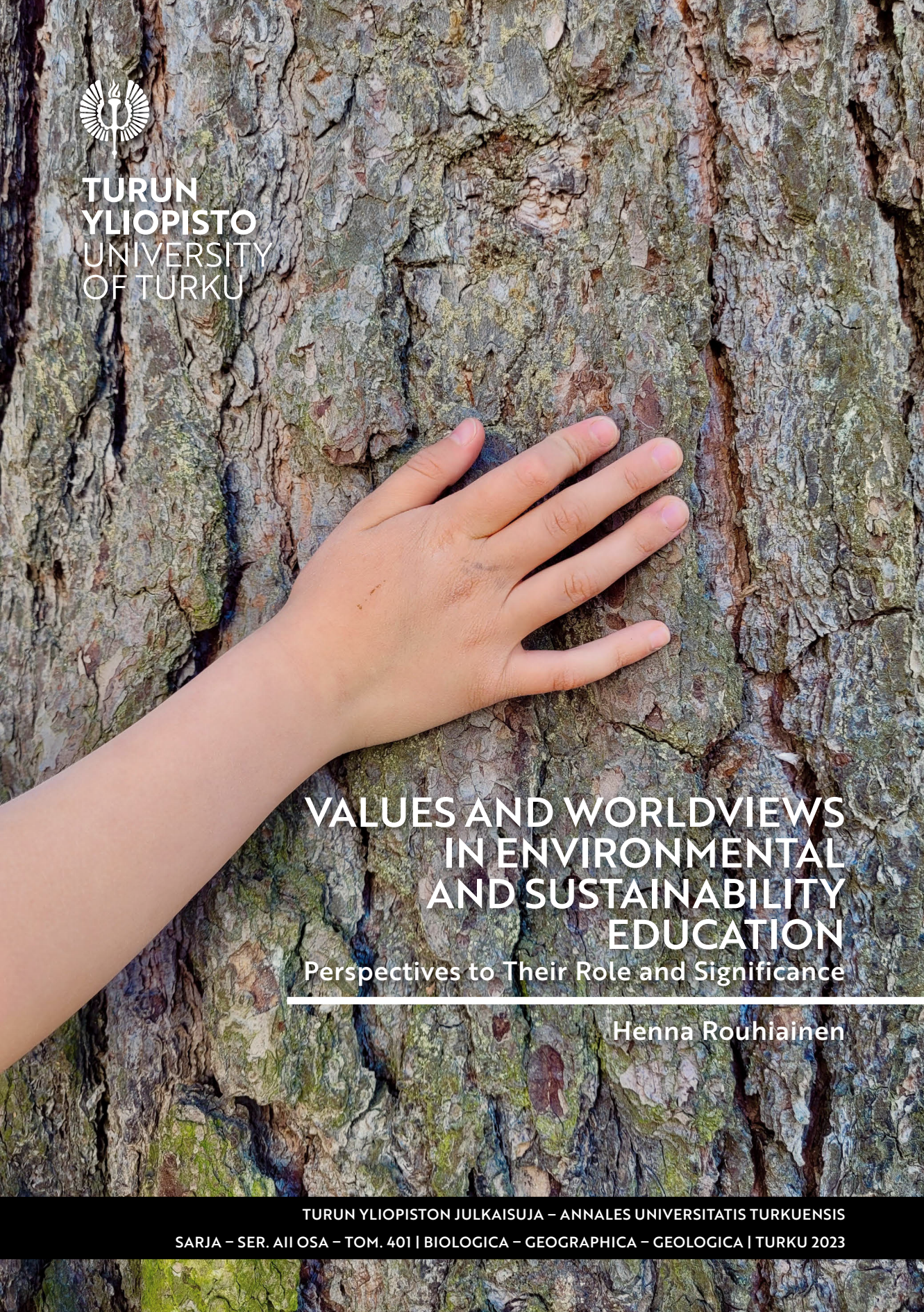




**TURUN
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**VALUES AND WORLDVIEWS
IN ENVIRONMENTAL
AND SUSTAINABILITY
EDUCATION**

Perspectives to Their Role and Significance

Henna Rouhiainen



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VALUES AND WORLDVIEWS IN ENVIRONMENTAL AND SUSTAINABILITY EDUCATION

Perspectives to Their Role and Significance

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ABSTRACT

This dissertation discusses the role of values and worldviews in environmental education (EE) and sustainability education (SE). Values and worldviews affect whether we feel concern for the environment and guide our environmental and sustainability choices and decisions. Even though values and worldviews have been studied rather extensively, their role and significance for EE and SE is so pivotal and broad-based, that many gaps in knowledge still exist. Furthermore, multidisciplinary studies covering a range of different educational contexts are not very common.

This research aims to increase theoretical understanding of the multifaceted view of the role of values and worldviews in EE and SE, as well as elicit some new and specific aspects related to this role. The research consists of three empirical sub-studies, focusing on three different themes in different educational contexts: early non-formal nature-related education in Finland, sustainable development education in a Finnish university, and climate change in elementary education in Cambodia. The research approach was multidisciplinary, and values and worldviews were approached from the perspectives of history, education and pedagogy, environmental psychology, as well as environmental philosophy and ethics.

The first two sub-studies were qualitative. The data of the sub-study I consisted of membership magazines of an early 20th century animal welfare organization Helsingin Eläinsuojeluyhdistys (HESY). These were analysed using deductive content analysis. The data of the sub-study II consisted of a preliminary assignment and in-depth interviews with five higher education teachers in a Finnish university. The data was analysed using abductive content analysis. The sub-study III was quantitative and based on a survey with Cambodian adolescents (N=389) from three public schools. This data was analysed using confirmatory factor analysis (CFA) and structural equation modelling (SEM).

The results of the study support the view that in order to understand educators' or learners' environmental and sustainability thinking or concern, it is important to understand their values, which may differ considerably. The results are in line with the view of environmental psychology that knowledge, emotions (e.g., concern) as well as values and worldviews are interconnected, and thus they should be considered in a holistic manner in EE and SE education.

The research also found support for the idea that two value dimensions, intrinsic and instrumental values of nature and altruism and biospherism, underlie people's

environmental engagement or sustainability thinking. In addition to these, however, other ideas based on relational values were found. As relational values may resonate with the lived experiences of people from different cultures, and reflect their environmental worldviews, pluralistic EE and SE education might benefit from including relational values as a third category alongside nature's intrinsic and instrumental values. Moreover, it may be worthwhile to study interest in interspecies relations as one of the explanations for environmental engagement alongside egoistic, altruistic and biospheric interests.

KEYWORDS: environmental education; sustainability education; education for sustainable development; values; worldviews; humane education; pluralism; climate change concern; New Environmental Paradigm; Cambodia

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TIIVISTELMÄ

Tämä väitöskirja käsittelee arvojen ja maailmankuvien roolia ympäristökasvatuksessa ja kestävyyskasvatuksessa. Arvot ja maailmankuvat vaikuttavat siihen, tunnemmeko huolta ympäristöstämme. Ne ohjaavat myös ympäristöön ja kestävään kehitykseen liittyviä valintojamme ja päätöksiämme. Arvoja ja maailmankuvia on tutkittu melko laajasti, mutta niiden rooli ja merkitys ympäristö- ja kestävyyskasvatukselle on niin keskeinen ja laaja-alainen, että tutkimustiedossa on edelleen monia aukkoja. Lisäksi monitieteiset tutkimukset, jotka kattavat erilaisia koulutus-konteksteja, eivät ole kovin yleisiä.

Tämän tutkimuksen tavoitteena on lisätä teoreettista ymmärrystä arvojen ja maailmankuvien roolista ympäristökasvatuksessa ja kestävyyskasvatuksessa ja tuoda esille myös uusia näkökulmia tähän rooliin liittyen. Tutkimus koostuu kolmesta empiirisestä osatutkimuksesta, jotka keskittyvät kolmeen eri teemaan eri koulutus-konteksteissa: varhaiseen nonformaaliin luontokasvatukseen Suomessa, kestävän kehityksen opetukseen suomalaisessa yliopistossa ja ilmastoaiheiseen kasvatukseen perusopetuksessa Kambodžassa.

Tutkimusote on monitieteinen ja arvoja ja maailmankuvia lähestytään historian, pedagogiikan, ympäristöpsykologian sekä ympäristöfilosofian ja -etiikan näkökulmista. Kaksi ensimmäistä osatutkimusta ovat laadullisia. Osatutkimuksen I aineisto koostuu Helsingin Eläinsuojeluyhdistyksen (HESY) 1900-luvun alkupuolen jäsenlehdistä. Nämä on analysoitu deduktiivisen sisällönanalyysin avulla. Osatutkimuksen II aineisto koostuu viiden suomalaisen korkeakouluopettajan kanssa tehdystä esitehtävästä ja haastatteluista. Aineisto on analysoitu käyttämällä abduktiivista sisällönanalyysiä. Osatutkimus III on määrällinen ja se perustuu kolmen kambodžalaisen yläkoulun oppilailla (N=389) toteutettuun kyselyyn. Nämä tiedot on analysoitu käyttämällä konfirmatorista faktorianalyysiä ja rakenneyhtälömallinnusta.

Tutkimuksen tulokset tukevat näkemystä, jonka mukaan on tärkeää ymmärtää kasvattajien ja oppijoiden moninaisia arvoja, jotta voidaan ymmärtää heidän ympäristö- ja kestävyysajatteluaan sekä -huoltaan. Tulokset ovat samansuuntaiset ympäristöpsykologian näkemyksen kanssa, jonka mukaan tieto, tunteet (esim. huoli) sekä arvot ja maailmankuvat liittyvät toisiinsa, ja siksi ne tulee huomioida kokonaisvaltaisesti ympäristö- ja kestävyyskasvatuksessa.

Tutkimuksessa löytyi tukea myös ajatukselle, jonka mukaan ympäristö- ja kestävyysajattelun, -asenteiden ja -toimien taustalla vaikuttaa kaksi arvoulottuvuutta, luonnon itseisarvo ja välinearvo sekä altruismi ja biosferismi. Näiden lisäksi löydettiin kuitenkin myös muita, niin sanottuihin relationaalsiin arvoihin perustuvia näkemyksiä. Koska relationaaliset arvot voivat resonoida eri kulttuureista tulevien ihmisten kokemusten kanssa ja heijastaa heidän ympäristömaailmankuviaan, pluralistinen ympäristö- ja kestävyyskasvatus voisi hyötyä relationaalisten arvojen käsittelystä kolmantena kategoriana luonnon itseis- ja välinearvojen rinnalla. Lisäksi voisi olla kannattavaa tutkia, voisiko kiinnostus lajien välisiin suhteisiin selittää ympäristömyönteistä ajattelua, asenteita tai toimintaa egoististen, altruististen ja biosferisten intressien rinnalla.

ASIASANAT: ympäristökasvatus; kestävyyskasvatus; kestävä kehityksen kasvat-
tus; arvot; maailmankuvat; humane education; pluralismi; ilmastonmuutos; New
Environmental Paradigm; Kambodža

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Abbreviations

CFA	Confirmatory factor analysis
ChEMS	Environmental Motives Scale for Children
DSP	Dominant Social Paradigm
EE	Environmental education
EfS	Education for sustainability
ESD	Education for sustainable development
HESY	Helsingin eläinsuojeluyhdistys [Helsinki Humane Society]
NEP	New Environmental Paradigm
NEP-C	New Environmental Paradigm for Children
RV	Relational value
SD	Sustainable development
SE	Sustainability education
SEM	Structural equation modelling

List of Original Publications

This dissertation is based on the following original publications, which are referred to in the text by their Roman numerals:

- I Rouhiainen, H. and Vuorisalo, T. In search for the ideological roots of non-formal environment-related education in Finland: the case of Helsinki Humane Society before World War II. *Environmental Education Research*, 2014; 20(2): 145-160.
- II Rouhiainen, H. and Vuorisalo, T. Higher education teachers' conceptions of sustainable development: implications for interdisciplinary pluralistic teaching. *Environmental Education Research*, 2019; 25(12): 1713-1730.
- III Rouhiainen, H. and Haanpää, L. The antecedents of adolescents' climate change concern in Cambodia. Submitted manuscript.

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1 Introduction

Sustainability is essentially about reconciling people's good quality of life with other forms of non-human life on Earth (IPBES, 2022b). This view is shared by the vast majority of the world's countries (IPBES, 2022a). On a practical level, however, there is still no consensus on what sustainability means (Ruggerio, 2021). Therefore, pursuits towards reconciliation of human well-being with the well-being of other species are often difficult and lead to disputes between different societal interest groups as well as confusion in individual humans' everyday lives.

For an ordinary citizen, sustainability debates may be hard to follow. Perspectives to sustainability issues such as agriculture or forest use are numerous, and eventually 'sustainability' seems to mean everything – and nothing. In everyday life people often face situations, where they would like to act in a sustainable manner, yet it feels too complicated. A Finnish consumer, for instance, may wonder whether it is better to choose Finnish or Spanish tomatoes in the grocery store – which are more sustainable in springtime? Choosing can be so difficult that it's finally made by lottery. These examples describe the practical difficulties involved in implementing sustainability, because, on the surface, sustainability itself is such an ambiguous goal.

