genetic component, thus Wilson suggested that humans are biologically attracted to nature. This early concept, named "biophilia" recognises the intrinsic attraction we as humans have for nature, but as an early and simplistic theory, it does not count with many other factors influencing this human-nature relation, some of them will be explained and detailed in further sections of this thesis.

According to Wilson's words that can be read in his prologue (1984) *"The conclusion I draw is optimistic: to the degree that we come to understand other organisms, we will place a greater value on them, and on ourselves"* (p. 2). From Wilson's words, it could be abstracted the notion that we need to first understand other organisms, and to achieve

that will be complicated if we as humans are living in densely populated cities deprived of biodiversity and with limited contact with nature.

Complementing the biophilia hypothesis described earlier, but introducing the concept of place, is the topophilia hypothesis (Beery & Wolf-Waltz, 2014). This later theory that they introduced proposes substituting the abstract, broad, and elusive concept of "nature" for the more relational concept "place". The authors argue that with the "place" concept two ideas are introduced: first, it captures the social construction around places and landscapes, and second, it recognizes nature or the environment as the material basis for it. This theory doesn't look at nature as an undefined static material and consider that place offers an understanding where people and their environments are products of their various connection rather than of some essential "self" as it was proposed in the biophilia hypothesis. The topophilia hypothesis also recognises that places do have an impact on the human way of life, due to this connection or affiliation between humans and place, and that place contributes to certain social relations such as identity formation or behaviour.

Understanding the construction and factors influencing the human-nature connection as well as people's understanding of nature is important to effectively achieve environmental management goals, as this relationship (influenced by personal values and attitudes) will have different behavioural implications that could potentially promote or obstruct both environmental management plans and conservation goals (Restall & Conrad, 2015).

Since the connection to nature literature increased, it also increased the number of environmental psychologists creating measurement scales designed to quantify and to understand the human-nature connection. (Schultz, 2002, Mayer & Frantz, 2004, Cheng & Monroe, 2012).

Frantz & Mayer (2014) reviewed the human connection to nature literature and found strong positive relations between the connection to nature scales results and self-reported environmentally responsible behaviours. With these optimistic correlations found, they suggest that connection to nature should be a goal for the environmental education programmes and not just as an assessment tool. They defend this arguing that

environmental education is first “almost certainly impacting people’s sense of connection to the natural world” and secondly “a crucial component of confronting climate destabilization”. The relationship between connection with nature and pro-environmental behaviours is elaborated in chapter 2 “Background information and theories”.

1.1 Research questions.

This thesis will study the connection to nature from Spanish-speaking students participating in FEE’s environmental education programmes. Environmental education role in reverting the climate crisis is crucial: well-designed environmental education programmes have the potential to not only increase the learning about the environment, but to increase the connection with nature through creating long-lasting pro-environmental values and attitudes, and citizens that will make better decisions regarding their daily activities and how they impact the environment.

It is well documented the need to mobilise the biggest possible amount of resources to revert the climate crisis we are facing. Raising awareness and promoting pro-environmental behaviours in society through environmental education has the potential to achieve substantial changes and momentum towards more sustainable and better environmental conditions in the future.

The Foundation for Environmental Education with its education programmes, particularly with the Eco-Schools programme being implemented in 68 countries, reaching almost 17 million students, has the potential to positive influence and increase the nature connection of millions of students worldwide. To strengthen students’ connection with nature, it is essential to quantify this connection. Identify a tool for measuring students’ connection with nature that could be replicable in different cultures and languages, has the potential for first assess the impact that environmental education programmes have on the students and secondly, to potentially provide a global picture of the connection with nature, an aspect that is missing in the connection with nature literature (Ives et. al, 2017).

It has been argued that the connection with nature literature is biased towards developed-western countries and cultures, as most publications are being carried out in these contexts and written in English. Even with the increased focus on the connection to nature topic by the academics and practitioners, there is still a lack of understanding on how this connection is in other socio-cultural contexts rather than the Western and developing societies. Ives et al (2017) pointed in their review of the connection to nature literature, that the empirical research on Human-Nature Connection (HNC) has been biased towards western countries (USA, Australia, Canada, United Kingdom and The Netherlands representing >65% of the publications studied).

This thesis will contribute to filling this lack of understanding of measuring the connection with nature in other cultures and languages as well as proposing this measurement as a FEE indicator for its educational programmes. This study will be carried out in the Spanish-speaking schools selected from countries participating in the environmental education programmes of the Foundation for Environmental Education (FEE).

Utilising FEE's network and the presence of the Eco-Schools programme in Spanish-speaking countries, this thesis will identify and utilise a nature connection measurement tool as well as evaluating the tool to study the potentials for it being adopted by FEE. The thesis will also study how is the perception of the nature connection from the Spanish-speaking teachers participating in the Eco-School programmes.

Based on the literature gaps, the potentials of the nature connection in reversing the climate situation we are facing, and the motivations explained above, two main research questions will be addressed during this thesis:

- I. Is it possible to measure with reliability the connection with nature from Spanish-speaking students participating in FEE's Eco-Schools programme? And are the results obtained aligned with the literature?

- II. What are the notions and what do Spanish-speakers teachers think or understand regarding the "connection with nature" construct?

From the available literature, first, a tool for measuring the connection with nature of FEE Eco-School's students' will be identified, implemented and its performance in the Spanish-speaking countries will be evaluated. To solve the first research question, an analysis will be carried out with the aim of testing if the tool is reliable as well as if the results found in the literature are aligned with the results obtained from the Spanish-speaking countries.

Dealing with the second research question, a second analysis will be executed, to investigate what is the view of the practitioner who are working with the Eco-School environmental education programme, regarding their students' connection with nature. It will be studied what are their recommendations to increase this connection, what are the benefits they believe are derived from this connection, as well as how to better improve this connection from the formal education perspective.

2. Background information and theory.

The purpose of this chapter is to provide an overview of the concepts that are involved in the construction of the human-nature connection, as well as the benefits of this connection and the FEE and Eco-Schools functioning.

Concerning these benefits, the health benefits derived from nature contact and the connection with nature will be explained first. Providing an extensive explanation of these benefits is out of the scope of this thesis, but the main lines and hypothesis will be explained to provide a convenient basis for the analysis and discussion.

Due to its importance but still linked with the benefits of the connection to nature are the pro-environmental or pro-nature behaviours derived from this connection that will be described secondly as other benefits of the contact with nature.

In the last sub-sections of this chapter, first, some concepts and notions behind the different criteria that are triggering or influencing the development of pro-environmental and pro-nature behaviours will be explained, together with a review of the different tools available for measuring the connection with nature, providing a general overview of the actual state of the art.

This chapter ends with a subsection explaining FEE and the Eco-Schools programme, as they have been crucial components of this thesis development.

2.1 Benefits from the connection with nature.

Two main broad benefits could be identified from the human-nature connection: first, the sustainable related outcomes originated from the increased pro-environmental and pro-conservation behaviours originating from a higher connection with nature and second, the health benefits (both mental and physical) derived from an increased connection with nature. These two aspects could be understood as benefits for the ecosystems or "Earth's health", as well as benefits for the humans' health.

Before clarifying these two benefits from the connection with nature, it will be useful to define first the concept of "contact with nature" as many of the research based on the benefits of being connected with nature is studying the benefits of this contact nature. Martin et. al (2020) defined nature contact as "*any human interaction with the biophysical*

system, including flora, fauna and geological landforms”, and they list three ways in which nature contact can occur. These three ways are: intentional contact (e.g. visits to natural spaces), incidental contact (e.g. greenspace exposure in neighbourhood) and lastly indirect contact (e.g. watching natural documentaries). Due to its broad definition and the different ways it can occur, contact with nature has produced a vast amount of literature looking at the different health benefits derived from it.

Besides the already briefly explained biophilia and topophilia hypotheses, there are several hypotheses linking nature contact and health benefits. First, there is the hypothesis that the fact of being in intentional contact with nature promotes physical activity, the health benefits from physical activities are well understood and well known, with positive benefits such as increased life span rates, as well as fewer diseases associated with sedentary lifestyles among others. In their systematic review looking at the articles comparing the benefits of indoor and outdoor exercising, Thompson et. al (2011) concluded that exercising in natural environments, in comparison with indoor exercising was associated with *“greater feelings of revitalization and positive engagement, decreases in tension, confusion, anger, depression and increased energy”* (p. 1761). Outdoor exercising in natural environments was reported by the participants as more enjoyable and participants of the studies also declared a greater intent to repeat the activity at a later date, when compared with the participants exercising indoors.

As explained in the introduction of this thesis, nowadays the amount of time that people spend in front of screens and inside buildings due to their daily habits, is resulting in most humans having highly sedentary habits (Soga et. al. 2016, Singer et. al., 2009). For them, the intentional contact with nature would suppose an increase in healthy lifestyles and increased exercising, with the associated benefits from it (Twohig-Bennet & Jones, 2018).

The second hypothesis linking nature contact and health benefits is the “Old Friends” hypothesis (Rook, 2013). This hypothesis has the potential to explain some of the long term’s health benefits derived from living close to natural environments. This hypothesis claims that “the use of greenspace increases exposure to a range of microorganisms, including bacteria, protozoa and helminths, which are abundant in nature and may be

important for the development of the immune system and regulation of inflammatory responses” (Twohig-Bennet & Jones, 2018 p. 629).

The “Old Friends” hypothesis, also known as the “hygiene hypothesis”, argues that in the urban contexts, where is a lack of green or “blue” spaces (coastal environments), there is a lack of exposure to these Old Friends, present in the mankind’s evolutionary past that were tolerated by humans, and by doing so, the Old Friends evolved roles in driving immunoregulatory mechanisms with positive outcomes for the human health.

Exposures during human evolution	Situation in modern urban centre
Helminths Gut and non-gut (blood)	LOST
Ectoparasites Fleas, lice, mites, ticks	MOSTLY LOST
Carrier states Salmonella, hepatitis A virus, <i>H. pylori</i> , TB, toxoplasma	MOSTLY LOST
Microbiota of other humans: skin, gut, airway, oropharyngeal, genitourinary	DIMINISHED diversity
Microbiota of natural environment: animals, soil, air, plants (rhizosphere, phyllosphere)	VARIABLE loss

Fig. 2. Obtained from Rook (2013). A simple classification of the parasites and organisms that humans were exposed since the history of humankind and how the situation for this exposure is now in urban settings.

Exposure to these organisms after birth, according to Rook (2013) provides “teaching inputs” to the immune system for several reasons. First, being exposed to broad biodiversity of organisms, constitute a memory for the immune system of diverse molecular structures that further facilitates the recognition of novel, dangerous organisms. Secondly, the microbial components from the human’s gut maintain an “essential background level of activation of the immune system”. The third reason for these organisms benefiting the immune system is that the immune system when it’s exposed to these organisms develops regulatory pathways and regulatory T cells (Tregs) that “stop inappropriate immune attacks on self, harmless allergens and gut contents.

The absence of exposure to these organisms, according to the author (Rook, 2013) has a negative effect on the immunoregulatory system, with negative effects regularly seen in high-income countries, where “persistently raised inflammatory mediators led to increased risk of cardiovascular diseases and depression”. Among the benefits from the exposure to these “Old Friends” could be the immunoregulation system blocking or more effectively blocking treat models of allergies, autoimmune diseases and inflammatory bowel disease.

The third hypothesis that relates contact with nature and health benefits is the one derived from exposure to sunlight. Being exposed to sunlight is thought to counteract seasonal affective disorders and to provide a natural source of Vitamin D (Twohig-Bennet & Jones, 2018).

The fourth hypothesis associates the contact with nature and green spaces contributing to the improved well-being due to social interactions. In their study, Maas et. al, (2009), investigated the benefits of living close to greenspaces from 10,089 residents of the Netherlands. They remarked on the importance of green space for the occurrence and improvement of neighbourhood social ties. They found that “people with more green space in their living environment feel less lonely and experience less shortage of social support”. According to their results, these relations were stronger for the elderly and children (since they have reduced mobility, they rely more on their neighbourhood) and for people with a low income or a low education.

These hypotheses explained above are of course interlinked, and the combination of them are influencing in providing people with multiple benefits to their wellbeing and health. There is emerging literature, pointing to the need to focus not only on the visual nature benefits, as the benefits that people receive from nature are a combination of the five senses and at least three other non-sensory avenues; phytoncides, negative air ions and microbes (the last one is the Old Friends hypothesis explained before). Franco et. al, 2017.

According to Franco et. al, (ibid) the phytocides are antimicrobial volatile organic compounds emitted by plants, typically for defence against decay or attacks by herbivores, that have been found to increase the immune system activity in vitro and to

be antimicrobial when inhaled. Studies on mice have demonstrated that these compounds prolong sleep, reduce anxiety and stress. The authors, in their review of these different input entries for nature contact benefits, point out that the negative air ions are also entry points, producing several benefits for health and wellbeing. In indoor spaces, the number of negative ions in the air is just 10% of the amount present in the natural spaces. The negative air ions have positive effects on people health and wellbeing, as identified in the literature by Franco et al (ibid) for example, reducing anxiety, improving asthmatic patients' conditions or decreasing stuffiness, nausea, dizziness and incidence of headaches.

With the different hypotheses and the explanation of the different entry points of nature benefits done before, it is clear that for humans, as multi-sensory organisms, with just the visual part of nature is not enough to obtain all the potential benefits from nature, and that overrelying on the visual part as the dominant entry point for these benefits, will result in a shortcoming of all the different benefits on health and wellbeing.

Behavioural benefits of the connection with nature.

As explained at the beginning of this subchapter, apart from the already mentioned health benefits of contact with nature, there is another aspect which will be explained, and this is the "pro-nature" behaviours such as pro-environmental and pro-conservationism behaviours that are linked with a strong connection to nature.

The distinction between pro-environmental and pro-conservationist behaviours, need to be clarified. Martin et al, (2020) distinguished the two behaviours, highlighting the fact that the environmental behaviours are related to "household's" behaviours, such as energy or water consumption, waste recycling or transportation, and pro-conservationism behaviours (named also pro-nature behaviours) are focused on conservation issues in particular, with actions directly aimed towards biodiversity support and improvement, participating in activities such as volunteering or donating money to conservation or environmental organisations.

To revert the dramatic climate situation humanity is facing, apart from the changes at a macro level such as the Kyoto Protocol or the Paris Agreement, changes at the micro-level such as people everyday actions and choices to achieve environmental sustainability

need to occur and pro-nature behaviours will have a greater positive effect on the global health (Arendt & Matthes, 2016).

The concept of connection with nature, as pointed by Ives et. al, (2018) is a multifaceted concept, that incorporates at least five elements: material, experiential and cognitive connections in addition to emotional attachments and affective responses and lastly philosophical perspectives on humanity's relationship with nature. This multifaceted connection, when is strong, through different mechanisms influences people's behaviour converting their behaviour, into a more pro-environmental or pro conservationist.

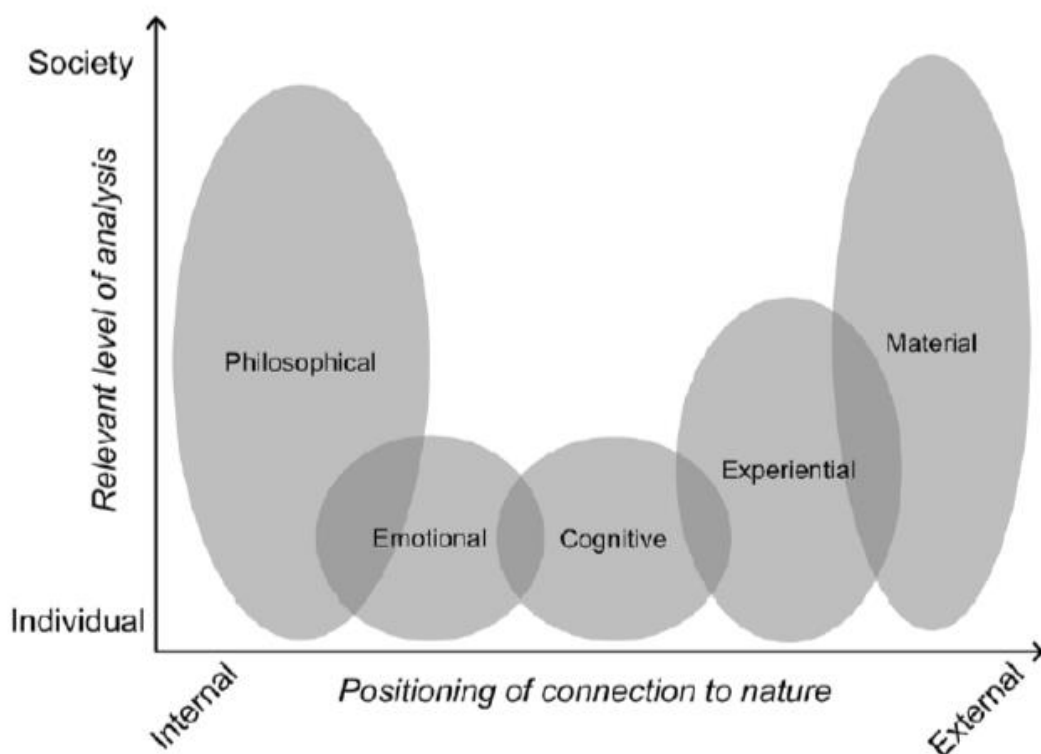


Fig 3: Conceptualisation of different types of human–nature connections, along a spectrum from people's inner to outer worlds. Ives et. al, 2018.