However, it is possible to bring clarity to sustainability by looking beneath the surface level of our sustainability choices and controversies. On a deeper and less visible level, sustainability choices and decisions are guided by our values and worldviews. Values indicate which of our preferences are to be given priority (Dietz et al. 2005). Worldviews are based on values and thus closely connected to them (Rohan, 2000; Stern, 2000; Boylan, 2022). Since each of us, as well as different interest groups, communities, and cultures, have their own values and worldviews, there are also countless interpretations of sustainable development (Connelly, 2007). When deciding upon the new Nature Act, choices are made, for instance, between what is more important; the rights and economic revenue of the landowner or the thriving of species living in different biotopes. When weighing the different types of tomatoes, we decide upon whether we prioritize lower price, lower environmental impact of tomato farming and transport, the rights of tomato farm workers, or the potentially greater health benefits of eating domestic food. Our different values,

preferences and worldviews are thus some of the root causes to why issues related to the environment and sustainability are controversial, confusing, and difficult to agree on (e.g., Scott and Vare, 2021; Inayatullah, 1998; IPBES, 2022).

Education is a way to mainstream environmental and sustainability awareness in societies. Often the goal of is to help people make environmentally friendly and sustainable choices and promote understand of how large-scale social and cultural change can be achieved (Sterling, 2011). Values and worldviews are closely to education: educators and educational institutions greatly influence the values of their students, especially children and young people, and thus society as a whole. Education reflects the values of the educator, the values of the institution and the values of society in general. These values can be open or hidden. (Halstead and Taylor, 1996; Berson and Oreg, 2016).

In environmental education (EE) and sustainability education (SE) research and practice, values and worldviews are often approached with the hope that by understanding or influencing them, people's decision-making and behaviour can be steered in a positive direction from an environmental and sustainability perspective (Dietz et al. 2005). This aim is based on the observation, well established by research, that certain values and worldviews can predict pro-environmental orientations and behaviours (Corner et al. 2014). Furthermore, in transformative learning theories, critically examining one's own and the society's values and worldviews is considered a prerequisite for changing one's thinking or doing in relation to the socio-ecological environment (Sterling, 2011). Since values are cognitive representations, people can reflect upon them, and consciously choose to pursue certain values – this makes values a meaningful topic for education (Sagiv and Schwartz, 2022).

Values and worldviews are time and place bound. That is why the prevailing perceptions of which values should be preferred from an overall sustainability perspective vary from culture to culture and from time to time. Over the last one hundred and fifty years, educators, and researchers with a focus on nature, animals, and later environment and sustainable development, have been considering such value questions as “How should nature and non-human species be treated?” (see sub-study I), “What is the role of values and worldviews in environmental engagement?” (see sub-study III), and “Can we or should we promote certain values as part of nature-related or sustainability education?” (see sub-study II). These discussions are linked not only to the development of the pedagogy and philosophy of environmental education, but also to wider societal discussion on the relationship between humans and nature and environmental protection. These discussions have a cultural basis related to how the relationship between humans and nature is understood and conceptualized (e.g., Aoyagi-Usui et al. 2003).

In this dissertation, I examine the role and expression of values and worldviews in different environmental and sustainability education approaches and contexts, typical of their time: in sub-study I, the focus is on the values of an early 20th century nature education organization; in sub-study II, I focus on higher education teachers' conceptions of sustainable development and values underlying them; and in sub-study III, the focus is on the values and worldviews predicting climate change concern among adolescent learners in Cambodia. The studies are empirical, and the research approach is multidisciplinary.

1.1 Environmental and sustainability education

In this study, EE and SE are understood very broadly: as learning-based activities that aim at communicating to and educating people about the loss of nature, environmental degradation, and unsustainability (Wals, 2012). EE and SE are understood as focusing not only on environmental and ecological aspects of sustainability, but also the links between ecological, social, cultural, economic, and political aspects of sustainability and the non-human world (Wals, 2012).

Even though there have been disputes among scholars about the most appropriate term for sustainability-related education (e.g., education for sustainable development (ESD), education for sustainability (EfS), or sustainability education (SE)), much international literature uses the different terms more or less synonymously (Hopkins and McKeown, 2002). In this dissertation, the terms sustainability education and sustainable development education are used in the same meaning and no position is taken as to which of the terms should be preferred.

The role and function of EE and SE can be viewed from two perspectives: instrumental and emancipatory (e.g., Wals, 2012). The first perspective is supported by environmentalists and those working in environmental policy, who generally consider EE and SE to play two key roles. First, EE and SE are considered to develop the support base for environmental policy and legislation. Second, they are seen as a way to influence citizens' environmental behaviour (Dreyfus and Wals, 1999; Wals, 2012; Vare and Scott, 2007; I; III). In this instrumental point of view, EE and SE are seen as serving a pre-determined goal: people's values and behaviours need to be changed in certain, expert-determined directions to improve the state of the environment (Wals, 2012; Vare and Scott, 2007; Jickling and Spork, 1998). From this perspective, EE and SE involve the promotion of pre-defined environmental ethics (Sauvé, 2005). In this type of education, the evaluation of the educational outcomes focuses on how the learners' behaviours change as a result of an educational intervention or activity (Wals, 2012; Vare and Scott, 2007; III).

Some EE and SE researchers and practitioners, on the other hand, understand the role of EE and SE as emancipatory. These days, this approach (also referred to as a

‘transformative approach’) is common in many schools and higher education institutions (e.g. Cincera et al., 2018; Mogren and Gericke, 2019; II). The advocates of the emancipatory perspective are concerned about people’s self-determination, agency, and democracy (Wals, 2012). The emancipatory perspective emphasizes the potential of education to strengthen people’s skills to think critically, as well as their capacities and self-confidence so that they can determine for themselves how to live together in a way that promotes an ecologically sound and humanly habitable future (Wals, 2012; Vare and Scott, 2007). Instead of providing a pre-defined ethics, emancipatory education encourages the development of ethical competency through the construction of one’s own value system (Sauvé, 2005). In this type of open-ended education, the evaluation of educational outcomes focuses on whether the conditions, under which the learning activity takes place, allow the change in learner behaviour – and social change – to happen (Wals, 2012; Vare and Scott, 2007).

Scholars and practitioners debate about the preferability of the instrumental versus emancipatory approach. Yet in practice, education is usually neither clearly instrumental nor emancipatory, but somewhere on a continuum between these two poles (Wals et al., 2008). Thus, the two approaches to EE and SE can be seen complementary. The first approach can promote education that has the potential to reach large numbers of people and may have clear and measurable benefits to people and the planet. Such is, for example, education that is related to preparedness for the acute risks resulting from climate change, for instance by increasing the awareness or operational capacity of vulnerable people in flood or drought situations (III). The second approach can prepare societies for the complexity and uncertainty of the future. It is appropriate for educational situations that seek to increase people’s long-term ability to make decisions and act sustainably, based on values and reliable information they have consciously deliberated (II) (Wals, 2012; Vare and Scott, 2007). In this dissertation, EE and SE are approached from both these perspectives: in sub-studies I and III, from an instrumental perspective, and in sub-study II from an emancipatory perspective.

1.2 Environmental values

‘Values’ have a variety of meanings in different disciplines. In this dissertation, values are understood in a similar manner as Stern and his colleagues (Stern et al., 1995) do: values act as fundamental guiding principles in life. They are more general and more stable than attitudes and may thus act as basic guideposts for action (Stern et al., 1995; Corner et al., 2014; Milfont et al., 2015). Values are considered as inherently desirable, worthy, and good (Sagiv and Schwartz, 2022). Some researchers think that, of all the factors affecting individual behaviour towards the environment, values are hardest to change in the short run, but in the long term, value

changes may impact decisions about the environment the most (Dietz et al., 2005; Stern, 2000).

Personal values change throughout the life span, and there are indications from studies concerning European countries and New Zealand that conservation and self-transcendence values are more important among older people, and self-enhancement and openness to change values are more important among younger people (Schwartz 2007; Sagiv and Schwartz, 2022; Milfont et al. 2016). Changes in values seem to be related to major or long-term changes in life circumstances (Sagiv and Schwartz, 2022), suggesting that values are not easily changed. Influencing individual values may thus require long-term values-related education starting at a young age.

In the context of EE and SE research, values have been addressed from the perspectives of several disciplines, including pedagogy, sociology, philosophy, psychology, and history, and the focus has been on both individual and communal values (e.g., Lijmbach et al, 2002; Gouveia et al., 2015; Sandell and Öhman, 2010; Östman, 2010). Empirical research – often through surveys, sometimes through interviews – has elucidated how different values are connected to or affect the environmental concerns or behaviours of individuals or communities. This, mainly descriptive, research method is used in social and behavioural sciences (Dietz et al., 2005). Ethical or prescriptive approaches provide arguments for how we should think about and value the environment and non-human animals and what our moral obligations to them are. They are used in studies with a philosophical premise (Dietz et al., 2005; Kalof and Satterfield, 2005). In this thesis, I have studied values from the perspectives of history (I), education and pedagogy (II), environmental psychology (III), and environmental philosophy and ethics (I, II). The focus is on the values of individuals and a civil society organization. Values are approached mainly from a descriptive perspective, but normative ethical viewpoints are included, as well.

1.2.1 Intrinsic value, instrumental value, and altruism in environmental engagement

The concepts of intrinsic value, instrumental value and altruism are central to research and discussion on environmental values, environmental decision-making and behaviour, and the values-basis of environmental and sustainability education.

Intrinsic value means that things have a moral value that is independent of human appreciation, i.e., it is valuable ‘in itself’ (Zimmermann and Bradley, 2019). If nature has an intrinsic value, it is morally valuable regardless of whether it benefits man (Dietz et al., 2005; II). Approaches to environmental ethics such as biocentrism and deep ecology are based on the notion of the intrinsic value of conserving nature and

its function (e.g., Jacob, 1994). EE or SE, that is based purely on the idea of intrinsic value of nature, is however rare (Smith, 2020).

Instrumental value, on the other hand, means that something has value because it benefits humans (Zimmermann and Bradley, 2019). In anthropocentrism, only humans are considered intrinsically valuable, and the rest of nature is seen instrumentally (Dietz et al., 2005; II): as a source of the material, social, or spiritual well-being of humans. Anthropocentric elements are included in many forms of environmentally oriented education, e.g., humane education (I), sustainable development education (II), and climate change education (III) (Kalof et al., 2016; Hopkins and McKeown, 2002; Monroe et al., 2019).

Altruism means an unselfish regard for or devotion to the welfare of others (Merriam-Webster Dictionary, 2013). In socio-biology, altruism refers to behaviour that benefits others (by increasing their fitness or reproduction) but incurs a cost to the individual (by reducing the individual's own fitness or reproduction) (e.g., Krebs and Davies, 1997). In psychology, altruistic motivation usually refers to intentions that benefit others and are based on the expression of one's own inner values. (Schwartz, 1977; see also III). This is commonly referred to as helping or sharing (Schwartz, 1977). From a philosophical perspective, altruism refers to the idea, that one's duties are only to others, whereas egoism refers to the idea, that each person's duties are only to themselves (Proudfoot and Lacey, 2009).

Two value dimensions are commonly used to explain the tensions underlying environmental protection and sustainability: intrinsic versus instrumental value of nature, and human self-interest versus altruism. The first of these, the tension between the intrinsic and the instrumental value of nature, has been widely discussed in social sciences and environmental ethics. In these disciplinary areas, opposing views of sustainable development are often outlined in terms of how nature is valued in relation to the other two 'domains' of sustainability, i.e., people and the economy, and which of these domains are considered to have intrinsic value and which are considered to have instrumental value (e.g., Connelly, 2007; Gladwin et al., 1995; Kalof and Satterfield, 2012; II).

An ample amount of research in environmental psychology has, in turn, elucidated the antecedents of environmental behaviour through the value dimensions of self-interest and altruism (Dietz et al., 2005; III). Different names are used for the variables measuring these two orientations, and probably the most widely used psychological measure of values, the Schwartz's (1992, 1994) universal value system, calls self-interest orientation self-enhancement and altruistic orientation self-transcendence (Sagiv and Schwartz, 2022).

Altruism can be further divided into social altruism (i.e., altruism is directed towards a broader group of humans, possibly all of humanity) and biospheric altruism (i.e., altruism is directed towards other species, ecosystems, and possibly

the whole biosphere) (Dietz et al., 2005). As DeGroot and Steg (2008) point out, the idea that the intrinsic value of nature is a third value orientation (in addition to interest towards the self and other people) was suggested in environmental ethics literature by Leopold (1949), Singer (1975), Naess, 1989, and Merchant (1992), among others. Based on these ideas, environmental psychologist Stern and his colleagues (Stern et al., 1993; Stern and Dietz, 1994; Stern et al., 1999) developed a tripartite model of environmental values. In their model, self-interest (or ‘egoistic values’) and humanistic altruism (or ‘altruistic values’) are anthropocentric concerns, while biospheric altruism (or ‘biospheric values’) acknowledges an intrinsic value of other species and the environment beyond humans (Stern 1993; 1994; 2000; Dietz et al. 2005).

Stern and colleagues (Stern et al., 1999; Stern, 2000) consider that these three value orientations are fundamental in human relationship to the environment, as they are very stable factors underlying environmentalism throughout a person’s life (Stern, 2000; Dietz et al. 2005). According to the authors, these value orientations have a considerable leverage on human action toward the environment through their influence on worldviews and more specific environmental beliefs – however this also means that the direct effect of values on environmental action can be modest (Dietz et al. 2005; Stern, 2000; III).

The idea of tripartite environmental values model was further developed by Schultz (2001), who applied it to measuring environmental concerns. In his model, the Environmental Motives Scale, concerns reflect “a sense that something is important and a belief that it may be at risk” (Dietz et al., 2005, p. 351). Schultz demonstrated that egoistic, altruistic, and biospheric environmental concerns are based on values of self-interest, humanistic altruism, and biospheric altruism, respectively (Schultz, 2001; Schultz et al., 2005).