On the opposite side, it has been remarked in the literature (Soga & Gaston, 2016, Kareiva, 2008) the fact that the decline of nature and wilderness experiences results in people less likely to value nature and be concerned or act against its disappearance. This idea was condensed by Frantz (2014) in the following powerful statement: *"Individuals will do inconvenient, painful and even deadly things that are not in their economic or biological best interest for people, groups, values and causes they care about"*. (pp 31)

Schultz (2011) argues that motivation is one of the main driving forces underlying behaviour change and that focusing on increasing the cognitive connection to nature (increasing knowledge through education) is not enough to lead to a change in behaviours. In his article he strongly recommends including motivational elements when educating or raising awareness, to achieve the desired change in behaviour, according to his words "motivation is the *only* way to achieve conservation goals", as "*Biodiversity conservation is a human endeavour: initiated by humans, designed by humans and intended to modify human behaviour*" (pp 1080).

Several studies pointed out the positive relation linking quality and frequency of nature contact with pro-nature behaviours. As pointed by Richardson et. al, (2020) in their findings, time spent in nature per se is not enough to prompt individuals to engage in active pro conservationism behaviours. For them, the key influential factor in predicting these kinds of behaviours is how that time is spent. They studied which variables better predicted the conservationism behaviours in 1,298 adults from the United Kingdom. They found that the "simple activities" variable (a variety of common simple nature-related activities that involve direct contact with nature, such as collecting shells, watching the clouds, or watching wildlife) together with the "nature connectedness" variable, contributed the most to the pro-nature behaviours. "Simple activities" accounted for 22% and "Nature connectedness" accounted for an additional 28% of the variance in pro-nature conservation behaviours.

There is then a strong relationship between the frequency and quality of nature contact and nature connection, as well as a strong connection between these factors and pro-nature behaviours. Hughes et. al, (2018) looked precisely at the relation between the nature connection and the probability of carrying out pro-nature behaviours (both environmental and pro-conservatism). They used the Connection to Nature Index tool (CNI) designed by Cheng & Richardson (2012) together with a pro-nature behaviour questionnaire and surveyed 775 children aged 10-11 in central England. They categorized the CNI results (that varies from 0 to 5) according to the probability of carrying out pro-nature behaviours, by correlating the results from the CNI tool with the questionnaires. In their study, they conclude that the "CNI is a good indicator of the likelihood of

behaviour” and “whether children are performing behaviours can be assessed by their CNI score” (Hughes et. al, 2018, pp 16).

2.2 Conservatism behavioural models. Attitudes and Cognition.

In the previous sections of this thesis, it has been remarked the necessity of promoting and increasing sustainable or pro-nature behaviours, as they will positively contribute to halt and reverse the dramatic consequences and negative effects of climate change globally.

As it was also explained, there is no linear connection between environmental knowledge and pro-nature behaviours, in this complex relation, many aspects are intervening, and it is an aspect that has attracted the attention of many psychologists and environmental psychologist academics and researchers.

Several models have been published to explain the different aspects that produce pro-environmental behaviours. The oldest (early 1970s) and simplest model is the Early US Linear Models, which assumes that by educating people about environmental issues would automatically result in more pro-environmental behaviours (Kollmuss & Agyeman, 2002).

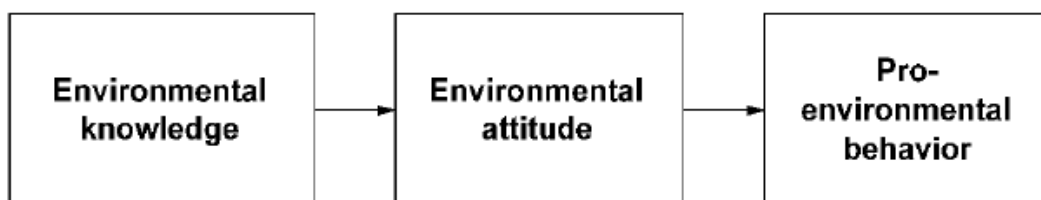


Fig 4: Obtained from Kollmuss & Agyeman (2002). Earliest pro-environmental behaviour model.

The last-mentioned pro-environmental behaviour model was proven to be inadequate and incomplete, as more environmental knowledge doesn't necessarily lead to more pro-environmental behaviours. Developing these types of pro-environmental behaviours is much difficult and complex and other authors have suggested alternative models with more factors intervening. The discrepancy between the level of environmental knowledge and the pro-environmental factor has been referred to as “the Gap” (Kollmuss & Agyeman, 2002).

Describing the different models for the construction and nurturing of pro-environmental behaviour, with the numerous factors involved it's out of the scope of this thesis, but it is relevant to mention different ideas and studies that link the relationship between connection to nature and these pro-environmental behaviours.

A schematic representation of this model proposed by Gosling & Williams (2010) (Figure 5 below) associates the connection to nature and to place with Biospheric concerns and later pro-environmental behaviours.

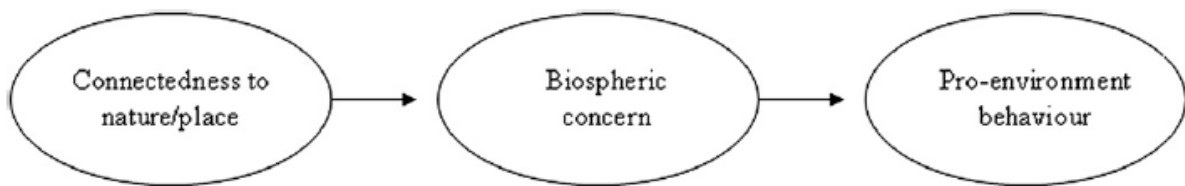


Fig 5: Gosling and Williams, 2010. Schematic representation of the pro-environmental behaviour construction.

Several studies have been published trying to quantify these relationships between connection to nature and pro-environmental behaviour. In the literature, as it was also noted by Mackay & Schmitt (2019) in their meta-analysis, the majority of these studies are based on pro-environmental behavioural intentions (normally obtained by surveys of their habits), with few studies carrying out experimental and direct observation analysis on these pro-environmental behaviours.

Stern (2000) also defends that even if there are factors mediating such as attitudes, social norms or constraints, there is a strong correlation between pro-environmental behaviour intentions and the actual behaviours.

In their review, Mackay & Schmitt (2019) analysed 74 different studies, with a total sample of 21,120 individuals, and found "compelling evidence for a strong and robust association between nature connection and pro-environmental behaviour ($r=0.37$ $p<.01$). According to the authors, the connection to nature is one of the strongest associations between other variables and pro-environmental behaviours.

Bamberg & Möser (2007) in another review on the pro-environmental behaviour occurrence, correlated different psycho-social variables and pro-environmental behaviours. After analysing 17 different studies, they conclude that the correlation

between attitude and pro-environmental behaviour is $r=0.42$ ($p<.05$). Among the different psychosocial variables measured in their study, the correlation between attitudes and pro-environmental behaviour was the strongest, followed by moral norms ($r=0.39$), social norms ($r=0.31$) and guilt ($r=0,30$).

Similarly, and providing more evidence on the strong relation of the connection to nature and pro-environmental behaviours Cheng & Monroe (2012) also found a strong correlation among the two variables, they weighted and quantified how the different variables measured were influencing these correlations. According to them, connection to nature is a strong predictor of both children’s interests in environmentally friendly practices, accounting for 30% of the variance as well as for children’s interest in participating in nature-based activities (38% of the variance $p<.05$).

In their study, Cheng & Monroe (ibid) deeply analyse how the different variables influence both “interest in environmentally friendly practices” and “interests in participating in nature-based activities”. The following diagram shows the weight of each variable measured.

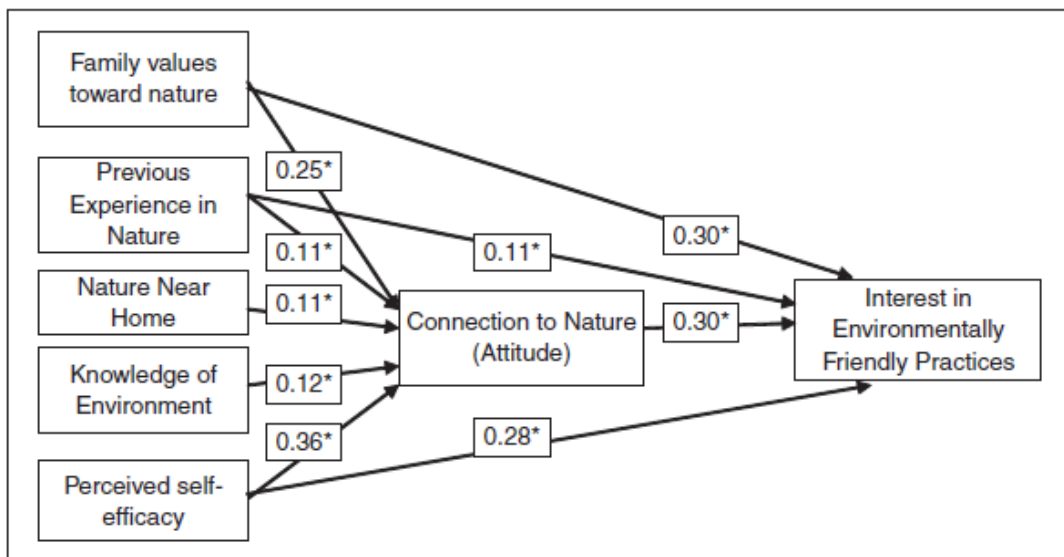


Fig 6: Obtained from Cheng & Monroe, model of the different variables that predict children’s interest in environmentally friendly practices.

According to Cheng & Monroe, a major part of the variance in the student’s interest in environmentally friendly practices (54%) can be explained with this model. As can be seen from this model (Fig 6), some factors have first, a direct effect or contribution to the

connection with nature, and then an indirect influence on the interest in environmentally friendly practices (factors such as "Family values toward nature", "Previous Experience in Nature" and "Perceived self-efficacy").

There are strong correlations between connection to nature and pro-environmental behaviours in the literature with $r=0.30$ $p<.05$ (Cheng & Monroe, 2012), $r=0.37$ $p<.05$ (Mackay & Schmitt, 2019) and $r=0.42$ $p<.05$ (Bamberg & Möser, 2008). These results show the importance of the connection to nature in mediating the pro-environmental behaviour outcomes and should encourage the idea of reinforcing and make the connection stronger in order to achieve sustainable and pro-environmental behaviours.

2.3 Nature connection during childhood.

With pieces of evidence in the literature of the benefits of the connection with nature for both human health and planetary health, achieved by pro-nature behaviours, several studies focused on the importance of children connection with nature.

As described earlier, the loss of nature experiences (Soga & Gaston, 2016) together with the increased urbanization is producing what it's being called "nature deficit disorder" (Louv, 2013). There is evidence that with an increasing population living in urban contexts away from nature and in combination with the sedentary indoor entertainment habits increasing, children worldwide are reducing their nature contacts, with their associated loss of benefits derived from the connection with nature, such as wellbeing benefits and sustainable behaviours.

When looking at the nature connection and children literature, Hughes et. al, (2018) argued that there are evidenced studies supporting the idea that increasing children experiences in nature turn them into more connected to nature children, and later in more connected to nature adults. They mention studies from different disciplines, that showed a positive relationship between childhood nature experiences such as "camping, hiking, playing in woods or picking flowers with positively protective environmental behaviours in adults".

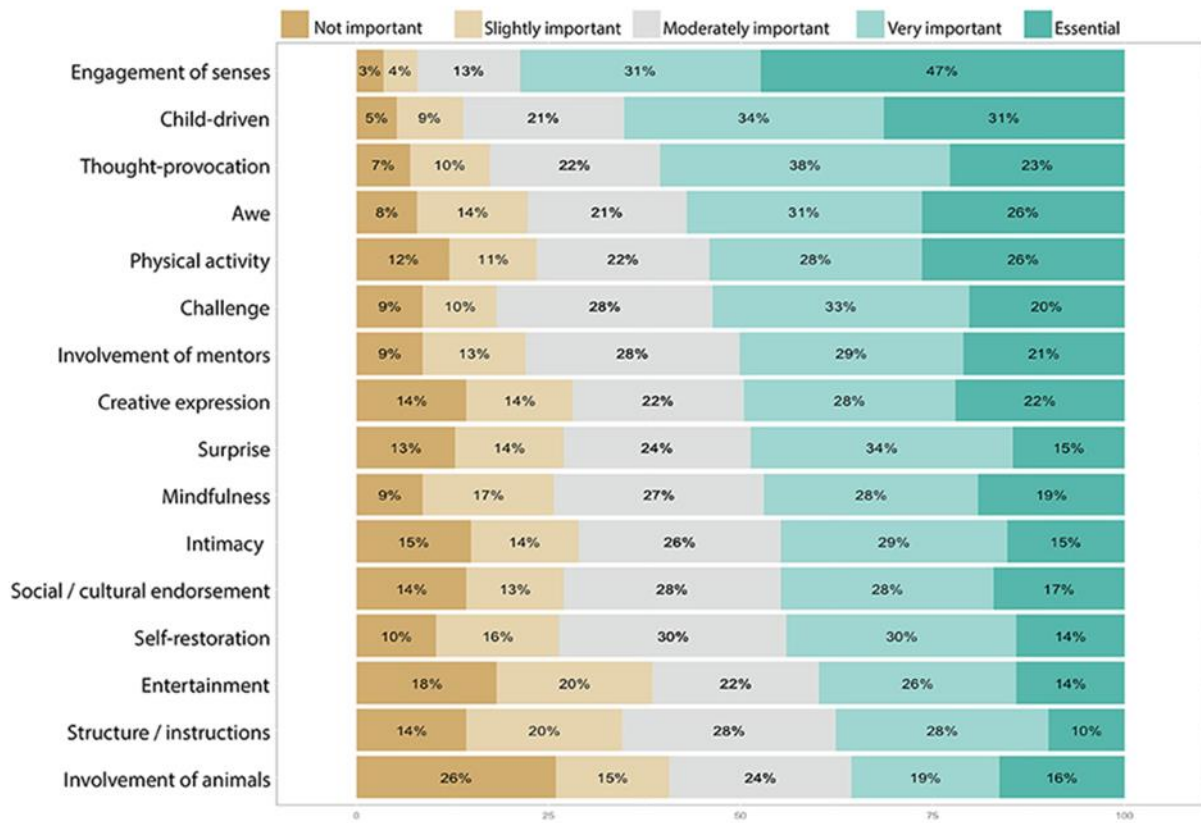
Liefländer et al (2012) support the idea that environmental education is crucial when it comes to promoting sustainable behaviours and achieving sustainable societies, but they recommend having in consideration connection with nature when designing

environmental education plans and programmes. They defend that environmental education programmes are normally focused on promoting environmental knowledge, which they consider not sufficient for solving the world's environmental problems. What they consider a strong motivation is the connectedness to nature, they argue that "improving connectedness to nature should be a high priority in all environmental education where the goal is providing the knowledge needed to achieve a sustainable society" (pp 380).

The role of education and educators is considerably important when it comes to children and their connection with nature, as well as their contacts or experiences with it. Giusti et al (2018) studied children's connection with nature through surveying professionals working on the field of connecting children with nature. The authors, after surveying these professionals, identified 16 qualities of significant nature situations. Once these qualities were identified, they proceeded to survey a bigger sample of professionals working on connecting children with nature from more than 10 different countries and asked them, to rank how important were the different qualities of significant nature situations proposed in relation to significant nature activities and for indicators of some form of connection to nature in children.

As it can be observed in the figure below (figure 7), most of the professionals responding to the survey thought that the list of the sixteen qualities that make a nature situation significant for children connection to nature was comprehensive. 67% of the respondents found the list of qualities to be very comprehensive and 7% fully comprehensive. According to the authors, the occurrence of at least one of the qualities described in the list will promote a significant nature situation, that will directly influence the children connection with nature.

How important are each of the qualities below for a significant nature activity?



How comprehensive is the list above to evaluate the qualities of nature activities that are important for children's connection to nature?

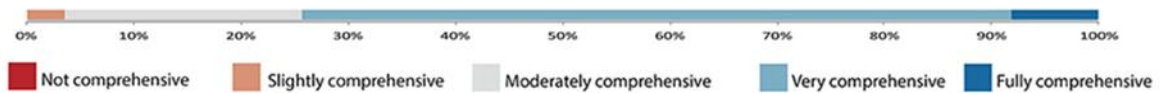
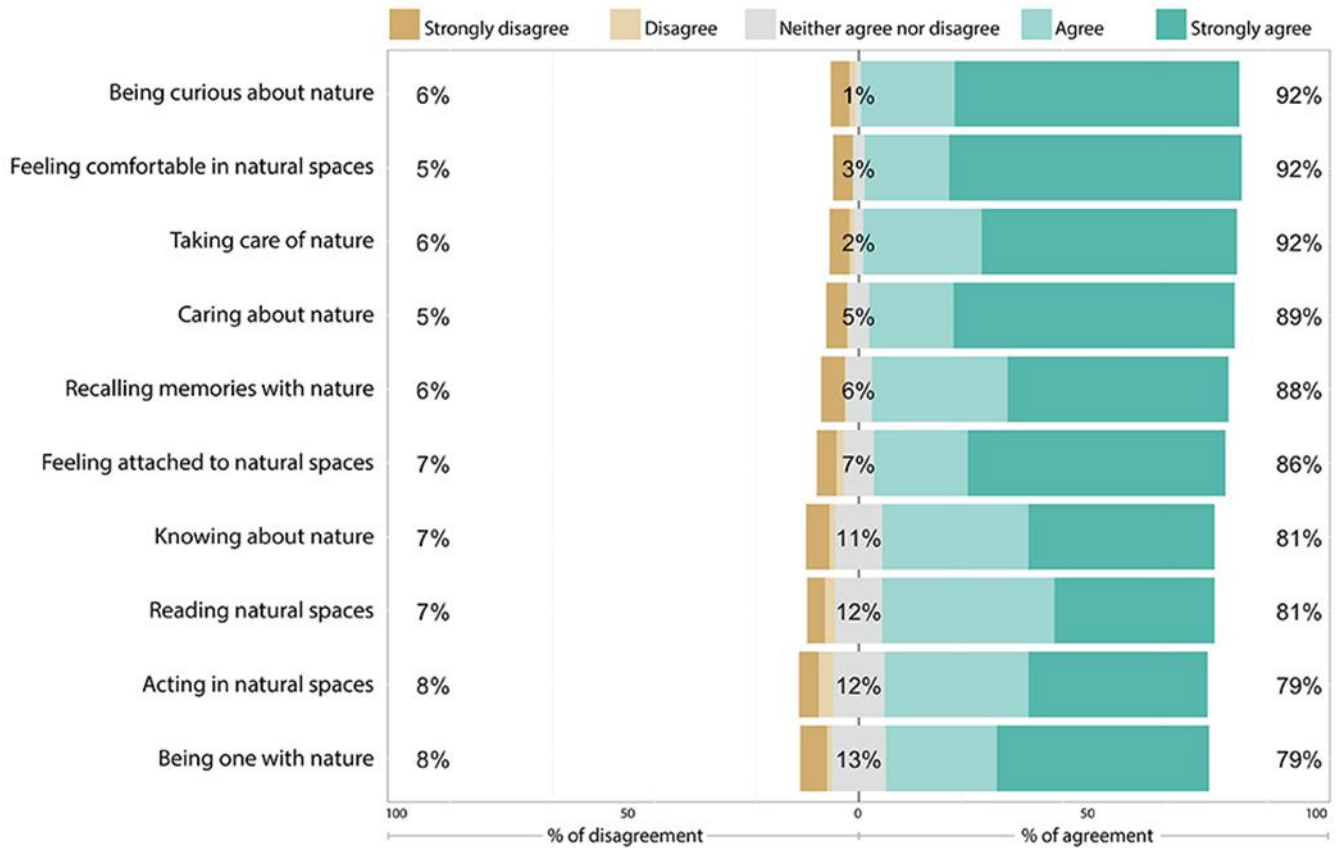


Fig 7: Obtained from Giusti et al (2018), on top the qualities from significant nature experiences, colours showing importance. Below, practitioners' answers on how comprehensive the list was to evaluate the qualities of nature activities.

In the same study and using the same methods described before, Giusti et al (2018) asked and surveyed the professionals working on connecting children with nature regarding which activities or actions influenced most in the children's connection to nature. Together with the professionals working on connecting children with nature, the authors identified a set of abilities that according to them "were clear indicators of human-nature connection". At least 79% of the professionals surveyed agreed or strongly agreed with the fact that the abilities proposed indicated some form of connection to nature. 5% of respondents thought that the list of abilities indicating a connection to nature was slightly comprehensive, 24% thought it was moderately, 64% thought the list was very

comprehensive and 7% thought the list was fully comprehensive. Results can be seen in Figure 8 below.

How much do you agree that the following abilities indicate some form of connection to nature in children?



How comprehensive is the list above to represent ALL abilities that indicate connection to nature in children?

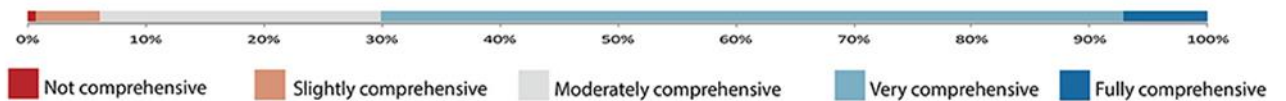


Fig 8: Obtained from Giusti et al (2018), list of abilities indicating forms of connection with nature in children, colour showing the level of agreement, below the practitioners' answers related to how comprehensive and representative the abilities listed are in indicating connection to nature in children.

The study from Giusti et. al, (2018) shows what are the important characteristics for the nature contacts or nature activities to be significant and promote nature connection among children, as well as which are the indicators better predicting which actions will cause a higher nature connection. These findings should be considered, when designing better environmental education programmes and plans, as proposed by Liefländer et. al, (2012).

2.4 Review of different tools to measure nature connection.

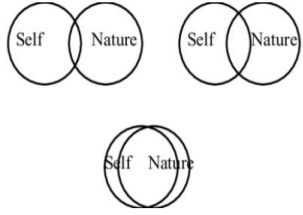
As it was explained earlier in this chapter, several authors have created and tested different tools with the purpose of understanding and measuring the connection with nature for both adults and children. Several publications reviewed these different tools, two of them are Tam (2013) and Salazar et. al, (2020). In the case of Salazar et. al, (2020), this is a guide developed by the North American Association for Environmental Education (NAAEE), intending to serve as a catalogue where environmental education practitioners could choose the most suitable tool (among the 11 different tools identified) for them and their environmental education programmes.

Tam (2013) tested the differences and similarities among seven of these measurement tools. After measuring and comparing the connection with nature of Chinese and American respondents using the seven tools identified, he concludes that *"the various measures show strong convergent validity and little incremental validity. Thus, they can be considered as markers of the same underlying constructs"* (pp 74).

According to Tam, authors who published these measurement tools showed some degree of awareness concerning the potential overlapping of these tools. As the connection with nature topic gained popularity recently, the different tools for measuring this connection were published within a few years of each other, this fact contributed to the overlapping among these measurement tools and to the lack of empirical clarifications regarding the differences and similarities among them, which Tam contributed to clarify in his study.

Another study comparing different nature connection measurement tools and finding similarities among them is Braggs et al, (2013). They compared three different tools: CNI (Connection to Nature Index), NR-6 (Nature Relatedness Scale, 6 item version) and the INS (Inclusion of Nature in Self). Their results showed that CNI and NR-6 were strongly correlated in comparison with these and INS, as this last one is slightly different, being a single-item scale. Even if they conclude that the three measurements tools performed well, their study advice the RSPB (Royal Society for the Protection of Birds) to implement the CNI tool as it was the most preferred by children, as well as the easiest to understand.

Intending to provide a good picture of the different tools, a table with 11 of the different tools to measure nature connection can be found below, the table is inspired by Tam's (2013) review and complemented with Salazar et al, (2020) guide on the different tools.

Tool Name/Concept – Year of publication	Format	Items example	More details/ Bibliography
Emotional affinity toward nature – 1999.	Likert scale, 16 items.	<i>"By getting in touch with nature today I have the feeling of the same origin".</i>	Kals et, al, 1999.
Inclusion of Nature in Self (INS) – 2001.	Choosing among seven different possibilities, the diagram that better describe respondent's relation with nature.		Schultz, 2001.
Environmental Identity Scale (EID) – 2003.	Likert scale, 24 items.	<i>"Being a part of the ecosystem is an important part of who I am"</i>	Clayton, 2003.
Connectedness to Nature Scale (CTN) – 2004.	Likert scale, 14 items.	<i>"My personal welfare is independent of the welfare of the natural world"</i>	Mayer & Frantz, 2004
Commitment to Nature (COM) – 2009.	Likert scale, 14 items.	<i>"I feel very attached to the natural environment"</i>	Davis et al, 2009
Nature Relatedness Scale (NR) – 2009.	Likert scale, 21 items.	<i>"I always think how my actions affect the environment"</i>	Nisbet et al, 2009
Revised Nature Relatedness Scale (NR-6) – 2013.	Likert scale, 6 items.	<i>"My connection to nature and the environment is a part of my spirituality"</i>	Nisbet & Zelenski, 2013.
Love and Care for Nature Scale (LCN) – 2010.	Likert scale, three versions: 5, 10 and 15 items.	<i>"I feel content and somehow at home in nature"</i>	Perkins, 2010.

Children’s environmental Perception Scale (CEPS) – 2011.	Likert scale, 16 items.	<i>“Plants and animals are easily harmed or hurt by people”</i>	Larson et al, 2011.
Connection to Nature Index (CNI) – 2012	Likert scale, 16 items.	<i>“Being in the natural environment makes me feel peaceful”</i>	Cheng & Monroe, 2012.
Revised Connection to Nature Index (CNI) – 2012.	Likert scale, different from the original, now the question is “how much you like to see or do the following things” 14 items	<i>“Love and Care for Nature”</i> <i>“Be in the outdoors”</i> <i>“Go outside and enjoy nature”</i>	Salazar et al, 2020.

Table 1: 11 of the tools identified to measure the nature connection, format, examples of statements and the bibliography related to them.

Salazar et, al (2020), in their guide aimed at providing the necessary information to environmental practitioners while choosing the most suitable tool for their programmes, provide an orientation of the age groups that these tools are designed for:

Age group	Measurement tool
Children and Young Adolescents (6 to 13 years old)	<ul style="list-style-type: none"> - Children’s environmental Perception Scale (CEPS) - Connection to Nature Index (CNI) - Inclusion of Nature in Self (INS) - Nature Relatedness Scale (NR) - Connectedness to Nature Scale (CTN)
Adolescents and Adults (14 years and more)	<ul style="list-style-type: none"> - Love and Care for Nature Scale - Nature Relatedness Scale (NR) - Inclusion of Nature in Self (INS) - Environmental Identity Scale (EID) - Connectedness to Nature Scale (CTN)

Table 2: different tools measuring the connection with nature, grouped by age group target.

2.5 Foundation for Environmental Education (FEE) and Eco-Schools.

The big role and influence that FEE had on this thesis, allowing, and developing this study, makes it important to explain how, when and “why” FEE was created. Providing an overview of its story, how it is organised and how its programmes work, will provide a better picture of the relevant settings of this thesis. As Eco-Schools is the most relevant programme in relation to this thesis, a brief explanation will be provided on how this programme and its components are executed.

The first United Nations Conference on the Human Environment, which took place in Stockholm in 1972 gathered for the first-time environment ministries from the United Nations. One of the main questions raised was how countries could reinforce knowledge about the environment and ecosystem understanding. During this conference, it was highly recommended to reinforce environmental education to achieve this goal.

After the Stockholm Conference, the first Conference on Environmental Education took place in Tbilisi, Georgia, in 1977. Experts from different countries were tasked to provide a set of recommendations and information on the subject to the European Council. The experts participating in this conference decided to keep the momentum going and meet two or three times per year.

In 1981, FEEE was constituted in Leiden, The Netherlands. In the beginning, FEE had an “extra E” as it was denominated “Foundation for Environmental Education in Europe” because the four members countries were European (Denmark, France, Germany, and Spain).

Four years later, in 1985, FEEE France, with the idea that “pollution does not recognise any borders” created a public campaign where students released 1000 bottles in the Atlantic Ocean with a personal letter on them. The purpose of the campaign was for the students to realise how the ocean currents distributed pollution around the world, hoping to receive a letter from South America, North America, Europe and Africa answering their letters, once the bottles were transported to the shores of the other continents. A symbol for this action was the creation of a blue flag, which is the precursor of the “Blue Flag”, officially created a few years later.

France idea to see the pollution of the oceans as a whole, prompted the creation and implementation of the Blue Flag programme, looking at ways to promote cleaner and safer beaches, including ideas on environmental education by achieving a set of requirements and criteria. At the same time, the European Union had a bathing water quality directive which wasn't being implemented to its full extent. The European Union saw the Blue Flag programme as a tool to help implement the directive and collaborated with FEEE financially to support the programme.

In 1987, the Blue Flag was presented, as one of the first eco-labels in the world (represented with a blue flag and a logo similar to the one used in the French students' bottles-releasing campaigns). The Blue Flag was a reward for the beaches and marinas following the criteria proposed by FEEE. Tourists, the general public, and the media were attracted to the programme and recognised that it promoted better environmental conditions and environmental education opportunities, such as tour guides and educational information billboards.

A couple of years later, in 1989, FEEE decided that there were too many countries and sites implementing the Blue Flag programme and that it was necessary to have stricter rules regarding which sites were awarded the Blue Flag award. To have the same consistency in all the countries, FEEE adapted the programme structure, and from 1992 it is necessary to have a member organisation in the country where the Blue Flag is being awarded. In 1992, the Blue Flag programme was back on track, with all countries participating following the same criteria approved in the FEEE first statute.

In 1992, two new ideas were presented to FEEE for creating new programmes, first, again a French initiative "Young Reporters for the Environment", secondly a Danish initiative "Green Schools" that was re-named as "Echo-Schools". These two new ideas were highly accepted at the core of FEEE, and it was a decision that both programmes were going to be implemented as a pilot for two years, before fully introducing them in 1994, "Young Reporters for the Environment" (YRE) and "Eco-Schools" became the FEEE's official programmes together with Blue Flag.

A fourth programme started in 1996, "Learning About Forests" (LEAF), was originally a Swedish, Finnish, and Norwegian programme called "Forests in School". A steering

committee was constituted to help FEEE incorporate and disseminate the programme within its country members. At that time, FEEE counted with 16 countries in Europe implementing FEEE's programmes.

The last programme that was incorporated into FEEE was "Green Key", a hospitality certification that was created by the Danish FEEE's member (The Danish Outdoor Council), as an ecolabel for the hotels and hostels. The programme was incorporated and adapted to FEEE's network in 1998, in a process similar to the one that took place when LEAF was incorporated.

FEEE popularisation and example of good environmental practices soon expanded outside the European Union. In the year 2000, the FEEE Assembly discussed the implications and possibilities to incorporate country members outside the European Union, recognizing that the goals and mission of FEEE were global and common goals. With these considerations, in 2001 FEEE took an "E" out and was renamed as FEE (Foundation for Environmental Education). Removing that E showed the interest of the organisation in becoming global and be ready to accept that challenge.

During the first years of the organisation, the five programmes were directed and coordinated globally and by different members (all Europeans). It was decided in a democratic process with all the members voting, in 2012, to centralize FEE's programmes and to have the FEE Head Office located in Copenhagen, where is now situated since then.

FEE nowadays.

Nowadays, FEE the world's largest environmental organisation, with members in 77 countries around, the world, implementing FEE's five programmes on all the continents. Two of the five programmes (Green Key & Blue Flag) are related to sustainable tourism. Despite the impressive numbers and achievements, these tourism programmes will not be explained in this thesis, as they are not connected with this study as the three environmental education programmes are (Eco-Schools, Learning About Forests & Young Reporters for the Environment).

With the internationalisation of FEE in 2001, FEE has been recognised as one key environmental player by UNEP (*United Nations Environment Programme*) and UNWTO

(*United Nations World Tourism Organization*), global leading environmental agencies that recognize the importance and necessity of having an organisation such as FEE and that became institutional partners of FEE's programmes.

FEE has also signed memorandums of understandings with big environmental organisations such as IUCN (*International Union for Conservation of Nature*) or EAUC (*Environmental Association for Universities and Colleges*).

These collaborations where international institutions support FEE and its programmes, allows FEE to be globally recognised for its sustainable efforts, and easier to be introduced in new countries.

Soon to be publicly disseminated is the FEE Gaia Strategy, developed and planned after consulting global experts working with environmental issues together with FEE's extensive network. The purpose of the Gaia Strategy (2020-2030) is to mobilise the biggest among of resources as well as raising awareness globally to revert the climate crisis, focusing on improving the global biodiversity, mitigating climate change effects, and fighting against pollution. The strategy, focused in the three goals described before, is composed of 12 different sub-goals that were prioritised by FEE and its network, in order to achieve and keep the track of the expected outcomes.

Eco-Schools programme.

Running since 1992, in 2020 this programme reaches 68 different countries, summing 59 000 schools and with an impressive number of 19 million students, this programme is the largest global sustainable school programme. It starts with the classrooms in the schools, but with time, it also has positive implications in the community surrounding the schools.

Three structural elements compose FEE's Eco-Schools programme: "The Seven Steps Framework", "The Eco-Schools Themes" and the "Assessment for the Green Flag".

The Seven Steps Framework:

It consists of a set of carefully designed measures to help schools maximise the success of their Eco-Schools objectives and ambitions. The Seven Steps involves a wide diversity

of individuals in the schools' communities, with students being major players in the whole process.

Step	Description
<i>Step 1: Formation of an Eco Committee.</i>	This committee is student-lead, composed by students, teachers, principals, non-teaching staff (cleaners, caretakers...) and ensures that the entire school knows about Eco-Schools. The Eco Committee meets regularly to discuss environmental and social actions for the school.
<i>Step 2: Carry out a Sustainability Audit.</i>	This audit helps the school to identify its current environmental and social impacts, highlighting "the good, the bad and the ugly". All main Eco-Schools themes (explained below) should be reviewed annually. It is essential that as many pupils as possible participate in this process, the results of the Sustainability Audit will inform the Action Plan.
<i>Step 3: Action Plan.</i>	Using the results from the Sustainability Audit, the Action Plan is the core of the Eco-Schools work. It is encouraged to focus on three of the proposed themes at a time. The Action Plan is then created and designed for improving those problems. It should include necessary tasks, people responsible of the tasks and timeframes to achieve the goals and targets proposed. The Action Plan applies the "SMART" attributes, so each action should be "Specific, Measurable, Attainable, Realistic and Timely".
<i>Step 4: Monitor and Evaluate.</i>	The results of the monitoring should be displayed and communicated to the whole school, the monitoring methods were defined in the Action Plan (Step 3), the evaluation of the success of the activities proposed allows the school to change the Action Plan if required.
<i>Step 5: Curriculum Work.</i>	Linking Eco-Schools activities to the educational curriculum ensures that Eco-Schools is truly integrated within the school community. The purpose is that all pupils from the schools, understand how real life environmental and social issues are dealt within in a real-life setting.
<i>Step 6: Inform and Involve.</i>	The purpose is to involve the whole school community, informing and taking the environmental practices and activities proposed outside the schools. This could be done in different ways, such as contacting local or national press, local business and corporations, as well as the pupils' homes.
<i>Step 7: Produce an Eco Code.</i>	This is a statement that lists the main objectives of the school Action Plan, it should be displayed prominently in the school, it should be memorable and easy to understand. The content of the Eco Code should be reviewed on a regular basis to make sure that it continues and supports the school's environmental aims and targets set in the Action Plan.