Most of the research in environmental psychology related to the value base of environmental protection has been conducted in Western countries. However, the tripartite environmental classification has also been supported by empirical studies in several non-Western countries and cultures (e.g., Schultz et al., 2005; De Groot and Steg, 2008; Milfont et al., 2006). The association of different types of values – especially biospheric, altruistic and egoistic values – with environmental concern and environmental behaviour will be described below in section 1.5.1.

1.2.2 Pluralism in environmental and sustainability education

The debate on moral pluralism in relation to environmental issues began among environmental ethics scholars in the 1980s (see, e.g., Stone, 1988; Callicott, 1990). Since the 2000s, it has become a popular response to the challenge of instrumental

versus emancipatory approach to EE and SE, especially in the Nordic countries (Rudsberg and Öhman, 2010; II). In environmental and sustainability education, pluralism usually refers to the plurality of values, perspectives and ideologies underlying people's conceptions of environmental and sustainability issues (e.g., Rudsberg and Öhman 2010; Kopnina, 2015). The idea behind pluralistic education is to avoid favouring particular views over others. Rather, pluralistic EE and SE seek to reveal and interrelate diverging values, norms, and interests (Wals, 2010) and solve environmental and sustainability problems by reconciling the underlying conflicts of interest in a participatory manner (Sund, 2015).

The premise of pluralism in EE and SE is not only principled but also practical: suggesting that environmental or sustainability issues are clear or unanimous can in fact hide their complexity and uncertainty as well as the various interests underlying sustainable development. This may reduce the chances of success in tackling these issues (Berglund and Gericke, 2016). In practice, pluralistic EE or SE means that students should learn to express, weigh and democratically discuss and agree on moral questions and norms relevant to real-life environmental and sustainability issues (Öhman, 2006, 2007; Rudsberg and Öhman, 2010; Hasslöf, Ekborg, and Malmberg, 2014). Including a historical perspective to these discussions is important (Laessoe, 2010; Kopnina, 2018). Moreover, a pluralistic approach to education requires that teachers are aware of their personal value-based positions and able to express them (Rudsberg and Öhman, 2010; II).

1.3 Environmental worldviews

In this dissertation, environmental worldviews are understood as generalized beliefs about the relationship between man and nature/environment, following a definition by Dietz and colleagues (et al. 2005, p. 346): “Beliefs are understandings about the state of the world; they are facts as an individual perceives them. [...] Worldviews are generalized beliefs. We might hold the specific belief that climate change leads to loss of habitat and thus species loss in boreal regions and a worldview that human actions often cause substantial harm to the environment.” From an environmental ethics perspective, a worldview can be understood as a primitive term for describing people's factual and normative conceptions. (Boylan, 2022).

Worldview is often used interchangeably with ideology in the literatures of environmental social science and environmental psychology. However, whereas an environmental worldview usually describes a person's or community's more general or primitive beliefs about the relationship between humans and nature, an environmental ideology can be understood as more comprehensive and systematic set of beliefs related to the human–nature relationship. Ideology is often used for political purposes, to justify or challenge a prevailing social order (which can include

not only humans but also other organisms). (See Dunlap et al., 2000; Sullivan, 2009; Hayes and Stratton, 2017).

Worldviews are based on personal (or cultural) value priorities (Rohan, 2000), and are therefore an important link between an individual's values and his/her decisions (Rohan, 2000; Stern, 2000; Boylan, 2022). Like values, worldviews can be the result of individual conscious thinking or the passive consequence of growing up in a particular culture (Boylan, 2022).

In this thesis, worldviews are approached from the perspectives of history (I), social science (II), and environmental psychology (III).

1.4 Different emphases of values and worldviews during the history of EE and SE

1.4.1 Early environmental education: scientific versus romanticist ideas

Educational thinking reflects the prevailing values and worldviews of a particular time (Halstead, 2005). As the idea of this thesis is to study the role of values and worldviews in environment related education during two different time periods, its early days and today, I briefly describe some of the major worldviews underlying environment-related education between these time periods. The developments described in this section mainly concern Western countries, especially Western Europe and the United States, as the bulk of research concerning the development of environmentalism as well as EE and ESD focuses on the West.

Environmental education is said to have blossomed in the latter half of the 19th century. This was a time, when interest towards the natural environment, the outdoors, and natural history – and with these, attention towards vast changes in the environment – started to grow in both Western Europe and North America (McCormick, 1991; Disinger, 1985). Romanticism, one of the major intellectual and artistic movements of the late 19th century, is considered an important ideological origin of environmentalist thought (Hay 2002; Oerlemans 2004; Scott and Vare, 2021). The writings of the English romantic poets emphasized the idea of nature and humans as interdependent, as well as our moral duty towards nature (Scott and Vare, 2021). Literacy, which became more common during the Romantic era and was based on the increased number of short stories, contributed to the development of an early ecological consciousness (Ottum, 2016).

In the history of education, Romanticism can be seen as an umbrella term for a collection of pedagogical schools. Romantic educational thinking emphasized ideas such as the imagination, experience, and the self-realization of the child (Willinsky, 2006). Humane education was an educational movement, built upon the romanticist

idea of the human-animal relationship. It started as an educational movement in Britain in the late 19th century. Humane education combined the concern for children's moral and citizenship education with romanticist ideas of animals and their gentle treatment, a kindness-to-animals ethic (Unti and De Rosa, 2003; Topelius, 1874; I).

In the second half of the 19th century and the beginning of the 20th century, educators debated the importance of the humanistic, religious, and scientific perspectives in the study of nature and animals. Controversies concerned both formal education (see, for example, Launonen, 2000 for Finland, Le Beau, 2007 in the USA) and informal learning, including children's educational literature and domestic education (e.g., Lutts 1990; Unti and DeRosa 2003; Varga 2009; I). The debate centred around a question of the perspective from which non-human animals should be understood, appreciated, and protected by humans. Simply put, one side of the debaters argued for the truthfulness of a scientific understanding of nature, and the other found empathy towards animals more important (Lutts, 1990).

Both perspectives, the scientific and the romantic, included anthropocentric and bio- or ecocentric views. The natural scientific view was related to the idea that natural resources should be managed for utilitarian purposes (Disinger, 1998). Yet scientists like Alexander von Humboldt saw nature as a web of life of that humans were a part of and had a duty to nurture (Scott and Vare, 2021). Much of romanticist education was based on the idea of the instrumental role of nature and animals in supporting human development, but some writers emphasized the intrinsic value of nature and the similarity of humans and animals (Scott and Vare, 2021; Marsden 1997; Oerlemans 2004; Tester 1991). Despite being one of the ideological origins of environmental thinking, Romanticism and humane education have been studied relatively little in relation to EE and SE (I).

1.4.2 Environmental awakening and the New Environmental Paradigm

In the 1940s and 1950s educational approaches that emphasized empathic attitude to nature and animals, humane education, and nature study, began to wane. Scientifically rigorous approaches, which responded to the economic needs of the reconstruction period, including conservation education and science education, gained more foothold especially in the US, but also in Finland (Disinger, 1983; Wals et al., 2014; Heimonen and Kaaro, 1999; Ratinen and Nevanpää, 2006).

Environmental education began to emerge in the early 1960s, during a time of the 'environmental awakening', out of a need to respond to emergent environmental crises, particularly pollution (Wals et al., 2014; McKeown and Hopkins, 2003). In the 1960s and 1970s, targeted action, both internationally and in Finland, was set in

motion to address the problems caused by economic development (Scott and Vare, 2021; Nienstedt, 1997). The first widely accepted definitions of environmental education emerged in the 1970s. At the same time, environmental education became one of the key tools of the United Nations (especially UNESCO and UNEP) in responding to the environmental crisis (United Nations, 1972; Disinger, 1983; Scott and Vare, 2021). The first international conference on environmental education was held in Tbilisi in 1977.

Common perception of the relationship between humans and nature began to change, as the public became aware that nature was vulnerable to human intervention (Scott and Vare, 2021; Nienstedt, 1997). In 1978, environmental sociologists Dunlap and Van Liere took a note of this change and called the prevailing, antienvironmental worldview a ‘Dominant Social Paradigm’ (DSP) and the new emerging environmentalist worldview ‘New Environmental Paradigm’ (NEP) (Dunlap and Van Liere, 1978; Dunlap et al., 2000). The NEP “focused on beliefs about humanity’s ability to upset the balance of nature, the existence of limits to growth for human societies, and humanity’s right to rule over the rest of nature” (Dunlap et al., 2000, p. 427; see also III).

1.4.3 Sustainable development and education: something for everyone?

The concept of sustainable development (usually defined as “development which meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, p. 43) was established in the report *Our Common Future* by the World Commission on Environment and Development (WCED or Brundtland Commission) in 1987 (WCED, 1987). The importance and worldwide recognition of the concept was further strengthened at subsequent UN conferences (Hopkins and McKeown, 2002). Sustainable development is usually presented as consisting of three pillars: environmental sustainability, social justice, and economic sustainability. The concept is very broad and thus controversial; it has been suggested that sustainability and sustainable development mean all things to all people (Norton, 2005; see also II).

Sustainable development can be interpreted and supported based on at least three major worldviews: ecocentric, technocentric, and anthropocentric (Byrch et al., 2007). Many scholars however see that, in practice, the widespread adoption of sustainable development in current societies has led to a situation, where the earlier focus of environmental policy has moved from nature conservation towards a highly anthropocentric promotion of social and especially economic development (Sauvé, 1999; Bonnett, 2007; Scott and Vare, 2021).

Parallel to the progress of sustainable development, the concept of education for sustainable development (ESD) has been developed as an educational solution to the challenge of environmental and other unsustainability problems. ESD has become widely adopted into official international environmental policy, and it has largely displaced EE (Jacobs, 1999; Stevenson, 2006). The goals of education for sustainable development are in many countries developed by ministries and then assigned to teachers (Hopkins and McKeown, 2002).

Both sustainable development and ESD have been widely criticized for being too vague, fuzzy, and even paradoxical as concepts (e.g., Jacobs, 1999; Scott, 2002; Stevenson, 2007; Scott and Vare, 2021), because there is no single way to define them in all situations or contexts (Dreyfus et al., 1999; Scott and Vare, 2021; II). Many scholars also believe that the economic pillar in particular has gained too much weight, which has led to a blurring of the contradiction between ecological integrity and economic growth (Jacobs, 1999; Hopwood et al. 2005). According to some researchers, in ESD, nature is viewed from an anthropocentric perspective, either as a resource for economic development or a shared resource for sustainable living (Sauvé, 2005). According to other critiques, the aim of ESD in vocational or higher education seems to be to develop students' knowledge and skills so that they can participate in the 'green economy' (Kopnina 2018).

Proponents of sustainable development as well as ESD argue that the strength of sustainable development lies precisely in its scope and pluralistic basis: it takes social and economic concerns seriously (Sauvé, 2005; McKeown and Hopkins, 2003) and enables different views to be brought to the common negotiating table, which encourages different parts of society to build a more sustainable future together (Sauvé, 1999; II).

Among the researchers and practitioners of sustainability education, there are proponents of both a pluralistic approach and an eco- or biocentric approach to sustainable development (Kopnina, 2015). A pluralistic and multidisciplinary approach is supported especially in Nordic formal education institutions, including higher education institutions (Kopnina, 2015). So far, there is relatively little information on whether pluralism is a more principled goal, or whether educators have adopted it in practice (II).

1.4.4 Education on climate change: increasing climate change engagement

Anthropogenic climate change emerged in the international agenda in the mid-1980s. Since then, there has been increasing evidence and deepening concern of the effects of climate change globally (Corner et al., 2014; Monroe et al., 2019), coupled with a steep rise in public communication of and education on climate change (Moser,

2010). A central feature of climate change education is that it is "about learning in the face of risk, uncertainty and rapid change" (Stevenson et al., 2017, p. 67). Climate change related education may focus on different forms of climate engagement, understood here as mitigation, adaptation, and disaster risk reduction on both individual and societal levels, but also as an increase in understanding of the cognitive and affective aspects of climate change (Cantell et al., 2019; Stevenson et al., 2017).

There are similar tensions in the societal debate on climate change as in the debate on sustainable development. These concern the role and weight of economic development in relation to ecological integrity and social justice (Öhman, 2009). Issues of social justice in particular have provoked heated debate, since the biggest historical contributors to the greenhouse gas problem have been industrialised countries, yet the effects of climate change (e.g., increase of heat waves, severe storms, floods and droughts) are, in general, more severe in developing countries (Stevenson et al., 2017; Bangay and Blum, 2010; III). In recent years, alongside the anthropocentric perspectives dominating the climate discussion, there have also been stronger ecocentric perspectives, as the connections between climate change and biodiversity loss have increasingly been brought to the fore (e.g., IPBES, 2019; IPCC, 2022).

It is important, that like climate change mitigation and adaptation efforts, also climate change education efforts in the developing countries are built with the intended audience in mind. In order to be impactful, education has to be compatible with local contexts and needs, as well as local people's climate perceptions and worldviews (United Nations Convention..., 2015; Stevenson et al., 2014; Leiserowitz, 2005; Schultz et al., 2005; Bangay and Blum, 2010). At the moment, however, this is challenging as relatively little is known about the antecedents of environmental concern in different cultures outside the West, including the role of values and worldviews in climate engagement. It has been pointed out that there is a clear need for cross-cultural research on human-environment interactions (Tam and Milfont, 2020; III).

1.5 How do values and worldviews affect environmental concern and behaviour?

1.5.1 Evidence from models of environmental psychology

There is strong empirical evidence showing that values and worldviews can predict environmental concerns and behaviours. In social and environmental psychology, it is common to use models in which different socio-demographic (e.g., age, gender), cognitive (e.g., values, worldviews, knowledge, beliefs), and affective factors (e.g.,

concern) interact in the form of a causal chain that leads to an individual's environmental engagement. Values are usually situated as one of the first links at the beginning of these causal chains, as values have been found to predict many of the other factors in the chain. Values affect concerns and behaviours usually simultaneously with or via other factors, including knowledge and worldviews (Dietz et al., 2005; Hines et al., 1987; Lyons and Breakwell, 1994; Levine and Strube, 2012; Fielding and Head, 2012; Milfont, 2012; Mobley et al., 2010; Xiao and Hong, 2010; Meinhold and Malkus, 2005; III).

Biospheric and (in some cases) altruistic values have been found to be positively associated – and egoistic values negatively associated – with an environmental worldview and different types of environmental concerns, behavioural intentions and behaviours in mainly Western adult populations (van der Linden, 2015; Shi et al., 2016; Corner et al., 2014; Howell, 2013; Poortinga et al., 2019; De Groot and Steg, 2008; De Groot and Steg, 2010; Jansson et al., 2011; Slimak and Dietz, 2006; Whitley et al., 2018). Similar results have been found regarding value-based environmental concerns (Schultz, 2001): biospheric and altruistic environmental concerns are positively associated with both an environmental worldview and environmental behaviours among adults (Steg et al., 2011; Milfont et al., 2006).

One of the most widely used measurements of an environmental worldview in environmental psychology is the 'New Environmental Paradigm Scale' developed by Dunlap and Van Liere in 1978 (Dunlap and Van Liere, 1978; Dunlap, 2008; Dunlap et al., 2000). This psychometric instrument is based on the idea of two mutually exclusive paradigms, the 'Dominant Social Paradigm' and the 'New Environmental Paradigm' (see section 'Environmental awakening and the New Environmental Paradigm' above).

According to the authors, the NEP (which they later called the 'New Ecological Paradigm Scale (Dunlap et al., 2000)) "taps 'primitive beliefs' about the nature of the earth and humanity's relationship with it" (Dunlap et al., 2000, p. 427) and measures an individual's endorsement of an ecological worldview (Dunlap et al., 2000; see also Stern et al., 1995). Best and Mayerl (2013) have suggested that the NEP should not be viewed as an isolated construct but as embedded in a structure of values and attitudes (Best and Mayerl, 2013). Values can be considered as antecedents of the NEP, and the NEP – which reflects primitive or general beliefs about the nature – precedes more specific attitudes and beliefs concerning the environment (Stern et al., 1995).

According to a number of studies, the NEP worldview is a strong predictor of more specific environmental beliefs, concerns, and behaviours (Hawcroft and Milfont, 2010; Xiao et al., 2019; Cordano et al., 2003; Unanue et al., 2016; III). There is support for the role of NEP as a mediator that channels the influences of other explanatory variables, including socio-demographic factors and individual

values, on environmental concern and behaviour (Xiao et al., 2019; Best and Mayerl, 2013; III). However, some studies conducted outside the Western countries indicate that the two main factors of the NEP – New Environmental Paradigm and Dominant Social Paradigm – may be accepted simultaneously in some cultures, even though the two are considered mutually exclusive in Western countries. There is thus a need for more cross-cultural studies (Grůňová et al., 2019; III).

1.5.2 Underrepresented young and non-Western populations

Research on the associations between children and young people's environmental values, worldviews and behaviour is much more limited than research concerning adults. According to existing studies, young people are generally more concerned about the environment, including climate change, compared to adults (Gifford and Nilsson, 2014; Corner et al., 2015). Environmental concern that is based on biospheric values appears to be associated with ecological worldviews (NEP for Children or NEP-C (Manoli et al., 2007)) in adolescents in Slovenia (Torkar et al., 2020). Furthermore, ecological worldviews (the NEP or NEP-C) have been associated with environmental behaviours among adolescents in the US and Spain (Meinhold and Malkus, 2005; Corraliza et al., 2013). Furthermore, it seems that young people's nature connectedness, concerns on and attitudes towards the environment, and environmental behaviours tend to dip temporarily in adolescence (Olsson and Gericke, 2016; Negev et al., 2008; Liefländer and Bogner, 2014; Otto et al., 2019; Chhokar et al., 2011; Chhokar et al., 2012; Skamp et al., 2009; Keith et al., 2021; Olsson et al., 2019). On the whole, the understanding of young people's environmental perceptions is still patchy and there are gaps in knowledge regarding how different psychosocial and demographic factors predict youth environmental and climate engagement (Gifford and Nilsson, 2014; Corner et al., 2015; Busch et al., 2019; Shi et al., 2015; Lewis et al., 2019; Grůňová et al., 2019; Torkar et al., 2021; Rosa et al., 2022; III).

Another research bias exists in relation to geography and culture. So far, research in environmental psychology has focused mainly on Western and especially English-speaking countries. The role of culture has often been side-lined in analyses. Cultural considerations are, however, essential, as people's actions towards nature are based on their relationship with their environment and this relationship is culture-bound. (Tam and Milfont, 2020; III).

1.6 The transmission of values and worldviews through education

As mentioned earlier in this Introduction, people's values are very hard to influence or change. Yet EE and SE educators often seek to do this, as in the long run, changes in people's values may have profoundly positive impacts on how they behave towards the environment (Dietz et al., 2005; Stern, 2000). A starting point for EE or SE dealing with values is that its content, activities, and aims should be formulated to be compatible with the environmental concerns and worldviews of the country and culture in question. Otherwise, they are likely to fail (Stevenson et al., 2014; Leiserowitz, 2005; Schultz et al., 2005; III).

Values and worldviews are transmitted in education via three routes: the official or formal curriculum; the actual curriculum; and the 'hidden curriculum' (Portelli, 1993). The term 'hidden curriculum' is used to describe the disconnect between what is overtly taught in educational institutions and what pupils actually learn (Cotton et al., 2013). In the case of formal and actual curricula, the value and worldview goals can be made explicit (Portelli, 1993; I), but in case of the 'hidden curriculum', they are transmitted to students unconsciously (Cotton et al., 2013; II). The values and worldviews being transmitted may be societal, institutional or teachers' own values (Portelli, 1993). Teachers' values and worldviews are included in their personal conceptions, i.e., practical interpretations or understandings, of environment and sustainability (Gallie, 1955; Jacobs, 1999; II).

1.7 The aim and goals of the research

As described at the beginning of this introduction, the broad aim of this dissertation is to increase theoretical understanding of the multifaceted view of the role of values and worldviews in EE and SE, as well as elicit some new and specific aspects related to this role. More specific goals of the research are related to the three research themes, early nature-related education, sustainable development, and climate change.

In the first sub-study, the goal is to increase understanding of the value and worldview basis of early nature-related education in Finland by focusing on the values of an early animal welfare and nature education organization, Helsinki Humane Society. Few studies have addressed early Finnish nature education organizations' values from environmental and sustainability educational perspectives. In existing studies, the focus has been on scientifically based nature conservation education, whereas research focusing on education related to animal welfare and empathy and based on Romanticist ideas has been largely missing in Finland.

In the second sub-study, the goal is to increase understanding of the values underlying the conceptions of sustainable development among higher education SE teachers in a Finnish higher education. I examine whether these conceptions reflect the pluralistic and interdisciplinary approaches to SE, that are widely supported in current higher education research and policy.

In the third sub-study, the goal is to acquire knowledge of how value-based environmental concerns and worldviews are associated with climate change concern among Cambodian adolescents, and based on this knowledge, make practical recommendations regarding the planning of climate change education for adolescents in Cambodia. The picture of the antecedents of environmental and climate related concern is comparatively sharp among adults in the Western countries. It is, however, much less clear outside the West and among adolescents.

Through the three sub-studies, I aim at answering the following questions:

1. What kind of value and worldview orientations were central to early nature education actors focusing on animal welfare in Finland?
2. Is the current call for interdisciplinarity and values plurality reflected in HE teachers' conceptions of sustainable development in Finland?
3. What are the values- and worldviews-based antecedents of climate change concern among adolescents in Cambodia?

2 Methods

2.1 Overview of the study designs

Environmental and sustainability issues are situated at the intersection of the natural world, society, culture, history, economics, and ethics. Thus, education on the environment and sustainability, whose basic goal is to help learners understand the effect of human interactions with and behaviours on nature, are also inherently multidisciplinary and holistic (Wals, 2012). This versatility of perspectives and a quest for holism were also the starting points of this dissertation research. A versatile, multidisciplinary and to some extent pluralistically based approach was sought throughout the dissertation, regarding theoretical and methodological choices as well as the choice of research participants/objects. The theoretical and methodological choices of the individual sub-studies were thus based on two aspects: what was considered a valid method to examine the gap in knowledge in each sub-study and the aim of general versatility and holism.

Based on this, a versatile research approach was chosen instead of a more concise approach and target group. The research was carried out as an empirical study, which utilized both qualitative and quantitative research methodology and, therefore, an interpretive and a positivist research approach. The themes chosen for research were early nature-related education in Finland, sustainable development education, and climate change education, as these were considered topics that have generated a lot of interest and values-related discussion in EE and SE in their time.

Theoretically, the sub-studies approached the role of values and worldviews in EE and SE through three frameworks: (I) the history of ideas, (II) interdisciplinary pluralism, and (III) socio-psychological theory on environmental concern, values, and worldviews. The study designs for each sub-study are summarized in Table 1.

In this section 2.1., general research approaches and theoretical frameworks of the sub-studies are described. In section 2.2., methods on analysis used in this thesis are first described on a more general level, and then the research procedure of each of the three sub-studies, including sources of data, is described in more detail.

Table 1. Summary of the study designs.

Study	Participants	Materials	Definition / understanding of values and worldviews	Analyses
Sub-study I (Rouhiainen and Vuorisalo 2014)	-	'Eläinsuojelus' magazine 1900-1905 (64 issues) 'Lilla djurvännan' magazine 1935-1940 (8 issues)	Values: ideas or concepts that are considered fundamentally desirable for education (Dietz et al., 2005; Sagiv & Schwartz, 2022) Worldviews: broad beliefs about human-animal / human-human relationships, ideologies (Dunlap et al., 2000; Dietz et al., 2005; Sullivan, 2009)	Deductive content analysis
Sub-study II (Rouhiainen and Vuorisalo 2019)	Higher education teachers of a Finnish university sustainable development learning programme	Preliminary classification assignment (N=5) In-depth interviews (N=5)	Values: broad ideas that are considered fundamentally desirable for SD (Dietz et al., 2005; Sagiv & Schwartz, 2022) Worldviews: broad beliefs about human-nature / human-human relationships (Dunlap et al., 2000; Dietz et al., 2005)	Abductive content analysis
Sub-study III (Rouhiainen and Haanpää, submitted)	Secondary school students in 3 public schools in Cambodia	Survey data (N=389)	Values: valuation of self / other humans / other nature underlying general environmental concern (EMS for children) (Schultz, 2001) Worldviews: broad beliefs about human-nature relationship, measured by the NEP-C scale (Dunlap et al., 2000; Manoli et al., 2007)	Confirmatory factor analysis (CFA) Structural equation modelling (SEM)

Historical research was chosen as the approach of sub-study I, because the purpose was to examine the expressions of values and worldviews in the context of early Finnish nature related education. Historical research aims to interpret the factual events of the past in such a way that understanding of the past as well as the present grows (Carr, 2009). History of ideas is an approach that aims to understand how certain philosophies, streams of thought or disciplines were born and developed, and how they influenced culture and society in different times. One of the central questions in the history of ideas has been the conflict between science and religion, which is central to the history of nature-related education (Grafton, 2006). The aim of this study was to increase understanding of the values and worldviews of educators related to nature education in different decades as well as how such values and worldviews can be studied and interpreted in educational research.

The approach chosen for sub-study II was an in-depth and interpretive study, the aim of which was to get an understanding of Finnish SD teachers' perceptions of sustainable development and the values and worldviews influencing them. Sustainability education is considered a moral obligation of today's universities and thus a central task of formal higher education. From the viewpoint of values and worldviews, sustainable development education is a very interesting theme, because its central challenge is a focus on multiple perspectives, a diverse value base and an interdisciplinary nature, which make sustainability issues difficult to solve.

The sub-study II is theoretically based on the ideas of interdisciplinarity and pluralism. In EE and SE research, pluralism usually refers to the plurality of values, perspectives and ideologies that underlie people's conceptions of environmental and sustainability issues (Rudsberg and Öhman, 2010; Kopnina, 2015). The idea behind pluralistic education is to avoid favouring particular views over others and to recognize that there is no one normatively right way of sustainable living. Rather, pluralistic EE and SD education seek to reveal and interrelate diverging values, norms, and interests (Wals, 2010) and solve environmental and sustainability problems and find creative solutions by reconciling the underlying conflicts of interest in a participatory manner (Sund, 2015).

In sub-study III, a more comprehensive and more generalizable, quantitative research approach was chosen. Theoretically, the focus was on a concept used in the field of environmental psychology, climate change concern. Environmental psychology is a research field under social psychology, that focuses on understanding transactions between human individuals and their environment. Environmental psychology investigates behaviours and the antecedents of behaviours that can be considered positive from the perspectives of sustainability, nature, or the climate, as well as interventions that foster pro-environmental and sustainable behaviours. (Gifford, 2014).