Table 3: Table describing the 7 steps methodology of Eco-School programmes, describing each of the steps required to complete the programme.

Eco-Schools Themes

For the Environmental Review (*Step 2*) there are 12 themes proposed for the schools to choose at least 3:

Theme name	Description
<i>Biodiversity & Nature</i>	Examines the flora and fauna present in the school environment and suggests ways to increase the levels of biodiversity around the school and raises the pupils' awareness of biodiversity and nature.
<i>Climate Change</i>	Examines the impacts we have on the Climate through our lifestyles and how our actions can influence the situation in a positive way.
<i>Energy</i>	Suggests ways in which all members of the school can work together to increase awareness of energy issues and to improve energy efficiency within the school.
<i>Food</i>	Encourages young people, their parents, and the whole community to take responsible food-related choices and actions that protect the environment, promote human rights, and improve the wellbeing of society - every day.
<i>Global Citizenship</i>	Examines what our rights and responsibilities are on a National, European and Global scale and encourages staff, students and parents to look at the impacts our consumption habits have on other parts of the world.
<i>Health & Wellbeing</i>	Encourages schools to promote the health and wellbeing of young people and the wider community and to make environmental connections to health and safety.
<i>Litter</i>	Examines the impact of litter on the environment and explores practical means for reducing and minimising the amount of litter produced by the school.
<i>Marine and Coast</i>	Teaches children about local and/or global coastal and marine habitats, how people are affecting these habitats and what we can do to protect them.
<i>School Grounds</i>	Encourages schools to introduce children to the natural environment and to biodiversity in a practical way by offering a safe and potentially exciting facility for outdoor education that can complement classroom-based activities.
<i>Transport</i>	Suggests ways for pupils, staff and local government to work together to raise awareness of transport issues and come up with practical solutions that will make a real difference to pupils' everyday lives.
<i>Waste</i>	Examines the impact of waste on the environment and explores actions to minimise the amount of waste that we produce and dispose of daily.
<i>Water</i>	Introduces the importance of water both locally and globally and raises awareness of how simple actions can substantially cut down water use.

Table 4: The different 12 themes of Eco-Schools programme, at least three of these themes must be reviewed for the Environmental review.

Assessment for the Green Flag.

After implementing the programme for some time and once that a high level of performance is achieved (usually it takes two years since a school enters the programme) schools can apply for and be awarded with the Green Flag.

This Green Flag that in 2020 is proudly hoisted in 19,782 schools globally, shows the commitment and achievement of the school community towards environmental and social causes. For renewing the awarded Green Flag, schools must include five instead of three themes of the "Eco-Schools Themes", this highly promotes schools being more proactive and ambitious after the two first years of the programme.

3. Methods.

Different elements had contributed to investigate and provide answers to the research questions proposed in this thesis. First, my experience as a FEE intern for almost a year provided many of the ideas and motivation inspiring this thesis, and FEE workers contributed with their experience, support, and time for solving and advising in this thesis preparation.

During my experience at FEE as an intern, where I could work together with FEE's strategic team on the development of its strategy for the 2020-2030 period, it was frequently debated and discussed the necessity of having key performance indicators showing the outcomes achieved by FEE and its extensive network. This necessity together with the recent developments in the field of human-nature connection highly influenced the development of this thesis.

Together with the experience at FEE, a literature review was carried out to investigate the recent publications and pieces of evidence relevant to the thesis' aim and objectives, with a special focus on the tools for measuring the connection with nature and its associations with pro-environmental behaviours.

The methods chapter is divided into two sections, first, the students' survey and its different processes will be detailed. Secondly, the teachers' survey and its process will be detailed, in order to provide a clear picture of how this thesis was executed.

3.1 Students' survey.

The students' connection with nature survey, based on the identified tool, had different steps that will be explained in different sections in order to provide a clearer explanation of the methods used.

The students' survey provided the answers regarding the feasibility of choosing, translating, and using a tool (published in English and tested in western-developed countries) in Spanish-speaking countries. The different analyses completed, explained in the methods and detailed in the results and discussion section, had the aim of verifying that the values obtained were reliable, and aligned with the literature findings.

3.1.1 Selecting a connection with nature measurement tool.

For measuring the students' connection to nature, the measurement tools available and tested in English were studied (see section 2.4 "Review of different tools to measure nature connection"). In our study, only the quantitative tools were taken into consideration. It was avoided to use qualitative tools, as these types of tools required more training and involvement of the responsible for collecting the data. Quantitative tools for measuring nature connection had also the advantage of data being easier to collect and that requires less time for interpreting the results.

From the literature review and based on the recommendations from both the NAAE (North America Association for Environmental Education) professionals with a great experience in connecting children with nature and professionals from FEE, two tools were pointed as the most suitable. The two tools identified as the most suitable for being used with the Spanish speakers' students from Eco-Schools, were the Nature Relatedness Scale (NR) developed by Nisbet et al (2009) and the Nature Connection Index (CNI) developed by Cheng & Monroe, (2012).

It was decided to use the "NR-6" which consists of a Likert scale comprehending 6 items, instead of the original Nature Relatedness Scale that consisted of 21 statements. The main advantage of this tool, when compared with the Nature Connection Index tool, is that the NR-6 was the only tool that the Spanish translation could be found. Dornhoff et. al, (2019) translated the tool into Spanish to measure Ecuadorian students' connection with nature.

As part of the selection process, the NR-6 was pre-tested and shared with FEE's workers and two Spanish teachers interviewed. They contributed to the selection process with their expertise and recommendations. The NR-6 raised concerns, specifically regarding one of the 6 items. Below it could be found the NR-6 scale and the different items.

1. My ideal vacation spot would be a remote, wilderness area.
2. I always think about how my actions affect the environment
3. My connection to nature and the environment is a part of my spirituality.
4. I take notice of wildlife wherever I am.

5. My relationship to nature is an important part of who I am.
6. I feel very connected to all living things and the earth.

Table 5: The NR-6 measurement tool, consisting of six statements to which respondents need to point their degree of agreement/disagreement.

As it can be seen above, the NR-6 scale consists of six different statements, to which respondents must indicate their degree of agreement or disagreement with each statement. The values for each item vary from 1 to 5, being 5 totally agreement and 1 the opposite. The NR-6 final result is calculated by doing the mean of the 6 different statements, thus can vary from 1 to 5, with a value of 5 indicating the strongest connection with nature possible.

During the pre-test sampling, statement number 3 *“My connection to nature and the environment is part of my spirituality”* raised concerns from both, FEE’s educational team workers and from Spanish teachers. As the goal was to measure the connection with nature from primary students, Spanish teachers participating in the pre-test were asked if they believed that the survey and its different items were easy to understand for a primary school student. A teacher indicated that *“I highly doubt that a 12 years-old could fully understand it”*. Statement number 3 also raised some concerns regarding the different cultures participating in FEE’s programmes and how this specific item response could vary depending on the “spirituality/religion” and social contexts, without reflecting a clear link with the connection with nature.

Despite NR-6 being already translated in the literature and that it was recommended and suitable for the study, it was decided to use the Connection to Nature Index tool to avoid the potential issues for item number three being used in different cultures and contexts. The Connection to Nature Index tool was also recommended by the NAAE professionals during a webinar focused on measuring the connection with nature.

In the election of the CNI as the measurement tool, it also contributed the fact that according to Bragg et al (2013), when children were asked, the CNI tool was the easiest and preferred for answering compared with the NR-6 (and the INS (Inclusion of Nature in Self)).

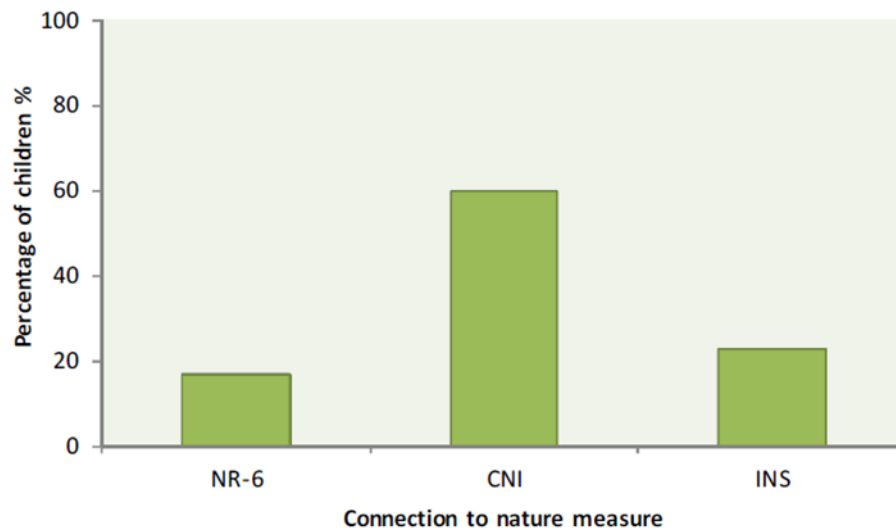


Figure 9: Obtained from Braggs et al (2013). The graph showing how the major percentage of children preferred the CNI tool over the other two tested: NR-6 and INS.

After it was decided to implement the CNI tool, this tool again was distributed to the FEE education team. The CNI tool was also distributed to Spanish teachers to gather their concerns or comments, and to investigate if the tool was easy to understand by primary schools' students.

Regarding the CNI tool, the comments received, by FEE educational team and Spanish teachers, mentioned that there could be a potential cultural aspect influencing on item number 8 "I like to collect rocks/shells/leaves in nature". It was argued that the collecting behavior could vary depending on the culture and even if there were regulations preventing the collection of natural elements such as the described in the CNI tool.

Nature Connection Index Survey:

How much do you like to see or do the following things?

(Students marked one of the Likert choices, between "Do not like at all" and "Like very much")

1.	See plants and flowers in nature.
2.	See wild animals living in a clean environment.
3.	Take care of animals and plants.
4.	Touch animals and plants.
5.	Love and care for nature.
6.	Go outside and enjoy nature.
7.	Learn more about nature.
8.	Collect rocks/shells/leaves in nature.
9.	Hear different sounds when I am in nature.
10.	Grow vegetables and plants.
11.	Be in the outdoors.
12.	Live with plants and animals.
13.	Consider myself as part of nature.
14.	Feel comfortable and peaceful in nature.

Table 6: Adaptation of the original CNI tool, from Cheng, J.C. & Monroe, M. C., (2012). Connection to nature: Children's affective attitude toward nature. *Environment and Behavior*, 44. This is their revised version, available in Salazar et. al, 2020 used with the author's permission.

Above can be seen the Connection to Nature index tool. It consists of a Likert scale, where respondents need to rank on a five-degree scale how much they like to see or to do each statement described. The CNI value is the mean of the sum of the 14 statements listed, the final value can vary from 1 to 5.

3.1.2 Translating the CNI tool.

The authors who published the CNI tool (Judith Cheng and Martha Monroe) and were contacted, didn't know any publication where the CNI was used in Spanish. That's why the CNI tool needed to be translated for being used with the Spanish-speaking students participating in the Eco-Schools programmes.

For the CNI tool translation, five Spanish teachers were contacted, four of them considered themselves bilingual, and they also taught their lessons in English, as in Spain,

primary schools have some subjects imparted in English to promote Spanish-English bilingualism among students.

Teachers contributing with the translation received the CNI tool, in English, and were asked to translate all the different elements of the CNI tool, including the students' brief guide to answer it and the title, as well as the different statements.

Teachers were asked to send back the Spanish translation, and with the 5 different translations, the common points and agreements were assumed to be well-translated.

For the remaining elements, where there were some slight differences in the Spanish translations, the possible translations were gathered in a document and circulated again with the teachers that contributed to the translation. Teachers had to vote for the statements that they believed were better translated. For creating the final translation, the most voted statements were assumed to be the best translations and combined with the statements were all translators agreed on the Spanish translation.

The Spanish version of the CNI can be found in Appendix I.

3.1.3 Students' survey data collection.

The Spanish-speaking countries participating in FEE's Eco-Schools programme were selected: Mexico, Colombia, Spain, Puerto Rico and the Dominican Republic. With the exemption of Colombia, FEE contacted the National Operators in charge of the implementation of the Eco-School programme in these countries.

Communications with the National Operators were done by email explaining to them the motivations and aims of the study. The expectations of the desired numbers of students responding per school, established in 3 schools per country and 30 students per school were also clarified to the different National Operators.

National Operators from Mexico, Spain, Puerto Rico and the Dominican Republic received the Connection to Nature Index tool translated in Spanish, as well as the Spanish survey that teachers were asked to respond to complement the student's survey.

National Operators contacted the schools and sent them the information and links required to execute the study. In the case of Colombia, as no National Operator is

coordinating the Eco-Schools programme now, being FEE Head Office in charge, the three schools chosen to participate in the study were directly contacted by FEE.

For the data collection, SurveyMonkey was used, as it is an easy online survey software and FEE and its network had years of experience using it. To facilitate the analysis, a link for each school was created. As explained above, the required number of schools per country surveyed was established in three, but in the case of Mexico, the National Operators asked to survey in 5 of their schools.

Apart from the CNI tool, the students' survey included two questions at the beginning, before the translated CNI tool, in which students were asked about their gender and age. Students' needed to mark one of the following options for the gender question: "a) Female, b) Male and c) Prefer not to respond". Regarding the age question, students needed to choose one of the following options: "a) Between 6 & 8 years, b) Between 9 & 11 years, and c) Between 12 & 14 years. After answering these two questions, students needed to fulfil the CNI questionnaire, described earlier (Table 6).

Surveys were sent to the schools, at the beginning they were given one month to compile the required number of answers. The number of responses were not sufficient for the study, due to complications derived from the Covid pandemic such as the increased online teaching or schools being closed. In order to gather a significant number of answers for the study, the time was extended to two months.

Participants of the survey received an email at the third week, kindly reminding them to compile the survey, and to explain to them that the deadline for collecting the data was extended another month. The last reminder was sent when there were two weeks left remaining for the deadline.

3.1.4 Students' data analyses.

Once the extended deadline occurred, the surveys were closed, and the answers were gathered and cleared. By using both Microsoft Excel and SPSS, several analyses were done, as the calculation of the reliability indexes (alpha Cronbach), the mean differences and standard deviation for each item, and the differences among gender, urban or rural among others. This different analyses were done at different levels, as detailed in the next chapter "Results", in some cases, the analyses were counting with the global sample (all

the Spanish speaking students), when in some cases the analyses were at national level or school level.

The results obtained from these analyses were then compared with the results from similar studies that implemented and used the CNI tools, as well as other studies looking at measuring the connection with nature in children with other tools. The analyses executed from the students' answers, contributed to answering the first research question of this thesis.

3.2. Teachers' survey.

The teachers' surveys, as explained before, were sent together with the students' survey to the different National Operators and directly to the schools' teachers in the case of Colombia. National Operators and teachers contacted were asked to answer first the teachers' survey, as it included some information regarding the aims of the study, as well as contact information and the CNI tool in Spanish, for them to have a look at it and contact FEE in case they had any comment, suggestion or doubt.

In comparison with the students' survey, the teachers' survey was more complex and lengthy to answer. It consisted of three parts that will be explained below. National operators and the schools contacted directly were asked to have at least one teacher per school answering the survey.

3.2.1 Teachers' survey design.

The survey sent to the teachers was written in English after consulting it with FEE's educational team and the academic supervisors of this thesis, who provided convenient and helpful advice to prepare the final version of the survey. Once the final version was written and planned, the questions were translated into Spanish.

This survey had three parts, first, teachers were asked about general information about themselves and their schools, secondly, they were asked closed question (they needed to rank several statements) related to the connection with nature construct, thirdly, teachers were asked open questions in which they needed to write the answers. Lastly, once the surveys were completed, the information regarding the students' survey as well as the study aims and motivations were shared with the teachers to provide teachers with

the necessary information of the next steps of the study as well as the requirements of it.

“Teachers’ survey”:

(Note that the survey sent to the teachers was written in Spanish, but here is the English version).

First part: “Information about you and your school”.

Name	<i>(open textbox).</i>
School Name	<i>(open textbox).</i>
Email	<i>(open textbox).</i>
Country	<i>(they had to choose the country from a list).</i>
Age	<i>(open textbox).</i>
Gender	<i>a) Female, b) Male, c) other, d) prefer not to say.</i>
Years of teaching experience	<i>(open textbox).</i>
Mark which FEE programme is your school participating in	<i>a) Eco-Schools, b) Young Reporters for the Environment (YRE), c) Learning About Forests (LEAF).</i>
Write the number of years participating in Eco-Schools	<i>(open textbox).</i>
Write the number of years participating in YRE	<i>(open textbox).</i>
Write the number of years participating in LEAF	<i>(open textbox).</i>
Does your school participate in other environmental education programme, apart from the ones FEE implement?	<i>a) no, b) yes. If marked b, please write the name of the programme below.</i>
Number of primary students (age 6 to 14) in your school	<i>(open textbox).</i>
“Would you consider your school to be placed in:”	<i>a) Rural environment, b) Urban environment.</i>

Second part: “Understanding the connection with nature”.

How many times in a month do you conduct class activities outdoors?	<i>(open textbox).</i>
What is the usual duration of these activities?	<i>a) Less than 1 hour, b) 1 to 2 hours, c) 2 to three hours, and d) more than three hours.</i>

Could you try to estimate, the number of hours in an academic year, that each class spend doing the outdoor activities?	<i>(open textbox).</i>
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"Please, rank the following statements from 1 to 5, being 1 "strongly disagree" and 5 "strongly agree".