In environmental psychology, understanding climate related concern and its socio-demographic and socio-psychological antecedents – including values-based motives and worldviews – is considered an effective strategy in climate education aimed at adolescents (Stevenson et al., 2019). However, considerable cross-cultural variation exists in the level and factors underlying collective climate-related concern. Furthermore, there is only fragmentary knowledge concerning these factors regarding children and adolescents living in non-Western countries (van der Linden, 2017; Corner et al., 2015; Shi et al., 2015; Lewis et al., 2019; Salehi et al., 2016). Therefore, more knowledge was sought on how values-based motives and environmental worldviews together with other socio-demographic and psychological factors are connected to young people's climate concern outside of Western countries. Understanding the interplay between these factors and climate change concern can help design climate change related teaching so that it best supports climate engagement in different contexts (Corner et al., 2015; Stevenson et al., 2014; Schultz et al., 2005).

2.2 Methodology

2.2.1 Content analysis

According to Weber (1990), content analysis is a research methodology that utilizes a set of procedures to make valid inferences from text. Text data may be obtained from narrative responses, open-ended survey questions, interviews, observations, or printed media (Hsieh & Shannon, 2005). In content analysis, words are distilled or condensed into a smaller number of content-related categories or themes. The units of analysis (words, phrases, paragraphs) in each category share the same meaning (Elo and Kyngäs, 2008; Weber, 1990; Graneheim and Lundman, 2004). Epistemologically, content analysis can be based on a positivistic or a hermeneutic point of view (Graneheim et al., 2017). In the positivistic point of view, data is treated quantitatively, and interpretation is scarce. In the hermeneutic point of view, data analysis is qualitative, and the researcher uses various degrees of interpretation (Graneheim et al., 2017). Qualitative content analysis can be defined as a research method, in which the content of text data is interpreted subjectively and themes or patterns are identified from the text through a systematic classification process (often called 'coding') (Hsieh & Shannon, 2005). The focus of the analysis is the content or contextual meaning of the text (Hsieh & Shannon, 2005). During the analysis process, data is abstracted and usually, latent meanings are produced from manifest and literal content (Erlingsson and Brysiewicz, 2017; Graneheim and Lundman, 2004). Together the categories and/or themes form a condensed and broad description of the phenomenon under study (Elo and Kyngäs, 2008).

The role of theory in qualitative content analysis is varied, as conclusions from the data can be drawn inductively, deductively, or abductively, depending on the approach chosen (Graneheim et al., 2017; Elo and Kyngäs, 2008). In the inductive (also called 'data-driven' [Schreier, 2012], 'text-driven' [Krippendorff, 2018] or 'conventional' [Hsieh and Shannon, 2005]) approach, the researcher looks for similarities and differences in the data (Graneheim et al., 2017). Inductive content analysis is generally used, when existing theory or research literature on a phenomenon is limited and the categories and their names flow from the data (Hsieh and Shannon, 2005).

Deductive (also called directed [Hsieh and Shannon, 2005] or concept-driven [Schreier, 2012]) approach means that existing theories or explanatory models about the phenomenon under study are tested against the collected data (Graneheim et al., 2017; Hsieh and Shannon, 2005). The purpose and main strength of the deductive approach is to validate or extend conceptually the existing theory (Hsieh and Shannon, 2005). Earlier research is used to identify key concepts or initial variables and categories and thus develop an initial coding scheme or matrix (Potter and Levine-Donnerstein, 1999; Elo and Kyngäs, 2008). Prior research can also be used to predict the relationships among the concepts and variables (Hsieh and Shannon, 2005). In deductive content analysis, the initial coding scheme or analysis matrix can be structured or unstructured, depending on the aim of the study (Elo and Kyngäs, 2008). When a structured matrix is used, data coding proceeds according to pre-determined categories. In the case of unstructured matrix, data is gathered by content and after the initial coding, the analysis can proceed in an inductive manner. In the latter phase, new categories or sub-categories are formed based on the meanings emerging from the data (Elo and Kyngäs, 2008). This technique resembles an abductive approach to content analysis.

The abductive (also called combined [Elo and Kyngäs, 2008]) approach to content analysis is neither clearly theory-generating nor theory-driven (Tavory and Timmermans, 2014). It is rather "a movement back and forth between inductive and deductive approaches" (Graneheim et al., 2017). In the abductive approach, the purpose is to describe the phenomenon under study and find a most likely theoretical explanation for it (Tavory and Timmermans, 2014). New theoretical openings are created based on surprising research evidence (Timmermans and Tavory, 2012). At the same time, the researcher admits that he/she always has theoretical preconceptions of the data (Timmermans and Tavory, 2012). The strength of the abductive approach to content analysis is that the new theoretical openings that are being created, have a clear relation to earlier theory (Timmermans and Tavory, 2012).

2.2.2 Structural equation modelling

Structural equation modelling (SEM) is a method of statistical analysis for testing hypothesized patterns of directional and nondirectional relationships among a set of observed and latent variables (MacCallum and Austin, 2000). Observed variables can be measured directly, whereas latent variables are hypothetical constructs that cannot be directly measured (MacCallum and Austin, 2000). The SEM analysis is used to determine the extent to which the theoretical model is supported by the sample data (Schumacker and Lomax, 2004).

SEM is flexible in the sense that it can be used to test various types of theoretical models, including regression models, path models, confirmatory factor models as well as combinations of path and confirmatory factor models (Schumacker and Lomax, 2004). The SEM allows statistical modeling and testing of complex phenomena (Schumacker and Lomax, 2004) and thus, it is well suited for psychological research (MacCallum and Austin, 2000), including environmental psychology. The adequacy of model fit to the data is determined using several statistical tests. SEM techniques also take measurement error into account when analyzing data (MacCallum and Austin, 2000).

2.2.3 Sub-study I

In sub-study I, the focus was on the educational and values-based contents of early animal welfare movement in Finland. The animal welfare movement was chosen as the object of scrutiny because animal welfare organizations were actively involved in non-formal education in Finland and they shared similar goals with the nature conservation movement, which was another prominent actor in early non-formal environment-related education in Finland. At the beginning of the 20th century, the status of animal welfare associations was, however, more established compared to the nature conservation movement, as the first Finnish nature conservation society was founded only in 1938.

Materials of sub-study I consisted of the membership magazines of the first Finnish animal welfare organization, Helsinki Humane Society (in Finnish: Helsingin eläinsuojeluyhdistys or HESY), founded in 1874. The research targeted the first four decades of the 20th century, from the peak period of the popular enlightenment movement in Finland to the Second World War, which paralyzed HESY's activities for over a decade (HESY-lehti 1/2004, 7). Two periods were chosen for scrutiny: years 1900-1905 and 1935-1940. During 1900-1905, the HESY membership magazine was called "Eläinsuojelus" (also known as "Oikeutta kaikille – Suomen eläinsuojeluyhdistysten aikakauskirja" during 1894-1896). In 1935-1940, the magazine was called "Lilla djurvänneren".

A content analysis was performed to search for meanings, which reflected environment-related education's main orientations at the time: humane, romanticist and natural scientific ideas. A deductive approach to content analysis was chosen, because existing research concerning environment-related educational thinking during the first half of the 20th century, also Finland, was rather abundant. In this study, the deductive approach to content analysis meant that pre-existing research (in particular, Gordon and Lawton, 2002; Jaakkola, 2011; Unti and DeRosa, 2003; Varga, 2009) was used for identifying key concepts as initial coding categories (Potter and Levine-Donnerstein, 1999). The initial categories of analysis are presented in Table 2.

The first part of the analysis was deductive. Meaning units (i.e., keywords, phrases, and ideas that contained educational meanings) were marked and placed in the initial categories, whenever they fitted in them. The analysis was then continued using a more inductive approach (Elo and Kyngäs, 2008). First, subcategories were identified based on the meanings that emerged from the data. Then, the relationships among all categories and subcategories were identified (Hsieh & Shannon, 2005). During the analysis process, the initial coding scheme was revised and refined (Hsieh & Shannon, 2005).

Table 2. Initial categories of analysis in sub-study I.

Key idea/concept	Includes ideas such as...
Education of the total human being	Education of the total human being Mind/sense, body, senses, emotions and will Harmony Art, aesthetics, aesthetic education
Moral education	Emphasis on morality in education Religiousness/Christianity in education Spirituality/sacredness in education
Education for civilized life	Order Self-discipline Civic loyalty
Mystic idea of nature	Nature as a threatening/melancholic force Nature as difficult to understand Nature within humans or things
Nature study	Empirism Natural sciences Nature as mechanistic, emphasis on natural laws
Kindness-to-animals ethic	Doing good/being kind to animals as a moral guideline Action/agency

2.2.4 Sub-study II

Sub-study II focused on higher education teachers' conceptions of sustainable development (SD) – a complex and contested concept – and the ideas and values underlying these conceptions. Participants of sub-study II were five experienced higher education teachers in an interdisciplinary programme of sustainable development in a Finnish university. In order to get an in-depth understanding of the teachers' conceptions of SD, the data collection was performed in two stages during 2013-2014. In stage 1, the teachers completed a task designed to stimulate their conceptual thinking about sustainability. In the task, they reviewed randomly chosen sustainability education materials produced by six Finnish environmental organizations in 2007-2011. The teachers searched the materials for claims that reflected the following categories: environmental sustainability, social sustainability, and economic sustainability. The teachers made the classifications using an interpretation frame based on the sustainable development triangle model by Connelly (2007) (see study II). This model, like the majority of sustainable development literature, assumes that sustainable development is based on three contesting domains: the environmental, the social, and the economic.

In stage 2, the teachers' classifications (the baseline data) were used to formulate questions for semi-structured interviews. Teachers were asked to describe their own conceptions of sustainable development as well as to recall and discuss more in-depth the classifications they made in stage 1.

The interview data was analysed using an abductive approach to content analysis, as the purpose was to explore the relationship between the teachers' personal conceptions of sustainable development and existing theory of economic, environmental, and social dimensions of SD, and to find new perspectives and theoretical openings related to the concept of SD.

2.2.5 Sub-study III

In sub-study III, the purpose was to explore the predictors of climate change concern among adolescents in a country that is highly vulnerable to the effects of climate change, Cambodia. In this research, climate change concern refers to feelings of concern and worry (van der Linden, 2017), and values-based general environmental concern and environmental worldview are hypothesized to predict this concern. Cambodia's public schools were selected as the research context because adolescent climate concern has not been studied in the country before.

The study design was cross-sectional. Data was collected using a survey targeted at secondary school students (majority of them 13-15 years). The survey was translated in Khmer and piloted with 23 students from grades 7-9 in a secondary school in Battambang province. After the pilot, the survey questionnaire was slightly

modified and administered to grade 7-9 students in three other public schools in different parts of Cambodia (Battambang province, Kandal province, and Kampong Thom province). The schools were chosen from areas with different levels of vulnerability to flooding using convenience sampling. All the schools chosen for the research were public schools situated outside larger cities, as the aim was to be able to generalize the study results to Cambodian adolescents (most schools in Cambodia are rural public schools).

The survey questionnaire was designed and formulated around central concepts of interest (climate change concern, value-based general environmental concerns, and environmental worldviews) and other socio-demographic and psychological variables considered relevant based on earlier research. The survey used both widely used and validated psychometric measures and some measures that were operationalized by the researcher. The measures were: Environmental Motives Scale for children (ChEMS) (Bruni et al. 2012) as an indicator of general environmental concern; the NEP-C scale (Manoli et al. 2007) as an indicator of environmental worldview; knowledge of climate change (a single self-designed item); climate change concern (a single self-designed item); gender (dichotomous measure); and grade (7, 8 or 9). Living area, age, mother's educational level and father's educational level were controlled as covariates.

The data was analysed using confirmatory factor analyses and structural equation modelling (SPSS and MPlus programs). For more accurate description of the data, the pilot study, and the actual study procedure, please see sub-study III.

2.2.6 Validity, reliability, and limitations of the studies

Although a single or correct way of performing a content analysis does not exist (Weber 1990), the validity and reliability of content analysis, and of qualitative research methodology in general, have been discussed extensively in the literature. On a general level, the analysis process should be described in enough detail, so that the reader understands the link between the data and the results (Polit and Beck, 2004; Elo and Kyngäs, 2008). One way of doing this is to include authentic citations from the text data in the research report (Elo and Kyngäs, 2008). Furthermore, context, selection of materials or participants, data collection and the process of analysis should be described in a clear manner (Graneheim and Lundman, 2004). As the methodology of study I is described rather briefly in the research article (study I), an attempt has been made to elucidate it in the description above.

In terms of reliability, category consistency or reproducibility (i.e., two coders should code the text in the same way) is considered important in content analysis (e.g., Weber, 1990). In quantitative content analysis, intercoder reliability can be calculated by using agreement coefficients (Weber, 1990; Cohen, 1960)). However,

in purely qualitative content analysis, using peer checking or intercoder reliability is not always considered possible or trustworthy, as the analysis process is based on subjective interpretation (Elo and Kyngäs, 2008). Even if there was more than one coder, the research result would be based on their commonly agreed, still subjective perspective (Vaismoradi et al., 2013).

The reliability of coding in qualitative content analysis can, however, be increased by defining the content of the categories in advance (giving categories ‘operational definitions’) and describing the interpretations of the data as explicitly as possible (Hsieh & Shannon, 2005). In the case of studies I and II, reliability has been sought by describing the analysis categories on a general level as well as discussing the analysis process and results among the authors of the study (Graneheim and Lundman, 2004).

Validity refers to correspondence between concepts, variables, methods and/or data as well as to the generalizability of results, inferences, and theory (Weber, 1990). The validity of categories in studies I and II is based on face validity, which Weber (1990) defines as the correspondence between the investigator’s definition of a concept and his or her definition of the category that measures it. Face validity is sometimes considered a weak form of validity, but as the means to increase validity in qualitative content analysis (for instance, using different measures of the same construct) are rather complicated, face validity is often used (Elo and Kyngäs, 2008; Weber 1990).