Formal education should promote and increase students' connection with nature	<i>a) 1, b) 2, c) 3, d) 4 and e) 5.</i>
Non-formal education activities and organisations, such as the Scouts, should promote and increase student's connection with nature.	<i>a) 1, b) 2, c) 3, d) 4 and e) 5.</i>
Formal education increases students' connection with nature.	<i>a) 1, b) 2, c) 3, d) 4 and e) 5.</i>
Eco-School programme increases the students' connection with nature.	<i>a) 1, b) 2, c) 3, d) 4 and e) 5.</i>
YRE programme increases the students' connection with nature.	<i>a) 1, b) 2, c) 3, d) 4 and e) 5.</i>
LEAF programme increases the students' connection with nature.	<i>a) 1, b) 2, c) 3, d) 4 and e) 5.</i>
It is possible to measure and quantify the students' connection with nature.	<i>a) 1, b) 2, c) 3, d) 4 and e) 5.</i>
An elevated connection with nature promotes pro-environmental behaviours in students.	<i>a) 1, b) 2, c) 3, d) 4 and e) 5.</i>
Human-nature connection is mainly influenced by personal values and beliefs, influenced by the sociocultural context.	<i>a) 1, b) 2, c) 3, d) 4 and e) 5.</i>
Human-nature connection is mainly influenced by the frequency and quality of personal experiences in nature.	<i>a) 1, b) 2, c) 3, d) 4 and e) 5.</i>
Human-nature connection is mainly influenced by the presence, type and quality of the natural environments and early experiences in life.	<i>a) 1, b) 2, c) 3, d) 4 and e) 5.</i>

Third part: "Open questions".

Please, list the first five words or short sentences that come to your mind when you think about the word "nature"	<i>Five textboxes were available. It was required to at least write three words/sentences.</i>
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Please, write the first positive aspects that come to your mind when thinking about the personal benefits of having a good or high connection with nature.	<i>Five textboxes were available. It was required to at least write three words/sentences.</i>
Please, indicate which Eco-Schools aspects or activities contribute stronger to increase the student's connection with nature.	<i>(three textboxes available).</i>
Please, indicate which YRE aspects or activities contribute stronger to increase the student's connection with nature.	<i>(three textboxes available).</i>
Please, indicate which LEAF aspects or activities contribute stronger to increase the student's connection with nature.	<i>(three textboxes available).</i>
Based on your professional experience, please indicate some ideas on how formal education could increase students' connection with nature.	<i>(three textboxes available).</i>

At the end of the survey, teachers received the instructions and the CNI tool for measuring the students' connection with nature, they also had the contact information, in case they wanted to ask something or if there were any extra clarifications needed.

3.2.2 Teachers' data collection and analyses.

The survey showed above, was sent to the teachers through the National Operators or directly by the FEE team, as in the case of Colombian schools. The survey was elaborated using SurveyMonkey, and only one link for the whole teachers' survey was created, to facilitate the comparison among the answers of the different teachers.

Teachers' surveys results helped solve the second research question of this thesis, investigating the different perceptions and ideas that teachers have in relation to the connection with nature. The data was analysed, as in the students' survey, using Microsoft Excel and SPSS.

An online software was used for producing the word cloud with the first concepts and sentences that teachers associated with the concept of nature.

In the closed questions of the survey (second part), to quantitatively analyse the results, the Likert scale from "Strongly disagree" to "Strongly Agree" was transformed to numbers, being 1 complete disagreement and 5 complete agreement with that specific statement.

For the third part, where the questions were open, the responses that teachers provided were categorised when possible based in the common points, under a broader category in order to provide clearer results.

One of the reasons behind the teachers' analysis was to provide more information to the students' responses (for example if the students were considered "urban" or "rural" and the amount of time they spent in outdoor activities). The teachers' survey analyses were not aimed at comparing the different nature views depending on the country, that's why the results from the teachers' surveys were analysed on a global level.

4. Results.

4.1 Students' survey.

The total amount of answers received was 506 students. Only 6 answers were discarded, as they were not properly answered. In the six cases, students wrongly introduced their age, as the age that they introduced didn't coincide with the ages of that specific school students.

The 500 students' survey responses were from 11 different schools, from 5 different Spanish-speaking countries. The number of responses by school and country can be found below:

Schools' codes	Number of responses
Mexico 1	201
Mexico 2	17
Mexico 3	25
Mexico 4	50
Mexico 5	34
Colombia 2	29
Spain 1	18
Spain 2	22
Dominican Republic 2	22
Dominican Republic 3	45
Puerto Rico 2	37
Total	500

Country	Number of responses
Mexico	327
Colombia	29
Spain	40
Dominican Republic	67
Puerto Rico 2	37

Table 7 & 8: Number of students that responded to the survey by school (table 7) and by country (table 8).

As can be observed from the schools' codes (Table 7), there were more schools contacted for the study, but their students didn't answer the survey. This could be explained due to the overworking that those schools had during the time of the study, with some of them even being closed and only teaching virtually due to the COVID-19 pandemic. Two reminders were sent to each school, by writing the contact person of each school, information that was provided by the National Operators working with FEE in the Spanish Speaking countries.

In total, there were contacted 19 schools. From Mexico 5 schools participated in the survey, Puerto Rico and the Dominican Republic contributed with 4 schools each, and, for Spain and Colombia, 3 schools participated.

When the national operators or the teachers were contacted to make their students answer the survey, they were kindly asked to have at least 30 students responding to the survey. This value wasn't reached in all the schools, mainly due to the difficulties that these schools were and are still experiencing from the absence of presential classes due to the COVID-19 pandemic.

The response rate, if calculated by country and classes, was relatively low. Except for Mexico that highly contributed to this study and mobilised most of the students, the rest of the countries did not reach the desired number of approximately 90-120 students (they were asked to have at least 30 students per school and 3 schools per country).

The table below (9) shows the response rate for the schools and countries selected for the study. First, they are calculated for all the schools contacted (counting the 19 schools that were contacted, either by FEE or by National Operators). Secondly, an analysis of the schools that contributed is done, where it is possible to see how many schools achieved the required 30 students by school.

School	Number of students' responses	Completion rate (%)
Mexico 1	201	670,0
Mexico 2	17	56,7
Mexico 3	25	83,3
Mexico 4	50	166,7
Mexico 5	34	113,3
Colombia 1	0	0,0
Colombia 2	29	96,7
Colombia 3	0	0,0
Spain 1	18	60,0
Spain 2	22	73,3
Spain 3	0	0,0
The Dominican Republic 1	0	0,0
The Dominican Republic 2	22	73,3
The Dominican Republic 3	45	150,0
The Dominican Republic 4	0	0,0
Puerto Rico 1	0	0,0

Puerto Rico 2	37	123,3
Puerto Rico 3	0	0,0
Puerto Rico 4	0	0,0
All	500	87,7

Table 9: Number of responses and response rate for each of the schools that the communications were initiated, note hoe some of them exceeded by far the number of answers required (30) and other schools did not provide an answer.

The global completion rate, summing all the students' responses, and counting with the schools that didn't participate was 87,7%.

According to the statistics provided by SurveyMonkey, the online software used for this survey, the average time required to complete the students' survey was 3 minutes.

Reliability and consistency analyses.

One of the main points of this research was to analyse if the tools measuring connection with nature, written originally in English, could be replicable in Spanish Speaking countries. The reliability and consistency of the students' answers were studied, by grouping the answers by schools and calculating independently their Cronbach's alpha values.

Cronbach's values are expressed by a number between 0 and 1. When this value is higher than 0.70 ($\alpha=70$) it is considered that the tool studied is measuring that construct in a reliable manner. What Cronbach's level shows is the level of agreement between the items on a certain scale, measured by the degree of correlation between respondent's answers across the different items (Salazar et. al, 2020).

The Connection to Nature Index (CNI) used for this thesis, had an initial Cronbach's value of 0.87 when first tested (Cheng & Monroe, 2012). Below can be found the Cronbach's values for each of the schools surveyed.

	Cronbach's Alpha	N
Mexico 1	0.862	201
Mexico 2	0.754	17
Mexico 3	0.937	25
Mexico 4	0.833	50

Mexico 5	0.953	34
Colombia 2	0.919	29
Spain 1	0.85	18
Spain 3	0.822	22
Dominican Republic 2	0.817	22
Dominican Republic 3	0.857	45
Puerto Rico 2	0.91	37

Table 10: Cronbach's values from the schools that participated in the study (second column) on the third column is represented the number of students that participated.

As can be seen above, all the Cronbach's values obtained in our surveys were higher than the acceptable value of $\alpha=0.70$. The lowest score obtained ($\alpha=0.754$) corresponding to "Mexico 2" was still higher than 0.70, this low value of α could be explained by the low number of students replying to the survey in Mexico 2 (N=17).

The Cronbach's values obtained are positively showing that there are both high internal consistency and internal reliability for the measurement tool. The values obtained in the Spanish speaking countries did not differ much from the Cronbach's values obtained by both researchers validating this measure ($\alpha=0.87$ Cheng & Monroe 2012) and other researchers using the CNI $\alpha=0.84$ (Hughes et. al 2018). One thing important to note is that in the Spanish-speaking schools, the explanation of the survey delivered to the students before doing it was made by the teachers, and not researchers with expertise on these topics. The explanation of the survey and the dedication time from the students and other parameters could not be controlled for this study, but overall, the values for reliability and consistency were acceptable for all the schools surveyed.

Analyses of the different items of the CNI tool.

Analyses were executed at three different levels, first at school level, secondly at the country level and lastly at the global level (all the different countries). In the following table, the CNI results are shown, by school, country and global.

	CNI	SD
Mexico 1 (N=201)	4,42	0,67
Mexico 2 (N=17)	4,63	0,34
Mexico 3 (N=25)	4,17	0,80
Mexico 4 (N=50)	4,07	0,55
Mexico 5 (N=34)	4,36	0,80
Mexico All (N=327)	4,35	0,68
Colombia 2 (N=29)	4,17	0,81
Spain 1 (N=18)	3,87	0,59
Spain 3 (N=22)	4,20	0,56
Spain All (N=40)	4,05	0,59
Dominican Republic 2 (N=22)	4,34	0,56
Dominican Republic 3 (N=45)	3,94	0,62
Dominican Republic All (N=67)	4,07	0,63
Puerto Rico 2 (N=37)	4,01	0,78
Global (N=500)	4,25	0,69

Table 11: Mean CNI of the schools and countries participating in the study, in the third column it is reflected the standard deviation of the mean CNI.

As it was mentioned before, the CNI tool provides values between 1 and 5, based on the mean of the 14 items Likert scale that the CNI survey consists of. Analyses of the different items were executed, at the three different levels, to investigate the tendencies and standard deviations of the responses.

An analysis of the mean CNI distribution among all the students showed that the variable was not normally distributed. When analysed the items individually, these did not show to be normally distributed, neither for the global sample nor when the data was analysed by country.

In the figure below (figure 10) it can be seen how the sample was not normally distributed, the Kurtosis value obtained is 3,826. This value shows that the mean values obtained from all the students were higher than what could be expected if the variable was normally distributed.

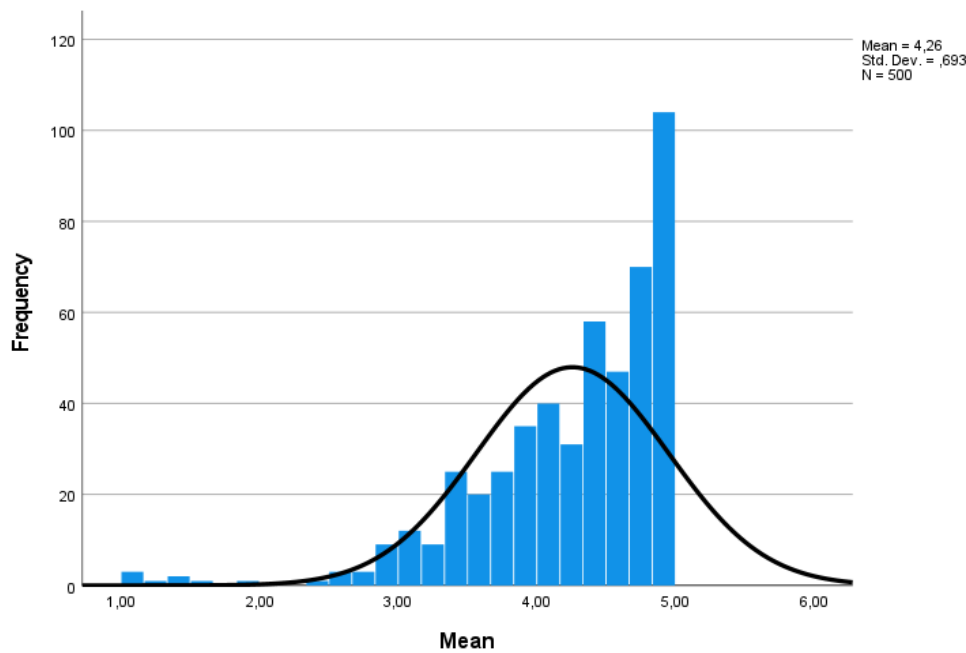


Figure 10: Graph displaying the frequency of CNI values, and how these differ from the normality curve (black line) for the global sample (all the Spanish-speaking students).

From the results obtained (shown in Table 12 below) there were some items with high standard deviations. The item with the lowest mean value (suggesting that children don't like doing that) and highest standard deviation was item 8 "Collect rocks/shells/leaves in nature" (global mean= 3,61 SD= 1,45), followed by item 10 "Grow vegetables and plants" (global mean 3,75, SD=1,36).

Collecting behaviour in children has been described as "a natural instinct, a serious form of play, a serious pursuit, a passion, a challenge and a normal part of life" (Waller et al, 2017). According to the authors, this collecting behaviour is proven to foster pro-environmental attitudes as well as educational outcomes such as skills in "selection, classification, labelling, organization, reading, speaking and presentation". The most popular locations for collecting nature items according to the authors are at home and during travel, followed by parks within walking distance, parks beyond walking distance, schools and summer cottages.

The low values related to the collection behaviour, have two potential explanations. First, the lack of access to nature will impede the development of these behaviours, and secondly, there could be cultural differences among the western civilizations where the

collecting behaviours in children were analysed compared with the Spanish-speaking countries studied here.

Related to the cultural differences, after analysing the results, a Spanish teacher interviewed gave an explanation regarding the collecting behaviour, pointing that at least at her school “collecting behaviours are not encouraged while doing outdoor activities in order to preserve nature”.

	MEXICO N=327		COLOMBIA N=29		SPAIN N=40		DOM.REP N=67		P. RICO N=37		GLOBAL N=500	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Q1: “See plants and flowers in nature”	4,36	1,15	3,55	1,48	3,71	1,19	3,85	1,15	4,03	1,24	4,17	1,21
Q2: “See wild animals living in a clean environment”	4,42	1,09	4,69	0,85	4,63	0,62	4,46	0,76	4,26	1,29	4,44	1,03
Q3: “Take care of animals and plants”	4,61	0,82	4,59	0,87	4,24	0,99	4,41	0,78	4,13	1,17	4,52	0,87
Q4: “Touch animals and plants”	4,45	1,03	4,17	1,26	4,39	0,83	4,24	1,04	4,16	1,13	4,38	1,04
Q5: “Love and care for nature”	4,67	0,74	4,48	0,91	4,32	0,99	4,63	0,67	4,29	1,04	4,60	0,80
Q6: “Go outside and enjoy nature”	4,44	1,03	4,52	0,99	4,37	1,02	4,29	0,92	4,21	1,19	4,40	1,02
Q7: “Learn more about nature”	4,23	1,15	4,48	0,95	3,68	1,11	4,06	0,98	3,34	1,10	4,11	1,14
Q8: “Collect rocks/shells/leaves in nature”	3,78	1,44	3,66	1,47	3,46	1,25	3,28	1,45	2,87	1,40	3,61	1,45
Q9: “Hear different sounds when I am in nature”	4,38	1,09	3,69	1,20	3,80	1,05	4,00	1,21	4,21	0,99	4,23	1,12
Q10: “Grow vegetables and plants”	3,94	1,33	3,97	1,45	3,10	1,36	3,18	1,27	3,66	1,24	3,75	1,36
Q11: “Be in the outdoors”	4,52	0,95	4,55	0,95	4,73	0,50	4,40	0,92	4,50	1,06	4,52	0,93
Q12: “Live with plants and animals”	4,38	1,04	4,00	1,41	4,10	1,16	4,04	1,08	4,34	1,05	4,29	1,09
Q13: “Consider myself as part of nature”	4,18	1,11	3,66	1,23	3,80	1,14	3,84	1,27	3,89	0,98	4,05	1,15

Q14: "Feel comfortable and peaceful in nature"	4,56	0,91	4,38	0,94	4,41	0,77	4,28	1,09	4,29	1,06	4,48	0,94
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Table 12: Mean value and standard deviation for each of the 14 CNI items by country and global.

Rural and urban differences.

Assuming that those schools located in rural environments would have more access and contact with nature in the surroundings and near the students' house, teachers were asked if their school were located "in a rural or urban environment".

There were some differences among the answers obtained from the urban and rural contexts. With an overall higher CNI in the rural schools supported, there were also interesting findings in the differences among the CNI survey.

	N	Mean CNI	Std. Deviation
Urban	196	4,1192	0,66019
Rural	304	4,3407	0,69863
Total	506	4,2536	0,69164

Table 13: Urban and Rural students' mean CNI and their standard deviations.

As the mean CNI values are not normally distributed, a Mann-Whitney U Test was performed to assess if the differences among rural and urban students were statistically significant. When the Mann-Whitney U Tests were performed, the level of significance used to assess the differences between groups was $p=0,05$. Items with a p-value higher than 0,05 were considered that there were not statistically different.