Furthermore, a general concern related to the deductive approach to content analysis is that an overemphasis on the theory can lead to depreciation of contextual aspects in explaining the phenomenon (Hsieh & Shannon, 2005, p. 1283). To avoid this, the results in Study I are described against a historical context and in Study II an abductive approach allows for a ‘dialogue’ between content, context, and theory.

Survey research is a compromise between errors and costs, and the balance of quality and possible sources of error must be considered carefully. A central question regarding survey quality is construct validity, i.e., the extent to which a measurement method accurately represents and measures the theoretical construct it is intended to measure. To avoid problems regarding construct validity, the survey questions and response categories should be extensively discussed with participating researchers and information users. The questionnaire should also be pretested with a small group of real respondents. A pretest was used in sub-study III. (Lyberg and Biemer, 2008; De Leeuw et al., 2008).

The ‘four cornerstones’ of survey research, i.e., coverage, sampling, response, and measurement, need to be considered when planning and conducting survey research. Coverage errors may occur, if the targeted sample does not contain all the elements of the population to which one wants to generalize results. Sampling error refers to the fact that only a subset of all people in the population is actually surveyed.

If random sampling is used, sampling error can be taken into account in statistical analysis. In sub-study III, non-random convenience sampling was used, and this is a potential source of coverage and sampling error. An effort was made to reduce this source of error by conducting sampling in three public schools in different parts of the country. Response error refers to nonresponse, i.e., a situation when the sampled units or targeted participants do not respond. In sub-study III response error was very small, because the survey was carried out during school lessons. (De Leeuw et al., 2008).

Measurement error refers to a situation, in which a respondent's answer to a question is inaccurate, and a discrepancy between a measurement and the true value occurs. Measurement error is a common source of survey error. The sources of systematic measurement error, or bias, include for instance the respondent, the questionnaire, the mode of data collection, and the interactions between these (De Leeuw et al., 2008). Surveys based on self-reports, such as sub-study III, are likely to have many of these problems (Schwarz, 1999). A pre-test can reduce the possibility of a measurement error (De Leeuw et al., 2008), which is why a pre-test was also applied in sub-study III. Nevertheless, potential sources of measurement error remain. For instance, it is possible that all the participants of sub-study III did not fully understand the survey questions or the response scales, or that their answers were biased because of socially desirable responding (Baumgartner and Steenkamp, 2006).

Another potential source of measurement error is the use of self-assessments. They are commonly used in educational research and many studies have demonstrated that positive associations exist between self-assessment and learning (Brown and Harris, 2013). Self-assessed knowledge is also known to predict general environmental concern and behaviour (Gifford and Nilsson, 2014). Nevertheless, self-assessments are a possible source of both validity and reliability problems in survey research, including sub-study III. Main reason for the inaccuracy of self-assessments in student surveys seems to be students' unrealistic optimism about their own abilities (Dunning et al., 2004; Brown et al., 2015). Other sources of error may include neglect of crucial information and having deficits in information (Dunning et al., 2004; Brown et al., 2015). As a result, the survey may measure something else than it is intended to measure (a problem of validity), or students may give different assessments of their knowledge levels, even though their true knowledge levels are equal (problem of reliability). Due to these reasons, self-assessed knowledge cannot be considered actual knowledge, but rather an experience-based estimate of or belief in one's knowledge.

Survey reliability refers to the reproducibility of the survey instrument's data. An important issue of survey reliability is consistency and stability: a survey participant should give the same answer to the same question at different points in time (Fowler

and Cosenza, 2008). Comparability of the constructs is especially important in cross-cultural research (De Leeuw et al., 2008). Comparability was pursued in sub-study III by using mainly previously validated measures that have been tested in different cultures. However, as all the measures used in the survey were not previously validated or used, the statistical quality of the survey may have been reduced.

Another important issue concerning reliability is whether the factors that are being measured are constructed of single or multiple items. In the case of psychometric factors, multiple-item measures of constructs are usually more reliable compared to single-item measures, as they can capture more information compared to single-item measures. This is especially important in the case of psychometric variables, which are not concrete or directly observable but latent (i.e., hidden, indirectly observable). Furthermore, the internal consistency of multiple-item constructs can be computed based on correlations between items (coefficient alpha), which increases their reliability and construct validity. Multiple-item predictor measures also show higher correlations with a criterion measure and thus they exhibit higher predictive validity. (Bergkvist and Rossiter, 2007).

While the justifications for using multiple-item measures are theoretically strong, single-item measures are usually used because of their practicality: they reduce respondent refusal and reduce data collection and data-processing costs (Bergkvist and Rossiter, 2007). If single-item constructs are used in a survey, as in sub-study III, it is important to recognize the above-described issues of validity and reliability and survey results should be interpreted with caution.

2.2.7 Considerations on research ethics

Research ethical guidelines valid at the time of each study as well as good scientific practice were followed throughout the research process (Finnish National Board..., 2009; Finnish National Board..., 2012; ALLEA, 2017). Honesty, care, and accuracy were sought in all stages of the research. The data collection was planned in a way that only data that was genuinely beneficial for increasing understanding of the research topic was collected. The key ethical questions in this dissertation research were related to the collection of data, especially questions of privacy and confidentiality. In my opinion, the study did not cause significant physical, psychological, social, or financial harm to any of the participants.

In historical research, possible harm may concern data collection, data storage, and consequences caused by research articles (Finnish National Board..., 2009). Regarding sub-study I, the collected data and the results presented in the research publication did not address topics that can be considered sensitive or harmful for the researched organization or other parties involved with the organization.

The participants of sub-study II were informed of the purpose and method of implementation of the research, and that participation was voluntary. The preliminary exercise or the research interviews did not contain sensitive topics. The participants' names or other direct or indirect identifiers were not published. Participants were treated in a respectful manner during data collection and in the research publication. The data was pseudonymized and saved on the secure server of the University of Turku.

Sub-study III involved pilot interviews and collection of survey data. It also involved minors, and data collection was carried out at altogether four different schools, during lessons. Before data collection, a permission was sought from the principals of each school. All the participating students were informed that participation was voluntary and that they had the opportunity to withdraw from the study at any point. Furthermore, the participants were informed of the purpose of the research, the method of implementation and who would be handling the collected data. All the information was given in the participants' own language.

The collected data did not include direct identifiers (such as name or ID), but it included indirect identifiers (such as gender, age, and grade). The data was pseudonymized and saved on the secure server of the University of Turku. Some of the participants were under 15 years old, however at the time of data collection (2014-2015) Finnish National Board on Research Integrity TENK or the University of Turku did not require that an ethical review should be carried out for this type of research, in which the data collection was carried out during school lessons and which did not cause harm to the participants (Finnish National Board..., 2009).

The data of sub-study I is publicly available through the National Library of Finland. The data of the sub-studies II and III has not been made publicly available, because permission to do this was not sought from the research participants before data collection. However, they are available from the researcher by request.

3 Results

The results of the sub-studies of this dissertation have been published in two articles and one manuscript. The first article described early nature education thinking in Finland and the value basis underlying it. The second article examined whether sustainability-oriented teachers' conceptions support a pluralistic perspective on sustainability education in a Finnish university. The third sub-study or manuscript represented a model of value motivations, worldviews and other factors underlying adolescents' climate change concern outside Western countries, in Cambodia. The main findings of the sub-studies are presented in the following.

3.1 Values underlying early Finnish nature education by Helsinki Humane Society (I)

The first sub-study focused on the value and worldview orientations that were considered to promote the well-being of both humans and non-human animals by an early nature education actor, Helsinki Humane Society. The membership magazines of Helsinki Humane Society were found to clearly reflect the values of humane education, based on Romanticist thinking. The studied magazines emphasized the comprehensive education of personality (resembling the idea of 'bildung'), including mind, heart, conscience, and senses, all typical of humane education. Especially during the first study period, 1900-1905, education was openly moral, and it focused on the increasing of young people's compassion towards non-human animals as well as other people. The studied magazines reflected the idea that increasing compassion – as well as sensitivity, love, and mercy – promoted moral action not only towards animals, but also in society in general. The central goal of the humane education approach represented by the Helsinki Humane Society was moral education: increasing compassion towards other animals and thus also enhancing moral activity in human society.

Non-human animals were described as having both intrinsic and instrumental value: On one hand, HESY aimed at promoting the rights and well-being of animals in the society through education aimed at children and young people. On the other hand, the aim was to promote the social cohesion of humans through educating

young people, with the help of animals, to become good citizens, i.e., individuals who are compassionate and willing to serve others.

Lutheran religiousness was part of the worldview of Helsinki Humane Society. Religious ideas were brought up when they served the central ideas and ethics of humane education: development of young people's overall personalities and especially compassion towards other animals and humans. Religious symbolism or mystic ideas often associated with romanticism did not appear in the studied texts.

Only a few texts referred to natural sciences, and the attitude towards them seemed to be ambivalent: on one hand, there was opposition to collecting animal samples, but on the other hand, knowledge of animal anatomy and biology was valued, because it was thought to increase people's understanding of animals and hence respect for them. No clear position was taken on the topical ideological debate of the time, 'science versus sensibility' or scientific naturalism versus humanism.

3.2 The presence of pluralistic and interdisciplinary perspectives of sustainable development among SE teachers in a Finnish university (II)

In the second sub-study, the conceptions of sustainable development were examined among sustainability-focused higher education teachers in a Finnish university. The conceptions expressed in the teachers' interviews were found versatile, pluralistic, and somewhat interconnected, apart from conceptions of economic sustainability, which were found narrow, sketchy, and with little connections to the other dimensions of sustainable development. The conceptions of all teachers included four dimensions of sustainable development: economic, environmental, social, and cultural sustainability. The conceptions, the number of meaning units in each conception, and their underlying values (anthropocentric, ecocentric, or biocentric) are presented in Table 3.

Economic sustainability was considered the least important dimension of sustainable development. The teachers described economic sustainability mainly from two perspectives: the limits of natural resources, and the consideration of external costs in the production and consumption of goods and services. Value questions underlying economic sustainability – such as the values underlying the current, market-based economic system, or alternatives to this system – were also discussed very little. Therefore, it was not possible to form more than one category of the teachers' conceptions of economic sustainability.

Table 3. Teachers' conceptions of Economic, Environmental, Social and Cultural Sustainability.

CATEGORY	CONCEPTION (SUBCATEGORY)	NUMBER OF MEANING UNITS	UNDERLYING VALUES
1) Economic sustainability dimension	(a) Environmental and social impacts of economic sustainability	3	Anthropocentric and ecocentric
2) Environmental sustainability dimension	(b) Extended environmental sustainability	4	Biocentric
	(c) Ecosystem-focused environmental sustainability	13	Anthropocentric and ecocentric
3) Social sustainability dimension	(d) Basic needs and rights as social sustainability	16	Anthropocentric
	(e) Well-being view as social sustainability	1	Anthropocentric
	(f) Social structures as social sustainability	4	Anthropocentric
4) Cultural sustainability dimension	(g) Cultural rights as cultural sustainability	8	Anthropocentric
	(h) Cultural change as cultural sustainability	3	Anthropocentric and ecocentric
	(i) Cultural preservation as cultural sustainability	1	Anthropocentric

Environmental sustainability was considered the most important dimension of sustainable development, either alone or together with social or cultural sustainability. The teachers' conceptions could be described under two categories, which were named 'extended environmental sustainability' and 'ecosystem-focused environmental sustainability'. The 'extended' conception referred to the need to give intrinsic value and extend moral considerations to other life forms besides humans. The 'ecosystem-focused' conception emphasized the functioning of natural systems and their provisions for humans, including natural resources and ecosystem services. In this conception, the role of non-human nature was more instrumental than in the first conception of environmental sustainability and the well-being of individual animals was considered subordinate to the functioning of ecological systems.

Conceptions of social sustainability were divided into three categories, which were named 'basic needs and rights view', 'well-being view', and 'social structures view'. According to the first of these conceptions, social sustainability referred to

the realization of basic needs and rights, such as provision of basic livelihoods, the reduction of poverty, the right to live a dignified life, the right to feel safe, and the possibility to belong to a social group. In the 'well-being' conception, social sustainability was understood as subjective well-being, which included happiness and social identity. The 'social structures' conception, in turn, emphasized the sustainability of social and political structures and institutions. Equity, i.e. equal treatment of people in terms of economic and educational opportunities, was also considered central in this conception.

Teachers' descriptions of cultural sustainability were found to be rich. They were divided into three categories: 'cultural rights', 'cultural change', and 'cultural preservation'. The conception of 'cultural rights' referred to individuals' and communities' rights to determine their cultural environments and states, including their cultural identities. This conception also included the right to own and use material and immaterial cultural products. According to the 'cultural change' conception, change was an essential part of culture. Cultures were considered to have a potential and even an obligation to change, so that overall sustainability could be advanced. The 'cultural preservation' conception understood cultural sustainability as the preservation of those cultural elements and phenomena, that could not be preserved in museums or archives. The 'rights' and 'preservation' conceptions place more intrinsic value on cultural elements and phenomena compared to the 'change' conception, which prioritizes ecological and overall sustainability.

3.3 Value motivations and worldviews explaining Cambodian adolescents' climate change concern (III)

The third sub-study examined psychological and socio-demographic antecedents of adolescents' climate change concern in Cambodia. The survey and its analyses showed that Cambodian adolescents' climate change concern was high, with 82 % of respondents expressing concern about climate change. Of the factors included in the analysis (i.e., gender, grade level, knowledge, ecological worldview, general environmental concern, living area, age, mother's educational level and father's educational level), the strongest predictor of climate change concern was ecological worldview, measured by the New Ecological Paradigm for Children (NEP-C) scale. The stronger an adolescent's ecological worldview was, the higher their climate change concern was. However, as most items of the NEP-C scale did not perform well in the analysis, the ecological worldview mainly presented the 'eco-crisis' factor of the NEP scale. Furthermore, altruistically motivated environmental concern was associated with climate change concern, yet indirectly via ecological worldview.