There were statistically significant differences among rural and urban students mean CNI, with an asymptotic significance value of $p=0,000$. Except for item 2 (See wild animals living in a clean environment) and item 5 (Love and care for nature) where no statistically differences were found, the other 12 items were found to be statistically different for rural and urban students.

		Mean	SD	p
Q1 See plants and flowers in nature.	Urban	4,11	1,06	0,007
	Rural	4,21	1,29	
Q2 See wild animals living in a clean environment.	Urban	4,46	0,90	0,157
	Rural	4,44	1,11	
<i>(no statistical difference found)</i>				
Q3 Take care of animals and plants.	Urban	4,39	0,86	0
	Rural	4,60	0,87	
Q4 Touch animals and plants.	Urban	4,26	0,98	0
	Rural	4,46	1,07	
Q5 Love and care for nature.	Urban	4,56	0,78	0,087
	Rural	4,62	0,81	
<i>(no statistical difference found)</i>				
Q6 Go outside and enjoy nature.	Urban	4,25	0,97	0
	Rural	4,50	1,05	
Q7 Learn more about nature.	Urban	3,86	1,11	0
	Rural	4,27	1,13	
Q8 Collect rocks/shells/leaves in nature.	Urban	3,37	1,40	0
	Rural	3,77	1,46	
Q9 Hear different sounds when I am in nature.	Urban	4,15	1,11	0,026
	Rural	4,29	1,13	
Q10 Grow vegetables and plants.	Urban	3,46	1,29	0
	Rural	3,94	1,37	
Q11 Be in the outdoors.	Urban	4,39	0,94	0
	Rural	4,61	0,91	
Q12 Live with plants and animals.	Urban	4,16	1,02	0
	Rural	4,37	1,13	
Q13 Consider myself as part of nature.	Urban	3,91	1,12	0,007
	Rural	4,14	1,15	
Q14 Feel comfortable and peaceful in nature.	Urban	4,37	0,99	0,007
	Rural	4,55	0,91	

Table 14: differences between all rural and urban answers for each of the 14 statements. Right column (p) shows the level of significance according to the Mann-Whitney U Tests of the differences among rural and urban for each statement. When p was higher than 0.05 it was considered no statistically difference.

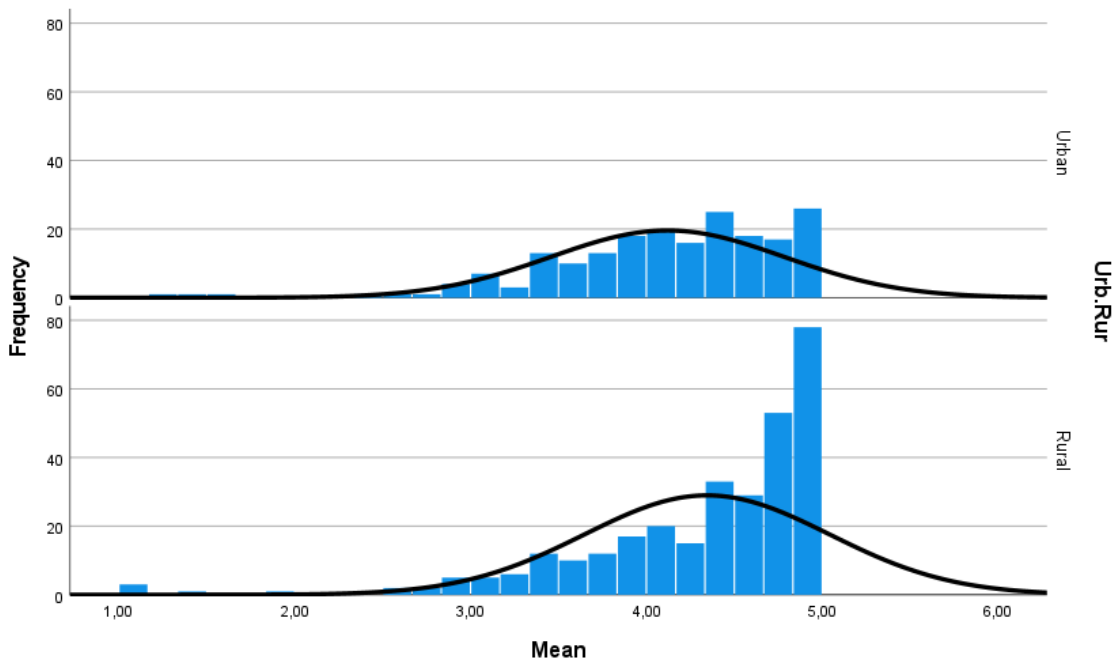
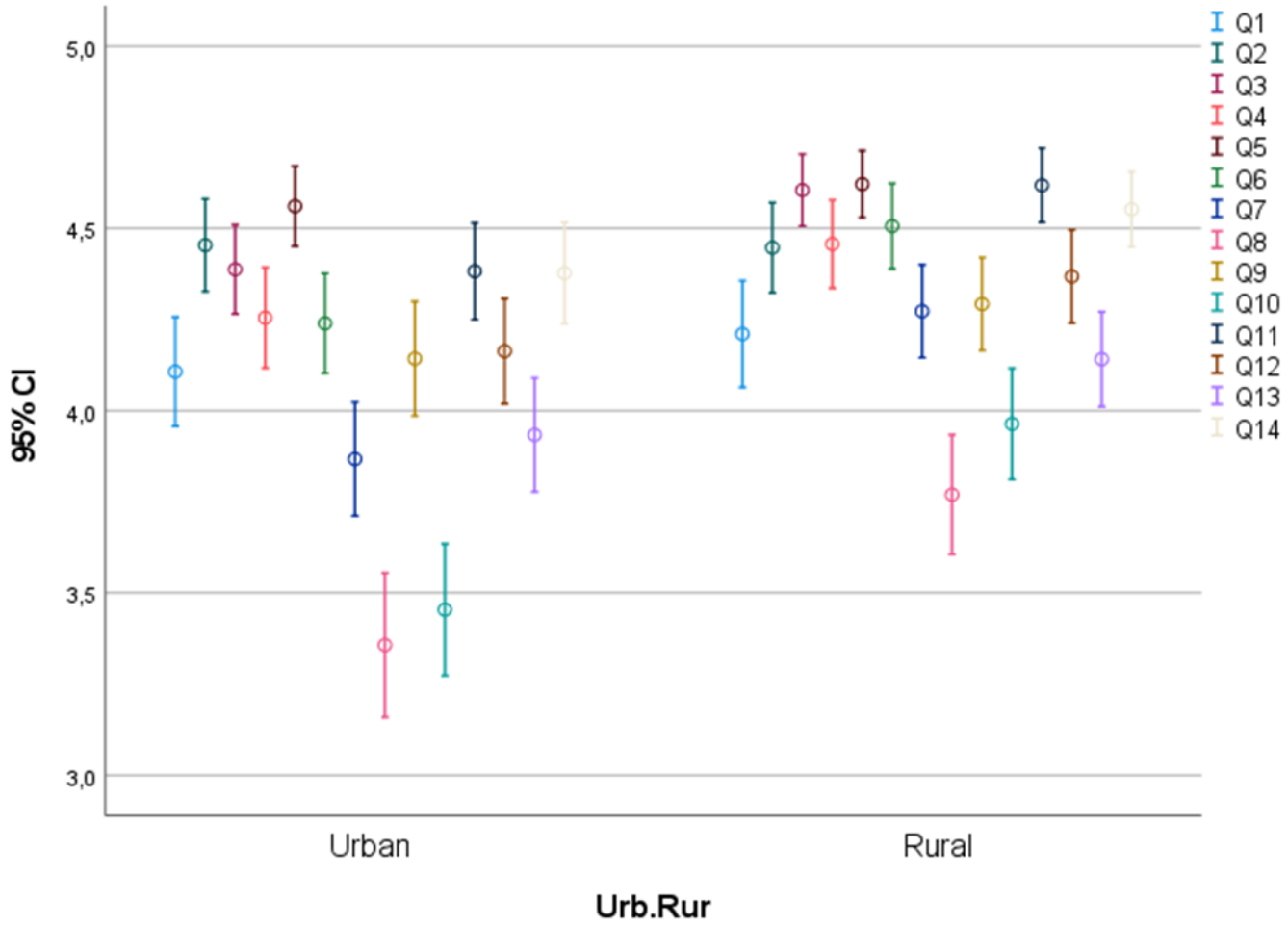


Figure 11 & 12: graph showing the mean value of each of the 14 CNI statements (11) urban vs rural students. Figure 12 (below) Graph showing differences between rural and urban mean CNI (found to be statistically significant).

As can be seen in the table 14 and figure 11, except for item 2 "See wild animals living in a clean environment" (which did not showed statistically significant difference) all the other items, were highly ranked (more preferred) by the students of schools located in rural contexts. These results coincided with the results from Hinds & Sparks (2008) where they found that the *"Participants from rural childhoods reported more positive affective connections, stronger identification, stronger behavioural intentions, more positive attitudes, more acceptable subjective norm, and greater PBC (perceived behavioural control) about engaging with the natural environment than did participants with urban childhoods"* (pp 115).

The results also supported the model of Cheng & Monroe, 2012, where the presence of nature near homes contributed 0,11 to the variance of the connection to nature. The items with the highest differences between rural and urban means, was item 10 "grow vegetable and plants" with 13,87% difference between rural and urban, followed by item 7 "learn more about nature" with a 10,6% difference between the rural and urban mean.

CNI differences in gender.

As can be seen below, there were differences among the students' answers if they were male or female. The results shown in tables 15 & 16, are from the global sample.

	N	Mean	Std. Deviation
Male	205	4,10	0,79
Female	295	4,37	0,59
Total	500	4,25	0,69

Table 15: students' responses grouped by gender, mean CNI and standard deviations.

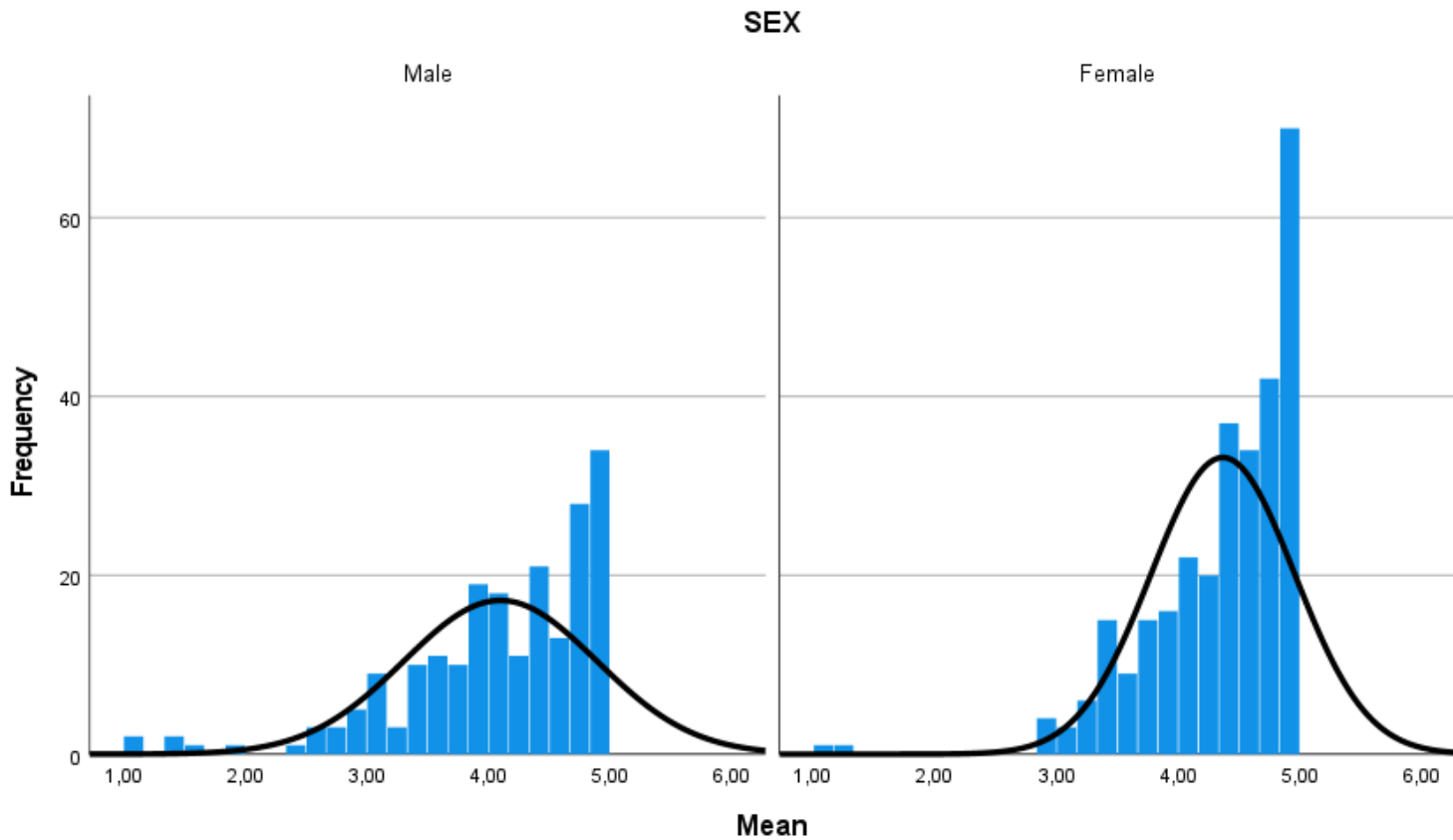


Figure 13: Mean CNI results for male and females, as can be observed, both of the groups do not show to be normally distributed (black line) and females had higher mean CNI values.

Again, Mann-Whitney U Test were performed to analyse if the differences found among female and male students were statistically significant.

There were statistically significant differences among females and males students mean CNI, with an asymptotic significance value of $p=0,000$.

Item	Gender	N	Mean	SD	p
Q1 See plants and flowers in nature.	Male	205	3,82	1,40	0
	Female	295	4,41	0,99	
Q2 See wild animals living in a clean environment. (no statistical difference found)	Male	205	4,44	1,02	0,647
	Female	295	4,45	1,03	
Q3 Take care of animals and plants.	Male	205	4,40	0,94	0,002
	Female	295	4,61	0,82	
Q4	Male	205	4,30	1,10	0,247

Touch animals and plants. (no statistical difference found)	Female	295	4,43	0,99	
Q5 Love and care for nature.	Male	205	4,45	0,94	0
	Female	295	4,70	0,67	
Q6 Go outside and enjoy nature.	Male	205	4,24	1,13	0,002
	Female	295	4,51	0,93	
Q7 Learn more about nature. (no statistical difference found)	Male	205	4,06	1,17	0,363
	Female	295	4,15	1,12	
Q8 Collect rocks/shells/leaves in nature.	Male	205	3,26	1,51	0
	Female	295	3,85	1,35	
Q9 Hear different sounds when I am in nature.	Male	205	4,02	1,23	0
	Female	295	4,38	1,02	
Q10 Grow vegetables and plants.	Male	205	3,57	1,45	0,019
	Female	295	3,90	1,26	
Q11 Be in the outdoors.	Male	205	4,37	1,05	0,001
	Female	295	4,63	0,81	
Q12 Live with plants and animals.	Male	205	4,18	1,15	0,041
	Female	295	4,36	1,05	
Q13 Consider myself as part of nature. (no statistical difference found)	Male	205	3,92	1,23	0,058
	Female	295	4,16	1,06	
Q14 Feel comfortable and peaceful in nature.	Male	205	4,34	1,07	0,003
	Female	295	4,59	0,84	

Table 16: differences among male and female responses by each of the CNI statements. While performing the Mann-Whitney U, if the p-value obtained were higher than 0,05 it was considered that there were no statistically differences among females and males responses.

The Mann-Whitney U Tests performed to assess the statistically significant differences among females and males for each item, showed that there were not found statistically significant differences for item 2, item 4, item 7 and item 13 for females and males.

Again, the last ranked item for both females and males, also having the highest standard deviation for both genders, was item 8 "Collect rocks/shells/leaves in nature". Item 8 was also the item with highest difference between females and males (18,1%).

Our results, showing higher connection to nature by female students, coincided with the results from Hughes et. al, 2008 where they used the CNI tool for measuring the connection with nature of 725 students. They found that girls were more likely to answer positively compared with boys. The mean CNI values obtained in Hughes et al (ibid) for girls was 4,14 and for boys 3,88.

Surprisingly, the CNI difference between males and females (6,70% higher in females) found in Hughes et. al (2008) was similar to the one we found in the Spanish-speaking students, where the female students had 6,59% more CNI when compared with males' students.

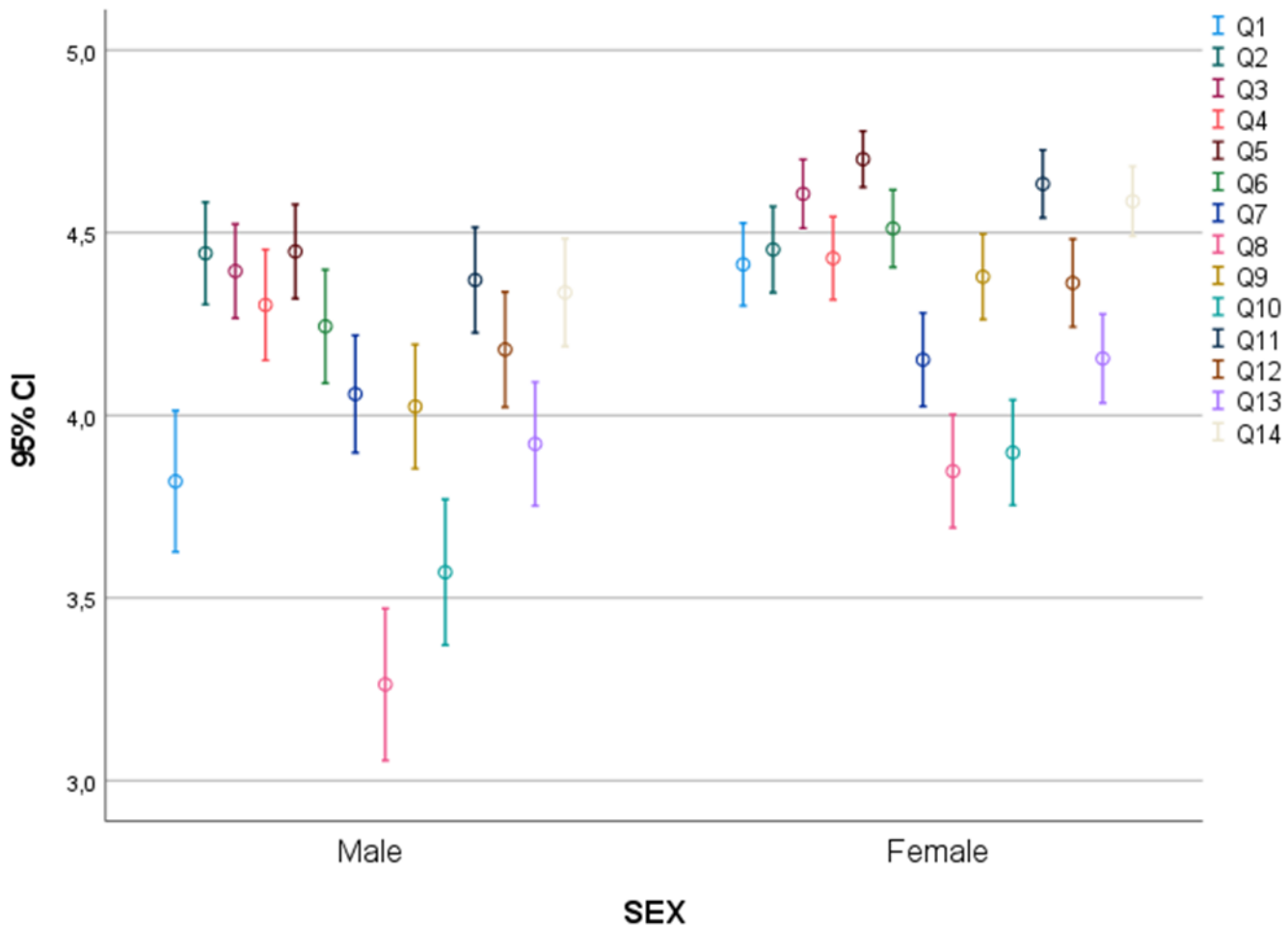


Figure 14; Each of the CNI statements mean value, compared by gender, as can be seen here, females tended to rank higher the CNI statements than males.

Differences between countries.

Mean CNI values by country were calculated and compared. The results obtained in our study were aligned with Dornhoff et al, (2019). They studied the difference among students' connection with nature from Ecuador and Germany, and they found that students in Ecuador had a higher connection to nature. Despite they used the NR-6 to calculate the students' connection with nature, their findings, as explained in section 2.4: "Review of different tools to measure nature connection" could be compared with the results obtained in this study, due to the similarities found and explained already among the different tools created to measure the connection with nature.

P values of the Mann-Whitney U Test.					
	Spain	Mexico	Colombia	Dominican Republic	Puerto Rico
Spain	x	<u>0,001</u>	0,169	0,837	0,588
Mexico	x	x	0,095	<u>0</u>	<u>0,001</u>
Colombia	x	x	x	0,226	0,2
Dominican Republic	x	x	x	x	0,992
Puerto Rico	x	x	x	x	x

Table 17: Matrix showing the levels of significance of the Mann-Whitney U tests performed among all the different Spanish-speaking countries. Again, p values higher than 0,05 were considered to lack statistical difference. Underlined and bold are the values which showed statistical difference.

When a Mann-Whitney U Test was performed, using the mean CNI, among the different countries, only statistically significant differences were found between a)Spain/Mexico, b)Mexico/ the Dominican Republic, and c)Mexico/Puerto Rico. These results can be observed in the table above.

The aim of this analysis, looking at the differences among countries, was not to explain those differences, as it would require a complex analysis out of the scope of this thesis aims.

It could be arguable, that despite not having found a statistical difference among all the countries, the results here show how Spanish students have a weaker connection with

nature when compared to the other countries, aligned with the findings from Dornhoff et al, (2019).

Connection to Nature Index (CNI) and pro-nature behaviours.

The last analysis is aimed at linking the values obtained from the CNI tool with the pro-nature behaviours. This analysis was done following the calculations from Hughes et. al (2018), where they linked the CNI values with pro-nature behaviours from UK students, and proposed different boundaries with different probabilities for conservation activities. In their research, for proposing these boundaries, the authors of the study measured the CNI value from UK students together with a pro-environmental and a pro-conservationist behaviours questionnaire.

Two aspects play an important role regarding the analysis of the CNI and pro-nature behaviours relation. First, as it was explained in the background information chapter, the connection to nature or attitudes in relation to nature are not directly linked with acting positively for nature, as there are many factors influencing behaviour apart from the attitudes.

Secondly, the data used for this analysis is based on UK students and their pro-conservation and pro-environmental intentions, and extrapolating these results will need a deeper study of the correlations between CNI values and pro environmental and pro-conservationist behaviours, as it was done for example in Hughes et. al (2018).

With these considerations in mind, below can be found the results, based on Hughes et. al (2018) correlations between CNI values and pro-nature behaviours, showing the proportion of students in "gradient of connection" by school and country. According to the authors' calculations, the students with the highest gradient of connection to nature (CNI>4,56) have a high probability of performing conservation behaviours (>70%).

	Mexico 1	Mexico 2	Mexico 3	Mexico 4	Mexico 5	Mexico ALL	Colombia 2
N tot	203	17	25	51	34	330	29
High	59%	65%	32%	24%	53%	51%	38%
Mid	22%	24%	40%	31%	26%	25%	31%
Low	19%	12%	28%	45%	21%	24%	31%

	Spain 1	Spain 3	Spain ALL	Dominican 2	Dominican 3	Dominican ALL	Puerto Rico 2	ALL
N tot	18	23	41	22	46	68	38	500
High	22%	35%	29%	50%	20%	29%	26%	44%
Mid	11%	17%	15%	23%	30%	28%	34%	26%
Low	67%	48%	56%	27%	50%	43%	39%	30%

Table 18: Probabilities for the occurrence of pro conservationism behaviours for each of the schools and global (bolded column on left).

4.2 Teachers' survey.

In comparison with the students' survey, the survey distributed among the teachers was a more complex one, combining first a questionnaire secondly a Likert scale and lastly, an open-ended question section. According to SurveyMonkey, the time spent answering this survey was 9 minutes.

The completion rate was less than what was aimed and asked to the National Operators, with some blocks of the survey being skipped in some cases. This resulted in a total of 8 schools out of 19 having completed the three parts of the survey. In some cases, more than one teacher by school responded to the survey.

Following the structure of the teachers' survey (having three parts, explained in detail in the methods chapter), the results of the teachers' survey will be summarized below.

First part of teachers' survey.

As described in the methods, the teachers' survey provided the general information regarding the school and the teachers, for example if schools were situated in rural or urban contexts, or which FEE's programmes were the schools participating in.

16 teachers answered the survey, from 13 different schools and from all the countries participating in the study. Surprisingly, all of the schools that answered the survey were only implementing FEE's Eco-School programme, and none of them implemented YRE or LEAF FEE's programmes.

In the cases where there were more than one answer per school, the rural/urban factor was checked for both answers and always coincided.

Second part of teachers' survey.

From the teachers' questionnaire, a Likert scale of 9 items was circulated as the second block of the survey. The number of teachers that answered the questionnaire was N=10.

The results from the Likert scale questionnaire, in which teachers had to respond according to their degree of agreement or disagreement with each of the proposed statements, can be found below.

As it was explained in the methods, the Likert scale used for the teachers' survey, had to be transformed to numbers in order to quantitatively analyse it. This was done, converting the degree of the agreement into numbers, being "extremely disagreement" a 1 and "extremely agreement" a 5.

Statement	Mean (N=10)	Comment
Formal education should promote and increase students' connection with nature.	5	
Non-formal education activities and organisations, such as the Scouts, should promote and increase student's connection with nature.	5	
Formal education increases students' connection with nature.	3,8	The lowest value, most disagreed statement.
Eco-School programme increases the students' connection with nature.	4,9	9 completely agreed and 1 moderately agreed.
YRE programme increases the students' connection with nature.	X	Not relevant, no schools participating in YRE.
LEAF programme increases the students' connection with nature.	X	Not relevant, no schools participating in LEAF.

It is possible to measure and quantify the students' connection with nature.	3,9	
An elevated connection with nature promotes pro-environmental behaviours in students.	5	
Human-nature connection is mainly influenced by personal values and beliefs, influenced by the sociocultural context.	4,6	
Human-nature connection is mainly influenced by the frequency and quality of personal experiences in nature.	4,6	
Human-nature connection is mainly influenced by the presence, type and quality of the natural environments and early experience in life.	4,4	

Table 19: Each of the statements comprehending the first part of the questionnaire, from the N=10 responses gathered, the mean value was calculated for the level of agreement/disagreement (second column).

From this questionnaire, 100% of the respondents strongly agreed that “formal education should promote and increase connection with nature of students” and that “an elevated connection with nature promotes pro-environmental behaviours”.

The idea that “formal education promotes nature connection in students” was the lowest score when the Likert scale was quantified, with a mean value of 3,8. As the mean values could range from 1 to 5, a 3,8 could be seen as a high value, but in comparison with the other statements, this is the statement that had more disagreements (mean= 3,8 SD=1,23)

In relation to the possibility of measuring connection with nature of students, when teachers were asked if this connection was “measurable and quantifiable”, 40% neither agree or disagree, 30% partially agreed and the remaining 30% strongly agreed with the statement. The mean value for this item was 3,9 being the second lowest, with more teachers disagreeing with that statement, (mean=3,9 SD=0,86).

The third statement, less ranked than the two mentioned before and related with the students' connection with nature construct, was “*Students' connection with nature is*

mainly influenced by the presence, quality, and type of natural environment experienced during childhood” with a ranked mean of 4,4 and SD=0,97.

Third part of teachers’ survey.

For the last part of the survey, with open questions where teachers had to answer four questions, the number of completed answers collected was N=10. Despite having the same number of full answers as in the questionnaire part, there were teachers who skipped the questionnaire part but answered the open questions and vice versa, making it not the same teachers’ sample for the two parts of the teachers’ survey.

Four open questions were asked:

First question: “Please, list the first five words or short sentences that come to your mind when you think about the word “Nature”.

The answers obtained for the first question were translated into English and the word cloud showing the different concepts listed are shown. For this specific question, there were 15 teachers responding.

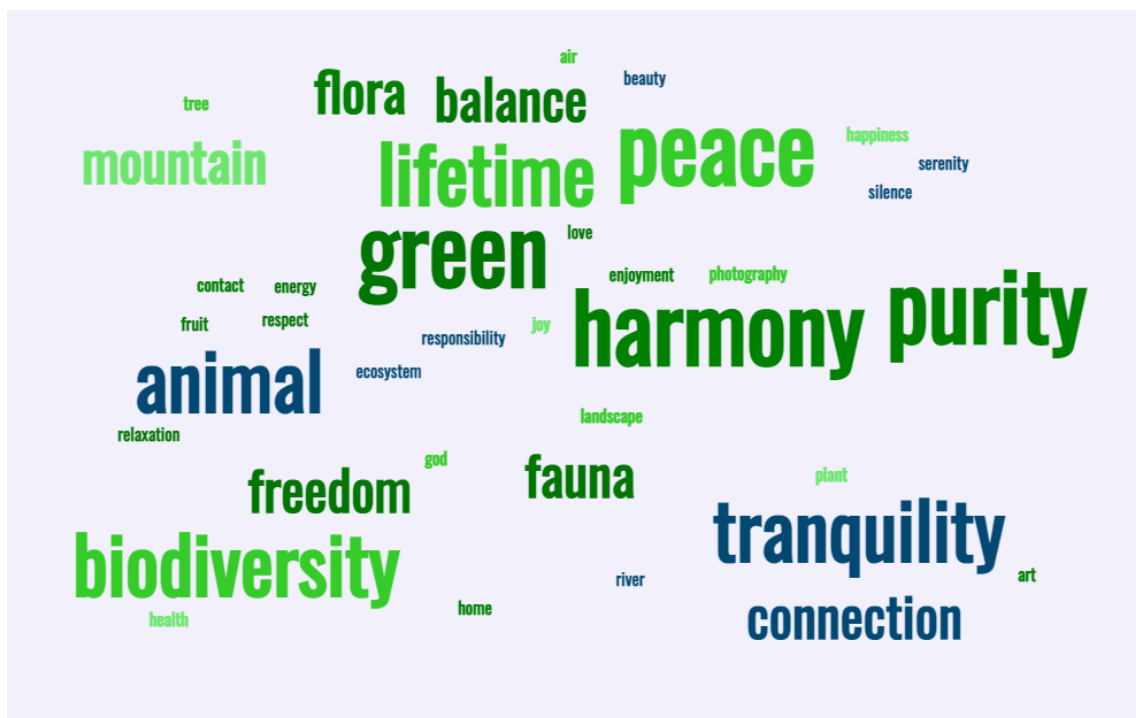


Figure 15: word cloud (translated into English) of Spanish-speaking teachers words associated with the term “nature”.

For the 45 different words listed, a list of the 15 more frequently cited concepts regarding the nature construct, can be found below (Table 20)

Number of times	Word	Number of times	Word	Number of times	Word
4 Times	Purity	3 Times	Lifetime	1 Time	Love
	Peace		Balance		
	Harmony		Mountain		
	Green		Fauna		
3 Times	Animal		Flora		
	Tranquillity		Freedom		
	Biodiversity		Connection		

Table 20: frequency of the 15 most cited concepts associated by teachers with the concept "Nature".

Second Question: *"Please, write the first positive aspects that come to your mind when thinking about the personal benefits of having a good or high connection with nature".*

In relation to the benefits of the connection with nature, two main tendencies appeared, in coincidence with the literature reviewed, first, the obtainment of pro-environmental values and behaviours and second, the mental and psychological benefits derived from the nature connection.

Teachers were asked to list three benefits from the connection with nature as they perceived them, these benefits were then categorised, the most frequent benefits described were categorised as "values or attitudes". A table with the different benefits listed by the teachers grouped by categories can be found below (table 21):

Proportion	Category	Example(s)
13 out of 30 (43%)	Values or Attitudes	<i>"Respect towards nature"</i> <i>"Empathy towards nature"</i> <i>"Love for nature"</i>
11 out of 30 (37%)	Health Benefits	<i>"Less anxiety"</i> <i>"Good mood"</i> <i>"Serves as a point of psycho-affective balance in moments of personal or social crisis"</i>

5 out of 30 (16%)	Pro-Environmental Behaviours	<i>"Making rational use of natural resources"</i> <i>"Developing of both, planet and society belonging sense, promoting the care of both"</i>
1 out of 30 (3,5%)	Cognitive	<i>"Knowledge of what is around us"</i>

Table 21: Showing the teachers' responses regarding which are the positive aspects of having a strong connection with nature, grouped by categories and with some response's examples.

Health benefits from the connection with nature were listed 11 times out of 30, most of the answers were more psychological health-oriented in regards to the health benefits. In relation to behaviours, 5 out of the 30 benefits listed by the teacher, mentioned increased pro-environmental behaviours.

Benefits that can be categorised as cognitive benefits from the connection with nature were listed in one occasion "knowledge what is around us".

Third question: *"Please, indicate which Eco-Schools aspects or activities contribute stronger to increase the students' connection with nature."*

For the third question, 11 teachers listed 27 different items. The items were categorised to analyse them and to provide a clearer picture of the findings. Three categories were identified: first, actions and activities that positively contributed to the connection to nature, secondly, those benefits from the Eco-Schools programme that were translated in pro-environmental attitudes and behaviours, and thirdly, specific actions or sections from the Eco-School programme.

Proportion	Category	Example(s)
15 out of 27 (55%)	Activities/Actions	<i>"School gardens"</i> <i>"Cleaning beaches"</i> <i>"Recycling"</i> <i>"Afforestation days"</i> <i>"Take care of plants"</i> <i>"Visiting parks and protected areas"</i>

7 out of 27 (26%)	Pro-Environmental behaviours	"Creation and strengthening of ecological awareness" "Respect for the environment" "Commitment to the environment" "They understand the need to take care of nature"
5 out of 27 (19%)	Eco-Schools steps/methodology	"Eco-Committee" "Eco Code" "Action Plan"

Table 22: showing the aspects or activities from the Eco-School programme that strongly contribute to connecting students with nature, according to the teachers' answers.

15 out of the 27 items could be categorised as "activities or actions". Among the activities listed, school gardens were the most popular, listed 4 times.

On 7 occasions, the Eco-Schools actions or aspects that were listed as more positively in contributing to the connection with nature were the pro-environmental values and attitudes obtained from participating in this programme.

The remaining 5 items listed, can be categorised as "Eco-Schools" steps or its own methodology, as can be seen in the table above (Table 22).