Self-assessed knowledge seemed to play a significant but small role in predicting Cambodian adolescents' climate change concern, as higher self-assessed knowledge was associated with higher climate change concern, stronger ecological worldview, and higher altruistic environmental concern, even though these effects were low.

The final SEM model showed a strong fit to the data (CFI > .976, TLI > .963, RMSEA < 0.034, and SRMR < 0.032). The model explained the variation in Cambodian adolescents' climate change concern relatively well ($R^2 = 0.295$) (Cohen, 2013). Some of the factors, which were included in the theoretical model, including gender, egoistic environmental concern and biospheric environmental concern, as well as the covariates living area and parents' levels of education, were excluded from the final model because of poor model fit. The final model is presented in Figure 1.

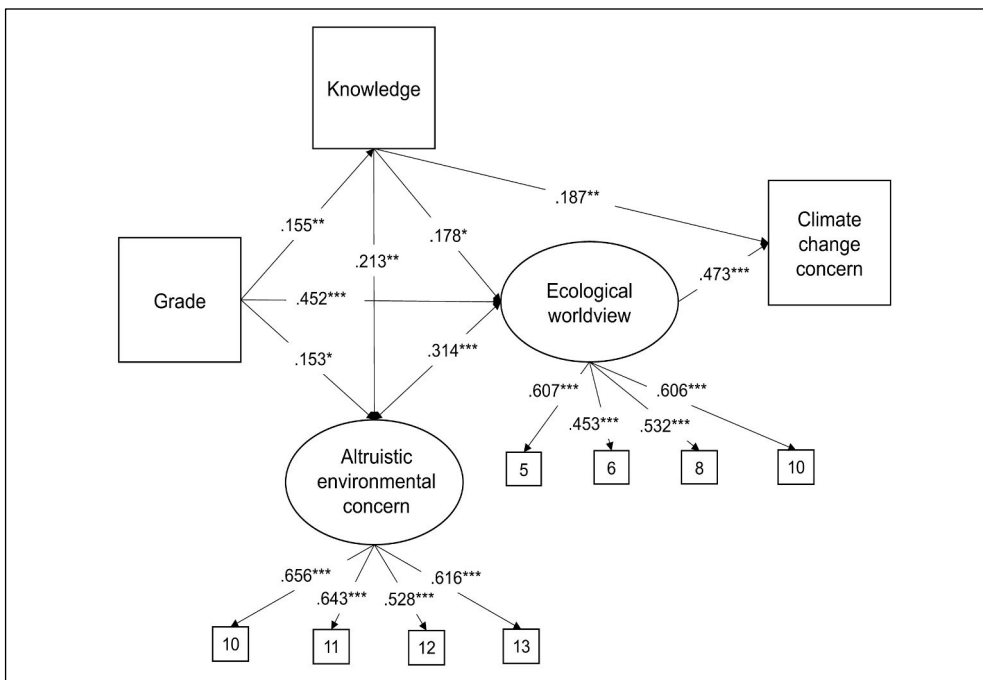


Figure 1. Factors affecting Cambodian secondary school students' climate change concern. Note: * $p < .05$, ** $p < .01$, *** $p < .001$.

4 Discussion

The aim of this dissertation was to find a multi-faceted view and new perspectives into the role of values and worldviews in EE and SE. Our values and worldviews act as guideposts of our thinking and actions on the human and non-human nature around us, yet values and worldviews are often overlooked when considering what is central in EE and SE (Vesterinen and Ratinen, 2023). Making different values and worldviews visible and teaching students to examine them critically and negotiate them is, however, one of the central tasks of EE and SE: values thinking, and normative competence are keys to understanding the controversies and challenges related to sustainability and environmental issues and to mapping of possible paths towards the reconciliation of the well-being of humans and non-human species (Wals and Jickling, 2002; Vesterinen and Ratinen, 2023).

Through three empirical studies, this dissertation provided insights into the role of values and worldviews in EE and SE from the perspectives of different education “stakeholders” – non-governmental organizations, teachers, and students – and in different contexts. The findings of the sub-studies as well as the dissertation research as a whole are discussed in the following sections. Conclusions of the findings are made in chapter 5. Conclusions.

4.1 Early animal welfare education emphasized empathy towards animals and children’s emotional and moral development

The early days of nature related education in Finland were characterized by educators’ debate on the importance of the humanistic, religious, and scientific perspectives in the study of nature and animals. Whereas one side of the debaters emphasized scientific knowledge and cognition, the other side – supporters of humane education – found empathy, values education, and emotional development more important. So far, however, the history of early nature education in Finland has not been examined from the perspective of humane education.

The results of the first sub-study (I) demonstrated that humane education thinking, based on the worldview of Romanticism, was an important educational approach in early nature related education in Finland. The results showed that

HESY's approach to education was openly moral values education, and HESY understood the role of education instrumentally, as the society's mission was to improve the well-being of animals and to develop the moral character in children. This is characteristic of EE and SE carried out by nature and environmental organizations (Wals, 2012; Thornberg, 2008). HESY's education focused on both anthropocentric motives of children's emotional development, and more biocentric motives of compassion, sensitivity, love, and mercy towards animals. In Finland, these ideals were especially promoted by Zachris Topelius, the "father" of the Finnish animal welfare movement as well as a prominent children's author and ideological influencer (Jaakkola, 2011). These aims were also in line with the late 19th century educational ideals, such as self-discipline, Christian sentiment, compassion, and moral sensitivity (Jaakkola 2011; Unti and DeRosa 2003). No clear position was taken on the scientific naturalism versus humanism debate.

From the 1920s onwards, mainstream nature education in Finland emphasized mostly natural sciences and factual and practical education (Söyrinki, 1954; Järvikoski 1984; Louhimaa, 1995; Ratinen and Nevanpää, 2006), following the modernist way of thinking. Meanwhile, education focusing on an emotional and moral relationship with nature was at a low ebb for several decades (Ratinen and Nevanpää, 2006). For instance, nature study that had many connections with humane education – emphasizing affective and experiential aspects of learning (Kohlstedt, 2005; Jenkins, 1981), spiritual or religious elements (Sauvé, 2005), beauty in nature (Jenkins, 1981), and sympathy towards nature and animals as a means towards developing a child's total personality (Kohlstedt, 2005) – seems to have been mostly missing, even though it was very popular in the US. An exception to this were the ideas of Niilo Söyrinki, an early pioneer of Finland's first nature conservation association, who emphasized the moral and aesthetic dimensions of nature education (Söyrinki, 1954).

However, it seems that today the core idea of early humane education – that compassion towards non-human animals also serves the moral growth of humans as well as general societal well-being – is again very topical in Finland. Although humane education itself has not been able to restore its popularity in Finland, similar ideas of empathy and affective and moral learning can be found in education aiming at restoring children's nature connection. An emotional connection to nature in childhood is considered to leverage respect and care for nature and motivate conservation actions later in life (Chawla, 2020; Ives et al., 2017). Research interest towards this topic as well as the number of nature-kindergartens has grown fast within the past decade, in Finland and elsewhere. The difference between the two approaches is that whereas in current forms of humane education, non-human animals are understood mainly as individuals (Arbour et al. 2009), the emphasis of education for nature connectedness is more holistic, focusing on ecological entities

(e.g., Chawla, 2020). In terms of research, efforts have recently been made to bring these approaches together, e.g., through the perspectives of multispecies ethnography (Ogden et al. 2013) and compassionate conservation (Coghlan and Cardilini, 2022).

The study data was confined to the educational material of one organization, which likely limited the range of value-based educational ideas found in the study. The studied organization was, however, a prominent actor in the field of early nature education in Finland, as well as the dominating organization in the region of the Finnish capital Helsinki, and thus a good source for studying nature education carried out by non-governmental actors at the time. The results of this study complement the picture of how the relationship between humans and non-human animals and the rest of nature was understood in early nature-related education in Finland, and they can offer new insights for today's EE and SE educators. Romanticism was a very multifaceted movement, and most of its supporters did not seek strong confrontations with science or progress. Rather, they opposed to the idea of science, "in which the all-knowing, all-powerful human stood above and apart from nature, manipulating it in 'his' own interests" (Hay, 2002, p. 5). Romanticists thus emphasized the idea that living nature is a unity from which humanity cannot be separated and that science should be based on more ecological insights (Hay, 2002).

4.2 Today's higher education supports plurality and interdisciplinarity in sustainability education

Sustainable development and education for SD have been widely criticized for being vague, ambiguous, and even paradoxical concepts (e.g., Jacobs, 1999; Scott, 2002; Norton, 2005; Stevenson, 2007; Scott and Vare, 2021). This is due to the complexity and, according to some scholars, essential contestedness of the SD concept (Gallie 1955; Jacobs 1999; Connelly 2007). From an educational point of view, the complexity, multi-interpretability, and multiple values underlying SD can however be seen as a possibility to promote plural, interdisciplinary and creative learning that is relevant for different stakeholders in various contexts (Boeve-de Pauw et al., 2015; Berglund and Gericke, 2016; Wals, 2010).

The results of the second sub-study (II) showed that, when viewed as a whole, the examined teachers' conceptions of SD provided a fairly good basis for interdisciplinary and pluralistic SD teaching: the conceptions were relatively versatile in terms of key concepts and underlying values, and the teachers were able to make connections between different SD dimensions. The teachers of this study interpreted the concept of SD through four dimensions, and they considered environmental sustainability the most important dimension of SD (either alone or with social sustainability). The biggest shortcoming in the teachers' understanding

of SD was their conceptions of economic sustainability, which were rather limited and sketchy. However, the conceptions of cultural sustainability were rich.

Other studies have also found that academics in the UK (Cotton et al., 2007) and Australia (Christie et al., 2015) emphasize environmental sustainability above other SD domains. On the other contrary, in a study by Sinakou et al. (2018) including a broad range of international academics in the field of ESD, who teach trainee teachers, a tendency towards the social and economic aspects and a non-holistic approach to SD was found. These studies together with the results of this study raise a concern that, since teaching academics emphasize some SD dimensions over others, are they able to convey a sufficiently balanced understanding of SD to students. The versatility of the conceptions found in this study is a good starting point for SD teaching, but further research would be needed concerning the teachers' actual teaching approaches.

The teachers of this study interpreted the concept of SD through four dimensions, a result that diverges from most studies concerning academics' understanding of SD (e.g., Carew and Mitchell, 2008; Borg et al., 2014; Sinakou et al., 2018). This result can be partly explained by the fact that the emphasis of the SD programme, in which the studied teachers were teaching, is based on four SD dimensions. However, interpreting SD through four dimensions may also reflect public discussion on sustainability, in which cultural sustainability is gaining a more prominent position (Soini and Birkeland, 2014). Public debate and sustainable development research trends may also explain the studied teachers' other SD conceptions' content and emphases.

Sustainable development was originally based on an ecocentric emphasis on environmental sustainability, and later the emphasis has shifted towards more social and economic perspectives (International Union for... 1980; Soini and Birkeland 2014). Although many have criticized that the economy receives too much emphasis in the practical implementation of SD (e.g., Bonnett, 2007), in research and policy economic sustainability is relatively rarely discussed explicitly, but rather as part of e.g., green economy discussions (Soini and Birkeland, 2014). This may partly explain the studied teachers' narrow and fragmented perceptions of economically sustainable development. A limited understanding of economic sustainability has also been found in studies with upper secondary school teachers in Finland (Uitto and Saloranta, 2017) and Sweden (Borg et al., 2014). Yet, more comprehensive conceptions of economic sustainability have been found with Australian engineering teachers (Carew and Mitchell, 2008) and British lecturers from a variety of disciplines (Cotton et al., 2007). It is possible that the discussion about economic sustainability is more limited in Finland and Sweden compared to some other countries.

Interest in cultural sustainability, in turn, has grown quite rapidly in recent decades in international policy and research (Soini and Birkeland, 2014). Soini and Birkeland (2014) have suggested that this is due to the growing importance of geographical and cultural diversity in the world and the cultural turn in sciences. The conceptions of cultural sustainability found in this study were broader and more comprehensive in comparison to studies conducted with SD teachers during the 2000s (Summers, Corney, and Childs 2004; Reid and Petocz 2006; Cotton et al. 2007; Summers and Childs 2007; Carew and Mitchell 2008). The discovered conceptions strongly reflected recent theorizations in the field of cultural sustainability by Soini and Birkeland (2014) and Dessein et al. (2015). These emphasize that cultural sustainability is underpinned by both anthropocentric (culture in and for sustainable development) and ecocentric (culture as sustainable development) values (Dessein et al., 2015; Soini and Dessein, 2016).

Even though the teachers' understanding of cultural sustainability was comprehensive when viewed as a whole, some teachers emphasized the difficulty of separating between the cultural and social dimensions. The teachers felt that this also made their teaching more difficult. This finding likely reflects the fact that the definitional work concerning the social and cultural dimensions of SD, both theoretically and practically, is still in progress. Especially the concept of social sustainability is fragmented (Weingaertner and Moberg, 2014; Shirazi and Keivani, 2017). In the the current research, teachers' perceptions of social sustainability seemed to partially reflect Maslow's hierarchy of needs (Maslow, 1943), which is one possible theoretical framework for approaching social sustainability in teaching. A categorization that could complement the hierarchy of needs and be applicable to teaching is Shirazi and Keivani's (2017) seven key principles of social sustainability, based on a qualitative meta-analysis of social sustainability studies. These key principles are equity; democracy, participation, and civic society; social inclusion and mix; social networking and interaction; livelihood and sense of place; safety and security; human well-being; and quality of life (Shirazi and Keivani, 2017). All in all, further definitional work concerning the different dimensions of sustainability is needed, for pedagogical as well as theoretical and practical reasons.