Fourth question *"Based on your professional experience, please indicate some ideas on how formal education could increase students' connection with nature".*

8 teachers listed 20 items that were categorised in three different categories, listed below, these are: "se of activities", "changes in the educational curriculum" and "environmental knowledge"

Proportion	Category	Example(s)
10 out of 20 (50%)	Set of activities	"Integrating in the official educational curriculum environmental education contents". "Strengthening the connection with nature as a transversal axis of all the competencies and contents of formal education". "It would be necessary to impose by educational curriculum hours of outdoor classes, that are not only those of physical education. If the decision is left to the

		teacher or the institution, it will always be made only in a small part".
8 out of 20 (40%)	Changes in educational curriculum	"Participate proactively in caring for the environment" "Developing more educational activities in natural environments". "Having gardens at schools".
2 out of 20 (10%)	Environmental Knowledge	"Creating and reinforcing ecological knowledge in students". "Providing current/actual information of the consequences of their action".

Table 23: teachers' recommendations on how formal education could improve the students' connection with nature.

5. Discussion.

This chapter will be organised as follows: first, a discussion regarding the research questions that were designated at the beginning of the thesis. Secondly, there will be a discussion in relation to the methods' critique. This chapter will conclude with a larger perspective discussion, that will take into consideration the potential for FEE of measuring the connection with nature and a set of recommendations for the future.

Research Questions:

The objective of this thesis, as stated already in the document, was to try to solve the two research questions proposed.

First, we will discuss the research question number 1: "Is it possible to measure with reliability the connection with nature from Spanish-speaking students participating in FEE's Eco-Schools programme? And are the results obtained aligned with the literature?"

The first research question discussed is composed of two interlinked questions, to solve them, the results obtained will be discussed here.

For the first of the two interlinked questions, aimed at studying the reliability and feasibility of the connection with nature measurement tool in Spanish-speaking students, we believe that it was possible to measure this connection, as the results show so. To measure the reliability, as explained in the methods and results, Cronbach's analyses were crucial and the values obtained were in all cases acceptable.

For the 11 schools that participated in the study, all of them had an acceptable and/or high Cronbach Alpha values for the CNI tool, showing that the measurement is reliable and consistent in each of the schools. The values obtained (and that can be seen in Table 10) are between the lowest $\alpha=0,75$ (Mexico 2) and the highest, $\alpha=0,95$ in the case of Mexico 5. These Cronbach values are well aligned with the CNI Cronbach's Alpha values identified in the literature when the tool was used in English-speaking countries; $\alpha=0.87$ found in Cheng & Monroe (2012) and $\alpha=0.84$ (Hughes et. al 2018).

The Cronbach's Alpha values obtained confirmed that the CNI tool can provide reliable results and in little time (the average time to answer the CNI survey was 3 minutes) without extensive and detailed explanations to the respondents prior to the survey.

A second analysis was carried out for the students' survey, in which the results obtained in the Spanish-speaking countries were compared with the results found in the literature. There were analysed the differences between rural/urban schools, differences among the gender of the students and finally the differences among countries CNI values.

As argued in the methods and results, the CNI tool provides values that arrange from 1 to 5. As it was confirmed in the results, the values obtained were not normally distributed, that is why to assess the statistical differences between countries, gender or rural/urban school, Mann-Whitney U Tests were performed.

First, it was tested the differences between rural and urban schools, which showed a clear statistical difference with an asymptotic significance value of $p=0,000$ and an overall higher CNI value obtained in the rural schools in comparison with the urban schools (Table 14). This analysis proved that there were differences for 12 of the 14 CNI statements, these findings are aligned with the literature, where Hinds & Sparks (2008) found that participants with rural childhoods had higher and stronger positive connections with nature and more positive affective connections as well, when compared with people who had urban childhoods.

The notion of students from rural areas having stronger connections with nature than urban students, is also defended in the literature by Cheng & Monroe (2012), authors of the original CNI. They found out in their study, that the presence of nature near home, contributed 11% of the variance on the connection to nature, thus, according to their model, with the rest of the aspects involved not taken into consideration, solely the presence of nature near the school and students' houses is translated into higher connection with nature.

Secondly, the differences among the students' CNI values were analysed looking at the differences in gender. The overall CNI value, showed a clear statistically difference among the two genders when the Mann-Whitney U Tests were performed, with an asymptotic significance p -value of $p=0,000$, and an overall higher CNI value obtained by females in comparison with males.

From the 14 CNI items or statements that compose the measurement tool, it was found statistical difference among female and male answers, in 10 of these statements (Table

16). These results were also aligned with the literature, and very close to Hughes et. al (2008) results. In their study, females had a mean CNI 6,70% higher than males. In our study, female Spanish-speaking students had a 6,59% higher mean CNI than males.

It was also analysed the differences among the different countries participating in the study (Tables 11, 12 & 17). Compared with the previous analyses, where the differences were compared using the CNI tool values, in this case, as there were no studies that measured the CNI in different countries, it was identified in the literature a study in which they used the NR-6 tool to compare Ecuador and Germany students' connection with nature.

As it was discussed in section 2.4 "Review of different tools for measuring the connection with nature", the similarities among the different tools available to measure the connection with nature, able us to do this comparison. What we found was that students from Spain had a lower connection with nature than the rest of the countries (only statistically differences were found between a) Spain & Mexico, b) Mexico & the Dominican Republic and c) Mexico & Puerto Rico).

The comparisons among the different Latin American countries were out of the scope of this thesis as this comparison would involve many culture-specific aspects hard to analyse. The results that we compared with the literature are the differences between Spain and the rest of the countries. According to Dornhoff et al, (2019), when they compared the connection with nature from Ecuador and German students, they found that students from Ecuador had a higher connection with nature. These findings could be compared with our results, where Spanish students showed a lower connection with nature when compared with the Latin American contexts.

The different analyses carried out to solve the first research questions, provided significant evidence to support the idea of the CNI measurement tool being replicable in Spanish-speaking countries, obtaining reliable and consistent results aligned with the literature.

The second research question of this thesis was "What are the notions and what do Spanish-speakers teachers think or understand regarding the "connection with nature" construct?" To solve it, the results from the teachers' survey were analysed and compared with the literature in some cases, to see the level of understanding and the commonalities among the teachers' responses and the literature.

Despite of the teachers' survey having a lower completion rate compared with the students' survey, some results worth being mentioned and remarked in this discussion.

In general lines, teachers' knowledge was aligned with the literature in the sense that they identified the main benefits from nature that are described in the literature. They recognised that a strong connection with nature implies the occurrence of pro-environmental attitudes and values, as well as health benefits and pro-environmental behaviours, as can be seen in Table 21.

Another positive aspect that emerged from the teachers' results is the fact that all the teachers who responded to the survey, strongly agreed that formal education should promote the connection with nature in their students (Table 19). This result, combined with the teachers' answers where they lowly scored the idea that this connection was measurable, suggest that the measurement tools to quantify the nature connection have strong potential for formal education and should be broadly disseminated to formal education teachers' who want to promote this connection.

When teachers were asked which Eco-Schools actions or aspects strongly contributed to improving the connection with nature, their answers again were to a certain extent aligned with the literature. Spanish-speaking teachers believed that activities and actions are the most influencing factor, with 55% of the Eco-Schools aspects falling under the activities and actions category (Table 22). Comparing the results obtained from the teachers' responses with the results from Giusti et al (2018) reflected in figure 7 there were found some commonalities. Activities being the most often cited by teachers, were school gardens and cleaning activities (around beaches or parks). These activities have the qualities that received the highest rank in the study from Giusti et al (ibid), such as engagement of senses, or physical activities among others.

The strong role that “simple activities” in nature have in regard to connecting people with nature, is also remarked by Richardson et al, (2020) and aligned with teachers’ responses on what were the best Eco-Schools initiatives when it came to connecting students with nature.

Lastly, teachers were asked according to their experience, how formal education could increase the students’ connection with nature. Again, activities were the most often cited ideas (50%) as can be seen reflected in Table 23 which aligns well with the findings from Giusti et al (2018). 40% of the teachers’ answers suggested the need to make changes in the educational curriculums to increase the connection with nature of the students. This also was reflected in the second part of the teachers’ questionnaire, where teachers had the strongest disagreement with the statement “*Formal education increases students’ connection with nature*” as can be seen in Table 19. These findings suggest that changes in the official educational curriculums are needed, to put more attention and focus on the human-nature connection. Even if this could seem negative, on the opposite side, from the results obtained and explained before, it was clear that the teachers surveyed had a good knowledge on how to increase this connection and the derived benefits from it. Another positive aspect is the potentials of doing “simple activities” in nature to connect students with nature, this should encourage schoolteachers, practitioners and environmental educators to promote more outdoor activities in nature.

Regarding the methods’ critique, which is the second part of this discussion, some aspects will be explained and mentioned next.

First, it could be argued that the students and teachers surveyed were chosen among several schools by the national operators and that this self-selection process made by the National Operators dealing with FEE’s programmes, could be biased, counting with the schools that better performed at Eco-School programme. As the aim of this study was to analyse the reliability, consistency and replicability of a nature connection measurement tool, this potential bias did not affect to our aims. It could be argued that other schools that weren’t among the chosen ones, could have maybe slower CNI mean values, but this would not affect the consistency and reliability of the results.

Another aspect in relation to the methods' critique is that teachers were asked if their school was situated in rural or urban areas, without a clear definition of what was rural and what was urban. In order to confirm the teachers' answers, schools were searched in Google Maps, where we tested out if the schools were in the context that teachers said. These analyses were not completely empirical or complemented with GIS software analysis, but rather qualitative analyses that could have some potential errors in case this study is repeated. That is why we suggest clarifying the rural/urban definition when this kind of questions are done in further studies. To clarify it, it could be asked the amount of nature near the schools or providing a clearer definition of what was considered rural and what was rural.

As it was described earlier, teachers' survey did not have the response rate expected, and in some of the cases, questions were skipped. To future studies, the teachers' survey should be better designed, and being easier to solve. We believe that the combination of the complex wording we might used, together with the high number of questions could have influenced teachers skipping the survey or some parts of it. These aspects should be considered if FEE wants to use this measurements as an indicator for its environmental education programmes.

In the connection with nature literature, it is often argued that the measurement tools created to quantify this connection are one-directional, in the sense that they look only at the relation with nature, and not looking at for example if respondents prefer or enjoy more other activities that are not in relation with nature. It is important to remind this when assessing these results. It is possible that a person with a high connection with nature value, prefer to spend time indoors, or playing videogames for example, that's why this critique of these tools being unidirectional could be linked with the general connection with nature, as well as with this thesis. Intending to clarify this, it could be incorporated contrasting questions to the CNI measurement tool in order to throw light on this such as "I enjoy playing videogames" or "watching TV shows/movies". In this way, these contrasts questions will provide a clearer picture of the students' connection with nature.

Potentials for FEE of using the CNI tool as an indicator.

In the light of the results, we believe that FEE has the opportunity to implement the CNI tool to measure the connection with nature from scholars around the world participating in FEE's educational programmes, mainly Eco-Schools but it could also be implemented in YRE (Young Reporters for the Environment) and LEAF (Learning About Forests).

It will be necessary for FEE in case the CNI measurement tool is implemented, to analyse the Cronbach's Alpha values obtained and establish a minimum value, which according to the literature should be higher than $\alpha=0.70$. It will also be required to translate the tool, this could be done inspired in the translation and back-translation method used in this thesis, which showed positive results.

Establishing this measurement not only will provide an overall picture of this connection worldwide with potential mapping implications but would also enhance the comparison along time of this construct. As discussed in the introduction and in the background information chapter, there is an urgent need to revert the climate situation we are facing and improving the connection with nature of children around the world will have powerful positive outcomes, such as health benefits and most important, pro-environmental and pro-conservationism behaviours and attitudes. As it was also demonstrated in the results, it is possible to link the level of connection with nature with the occurrence of pro-environmental and pro-conservationism behaviours, thus, measuring the connection with nature implies a broader set of positive outcomes.

Another suggestion for FEE is to measure the nature connection of students that are not participating in their educational programmes. This could be done through FEE's network, surveying schools outside FEE programmes, and comparing those results with the results of the students participating in Eco-School, YRE or LEAF programme. This comparison, if as expected, show that the students from schools involved in FEE's programmes have a higher connection with nature, could serve to increase FEE's programmes recognition and potentially to better promote the programmes among the different countries where these comparisons were made.

Taking a step further, FEE could measure some behaviours actively instead of just measuring the behaviours intentions. Through Eco-Schools methodology for example,

FEE could compare how the connection with nature is linked with behaviour such as waste (measuring how much waste is produced in schools or even more ambitiously, at the students' households). The same could be done with energy consumption for example, or with water utilisation. The linkage between the connection with nature and these types of behaviours will possess a significant relevance for the nature connection literature.

Taking into consideration the role and relevance of FEE in environmental education initiatives and programmes worldwide, another recommendation we do to FEE is to create synergies between FEE and academics focusing in the field of connecting people with nature. The expertise of the academics will produce a win-win situation, where academics could use FEE's network and data gathered for their research, and FEE will benefit from these studies results and recommendations. This type of quantitative research will help FEE in disseminating their work and showing the positive outcomes the organisation achieves.

The CNI tool could be used not just as an indicator of the effectiveness of FEE environmental education programmes but would also motivate teachers to achieve this kind of results. As it was explained in the results and the first part of the discussion, despite not being academic experts working improving the nature connection, teachers demonstrated having good knowledge on first, the benefits of a strong connection with nature (from the health benefits perspective and the associated pro-environmental attitudes and behaviours) and secondly, on how to make this connection stronger. When this type of measurement tools are established, it is expected that teachers working on this will make greater efforts and focus on increasing this connection.

Sorely the fact of the CNI tool providing a clear picture on this connection with nature around the world would have high academic relevance, as it was explained, there is a lack of global studies looking at the connection with nature, with most of the research done in developed English-speaking contexts. FEE and its highly dedicated extensive network has the potential to carry out probably the biggest survey in the world intending to assess the children's connection with nature globally. This fact could potentially benefit FEE as it could turn FEE into the biggest organisation in the world connecting children with nature. This fact could bring more opportunities to FEE and turn it into a bigger player

as it could strengthen the cooperation that FEE already has with big international organisations, such as UN and its declaration of the ecosystem restoration decade (2021-2030) or the proclamation of the IUCN (International Union for Conservation of Nature) “#NatureForAll” initiative, which is an international coalition looking at connecting people with nature, composed by diverse partners and organisations such as the World Commission on Protected Areas (WCPA) and the Commission on Education and Communication (CEC), both organisations being directed by the IUCN.

FEE has the competences, history, and years of experience to be a leading organisation in connecting children with nature and to establishing important collaborations with international organisations in order to increase its positive outcomes, in alignment with the FEE’s strategy for 2020-2030.

Quantifying this connection could also have further policy implications, prompting or facilitating policy makers’ decision to allocate resources and increased focus on this topic. It could be expected that policymakers will focus on improving the connection of those areas where the respondents had a lower connection with nature. For doing that, National Operators should be able to communicate the results of the surveys with the local politicians. FEE could also train the National Operators on how they should communicate to the politicians these results, as well as what measures could be done to increase the connection with nature.

It will be also important to well communicate the benefits of being in contact with nature as well as having a strong connection with nature in order to promote the policies and actions aimed at improving it. There is much to win (for both people and Earth) at a relatively low cost, what is clear is that all the efforts made by the civil society and policymakers towards sustainable futures are required and that children around the world will (hopefully) play a major role on achieving these sustainable outcomes.

Environmental education should not focus merely on providing the information and knowledge or increasing the cognitive abilities of the people participating in these programmes, but should also work motivating citizens for achieving a sustainable future, focusing in the attitudes and values, that have been proved to have better and long-lasting pro-environmental outcomes than merely environmental knowledge.

6. Conclusion.

From the results obtained in this thesis and with the literature remarking the health and behavioural benefits derived from the connection with nature and the different types of contact with nature (intentional, incidental or indirect), we conclude that measuring the connection with nature as an indicator for FEE's Eco-School programme is feasible and replicable in Spanish-speaking countries. With all the evidence gathered we recommend FEE to start implementing these measurements in order to achieve the positive outcomes described here from the connection with nature.

The CNI tool used in this study showed high consistency and reliability, and potential for linking the CNI results with broader pro-nature behaviours and attitudes. FEE being probably the world's biggest environmental education organisation has the resources, experience and knowledge in its network for being the biggest player on Earth in connecting students with nature.

We proposed a set of recommendations to FEE intending to maximise the effectiveness of using the connection with nature measurement tools. If our recommendations were followed, they will contribute to reducing the literature gap, by providing a picture of the state of the human-nature connection globally. Our recommendations will also contribute to reducing the gap between environmental knowledge and pro-environmental attitudes and behaviours among millions of students worldwide, with tremendous positive outcomes for planetary and humans' health.

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Appendix I: Spanish-speaking students' survey (Spanish version)

Encuesta estudiantes:

1. ¿Cuántos años tienes?

- Entre 6 y 8 años
- Entre 9 y 11 años
- Entre 12 y 14 años

2. Eres (selecciona la respuesta correcta)

- Hombre
- Mujer
- Prefiero no responder

3. ¿Cómo se llama tu colegio?

4. ¿Cuánto te gusta ver o hacer las siguientes cosas? Por favor selecciona un círculo por cada línea

	No me gusta nada				Me gusta mucho
Ver plantas y flores en la naturaleza.					
Ver animales salvajes viviendo en un entorno limpio.					
Cuidar de los animales y plantas.					
Tocar a los animales y plantas.					
Querer y cuidar la naturaleza.					
Pasar tiempo al aire libre y disfrutar de la naturaleza.					
Aprender más sobre la naturaleza.					
Recolectar o recoger piedras/conchas/hojas de la naturaleza.					
Escuchar diferentes sonidos cuando estoy en la naturaleza.					
Cultivar verduras y plantas.					
Estar al aire libre.					
Vivir con plantas y animales.					
Considerarme a mi mismo/a como parte de la naturaleza.					
Sentirme cómodo/a y tranquilo/a en la naturaleza.					

Haz click en "Terminar Encuesta"

Muchas gracias por haber completado la encuesta, ¡que tengas un gran día!