The number of participant teachers in this study was small, which likely limited the range of SD conceptions found as well as the generalizability of the results. Furthermore, the preliminary classification exercise may have potentially affected the way the teachers expressed their perspectives related to SD in the interviews. Nevertheless, it is likely that, due to their experience in teaching SD, they were able to express their central conceptions of SD. Furthermore, the research approach that stimulated the teachers to reflect on SD from different perspectives, may have elicited some new and specific aspects of the teachers' SD conceptions, such as ideas of cultural sustainability.

This study reinforces the view that the key in designing and implementing multi- or interdisciplinary teaching programmes on SD is that different SD concepts and values underlying the concepts are treated in a versatile and critical manner. Reaching a common vision of how to plan and implement multidisciplinary educational programmes that equip students with sufficient understanding of the complexity and controversies related to the implementation of SD is likely to be difficult, if the programme developers discuss SD only on a surface level, without delving deeper into underlying values. It requires teachers to read outside their own discipline, have a lot of time for preliminary discussion and reflection with their co-teachers and challenge their own views on sustainable development (Edvarsson Björnberg et al., 2015; Carew and Mitchell, 2008; Kilinc and Aydin, 2013; Holdsworth and Thomas, 2016). Teaching content must also be regularly updated, because due to its' essentially contested nature, SD is an ever-developing concept that constantly generates new theoretical perspectives and practical solutions. For higher education institutions, this requires that their values are based on an understanding of the role of higher education as an educator of civilized people, rather than trying to achieve quick, easily measurable results.

4.3 An environmental worldview and altruistic motivations predict Cambodian adolescents' climate change concern, according to the SEM model

Understanding young people's climate change concern can be considered central in planning education that aims at supporting future generations that engage in climate action.

It is known that both altruistically and biospherically motivated values and worldviews can affect concern on climate change (van der Linden 2015; Shi et al. 2016; Corner et al. 2014). Research on climate concern that targets non-Western adolescents is, however, much rarer than research targeting Western adults. Even though Cambodia is highly vulnerable to the effects of climate change, to my knowledge, there are no earlier studies that would have examined climate change concern among Cambodian adolescents.

The third sub-study (III) indicated that Cambodian adolescents are very concerned about climate change. The study demonstrated that ecological worldview, in this study the belief of an eco-crisis, is a strong predictor of Cambodian adolescents' climate change concern. Furthermore, altruistically motivated environmental concern (but not biospherically motivated concern) was indirectly associated with climate change concern.

Ecological worldviews were measured with a children's version of a widely used psychometric scale, the New Environmental Paradigm scale (NEP for Children or NEP-C) (Manoli et al., 2007). In this study, the four items of the NEP-C that were included in the final model mainly represented the "Ecocrisis" dimension of the NEP. This dimension or facet of the ecological worldview is commonly supported in studies across different cultures (Wu, 2012). Compared to the other two facets (rights of nature and human exemptionalism), the ecocrisis facet is based more on knowledge about the state of the environment, and not so much on cultural perceptions of the relationship between humans and nature.

It is possible that the NEP-C, due to its underlying Western worldview, is not a valid measure outside of Western cultures. Several researchers have stated that in Asian cultures the division between nature and culture is not generally as strong as it is in the West (Wu, 2012; Aoyagi-Usui et al., 2003, p. 30; Ironside, 2015). On the other hand, more weight is placed on anthropocentric environmental concerns, compared to biospheric concerns, in Asia compared to the West (Milfont et al., 2006; Watson and Halse, 2005). The result, according to which altruistically, but not biospherically, motivated environmental concern was associated with the strength of Cambodian adolescents' ecological worldview, may support this view.

It is also possible that the poor performance of the NEP-C scale is due to other sources of error related to the survey implementation, for instance that some of the survey items were too difficult to understand for the adolescents (Wu 2012; Kopnina 2011; Rosa et al. 2022). However, this seems less likely, as the survey was piloted and items that were found difficult for the respondents in the pilot study, were eliminated from the final survey.

The results of this study suggest that an association of knowledge and ecological worldview may exist among Cambodian adolescents, as higher self-assessed knowledge was found to be associated with stronger NEP-C. However, as knowledge was estimated using self-assessment and a single-item measure, the construct is likely to have problems of validity and reliability. This result should therefore be interpreted with caution (see also section 2.2.6.).

The results of this study can be used to inform the planning of climate change related education in Cambodia. The findings suggest that knowledge, a belief in an ecocrisis, and altruistic environmental concern may be relevant to Cambodian adolescents' level of climate change concern. Therefore, it is important that education on climate change provides students broad-based knowledge, that addresses the negative effects of human activity on climate. Furthermore, climate issues can be discussed from the viewpoint of moral and practical altruism, and education may include reflections on relational values (Chan et al., 2016), since a strict separation between biospheric and altruistic values does not necessarily support Cambodian conception of human-nature relationship.

It is important to note that strong feelings of concern or worry can also cause pessimism, which is why teachers should support students' coping strategies and agency. This way, concern can be channelled into action instead of withdrawal or denial. The responsibility of societal and political actors needs to be emphasized, so that students do not feel too heavy a personal burden of responsibility for climate action. (Ojala, 2012).

More research is needed to better explain the variance in Cambodian adolescents' climate change concern and understand the influence of cultural factors on ecological worldview in Cambodia. To do this, there is a need for both large-scale, randomized survey studies, including cultural measures and objective multiple-item knowledge measures, and in-depth qualitative studies examining the foundations of ecological worldviews in the country.

4.4 Various perspectives to nature's values as the basis of EE and SE

A view that has long been recognised by environmental and sustainability educators and now increasingly shared by environmental managers and conservationists is that environmental protection and sustainability can only be promoted by better taking into account different nature-related values and worldviews. This requires better understanding of the ways in which people value human-nature relationships. (Sauve, 2005; Anderson et al., 2022).

As described in the Introduction (section 1.2.1.), two value dimensions in particular are commonly used to describe nature's values, or tensions, underlying environmental protection and sustainability (e.g., Dietz, 2005; Anderson et al., 2022). These dimensions are intrinsic versus instrumental value of nature, and human self-interest versus altruism. This dissertation research found conceptions that fit these classifications well.

In the interviews conducted in the pilot phase of sub-study III, the participants brought up the instrumental values of nature. These were related to the exploitation of nature to obtain various commodities such as food or cash crops.

In sub-study II, all participants emphasized the intrinsic value of nature. Some of the ideas (under the Environmental sustainability priority category) emphasized nature's intrinsic value above the value of humans or human communities. Other ideas (Environmental and social sustainability priority and Environmental and cultural sustainability priority) considered that both the value of nature and the value of humans was intrinsic. In the latter case, participants expressed that balancing the value of humans with the value of nature causes a lot of tension within and between societies.

However, the research also brought up some perspectives to the values and valuation of nature, which cannot be classified according to the above-mentioned dichotomous divisions. Instead, they seem to be situated somewhere between these classes or poles. Central to these alternative ideas is the interaction or intertwining between human and non-human nature. They also combine perspectives of a concurrent utilization, respect, and care for nature.

For instance, sub-study III indicates that motives based on helping other people, i.e., social altruistic values, may be linked to adolescents' eco-crisis beliefs and thus their concerns about climate change. The participants' concerns about people and nature were thus intertwined and they influenced each other. In the pilot interviews the participants expressed views according to which humans are dependent on their relationship with non-human nature, including plants, animals, and the functioning of ecosystems and especially forests. Therefore, people should take good care and show stewardship of nature.

Sub-study II found that some of the participants' ideas emphasized humans' strong dependence on and interconnectedness with nature's ecosystems. These ideas resembled the stewardship views in sub-study III, but they placed an even stronger emphasis on humans' dependence on their relationship with nature.

Sub-study I addressed Romantic education, the central focus of which is the growth and development of an individual. Even though Romantics considered happiness an important aim for children and youth, happiness did not mean personal pleasure and it was not based on egoistic values but rather values located beyond the self. The results of sub-study I show that the humane educators at HESY thought that happiness could only be achieved through morally right actions and by furthering the well-being and happiness of others, both humans and animals. In other words, the happiness of an individual was considered tied to the happiness of human and animal others.

Common to the non-dualistic views described above is the idea that humans and non-human nature can be valuable concurrently and live well and develop in interaction. Value is not located in either humans or animals/nature, but rather derives from relationships between humans and/or non-human nature and responsibilities to them. The human-nature relationship is not understood as a tension or a trade-off, but rather as a relationship, which is beneficial for both parties. This type of values are called relational values (Chan et al., 2016; Anderson et al., 2022). Relational values (RVs) are not a new idea, but discussion on RVs has increased in recent years, especially in the fields of environmental management and conservation, but also more widely across different scientific fields and policies (dos Santos & Gould, 2018; Anderson et al., 2022).

Compared to intrinsic or instrumental values of nature, RVs are often better able to capture the way people in different contexts conceive the importance of their

bonds with nature and other people and what desirable and meaningful futures and a good life looks like. The expressions of relational values are very diverse (Chan et al., 2016). However, the causal connection of RVs to environmentally friendly activities has not yet been proven by research (Schultz and Ortega, 2018).

In the field of EE, relational values have been addressed as part of EE, yet under different labels (dos Santos and Gould, 2018) such as ‘connectedness to nature’, ‘sense of place’ and ‘multispecies education’. dos Santos and Gould (2018) have explored the presence of relational values in EE literature and found that relational values are addressed mainly under seven categories: connectedness, care, community, identity, kinship, responsibility, and stewardship. These categories, although overlapping, can also be found in the types of relational values brought up in this dissertation. These RV types are presented in Table 4.

Table 4. Types of relational values.

NATURE OF THE RELATIONSHIP	UNDERLYING IDEA	RELATIONAL VALUE TYPE (dos Santos & Gould 2018)	SUB-STUDY
Reciprocal People need nature: nature provides diverse benefits and services for humans	Humans receive benefits from nature in return for respect and care	Stewardship, Care, Responsibility	III
Interconnected Human species is/human communities are totally dependent on nature: nature is a prerequisite for life	Humans are part of the ecological system and thus, maintaining nature’s functions/ecosystem integrity is essential for humans’ survival	Connectedness, Responsibility	II
Developing / Educative A person’s growth and development are dependent on other animal and human individuals’ well-being or happiness: nature provides a possibility for personal growth	Humans can aim at self-development and realizing their purpose in the world through compassion and care for humans and animals	Care	I

Another way to look at these values is to place them in a field framed by two axes: nature's intrinsic–instrumental value and human self-interest–altruism. This field can be used as a heuristic tool, when examining how different value types relate to each other.

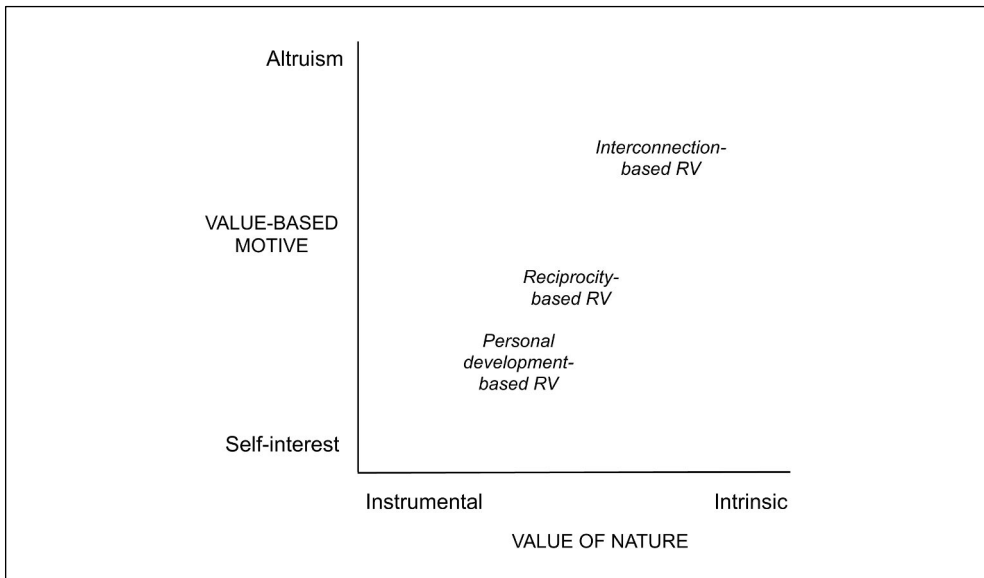


Figure 2. Depicting relational values (RVs) in a field.

From a pluralistic educational perspective (presented in the Introduction, section 1.2.2.), none of these value types can be considered the best way to approach the human-nature relationship ethically or practically. Rather, they can be used to complement pluralistic approaches in EE and SE, as they can open new perspectives to examining and understanding the values underlying human behaviours across varying places, cultures, and other contexts.

4.5 Limitations of the research

There are limitations to this research, and they are important to note. The first sub-study (I) utilized a limited sample of educational magazines from two specific historical time periods. Although the magazines can be considered to represent the most prominent Finnish nature education organization of the time, a broader selection of materials from other organizations or from a longer period might have given a more comprehensive picture of the phenomenon under study. In addition, a more critical approach could have revealed aspects of the material that did not come up in the analysis. Nevertheless, as this was the first study examining early Finnish nature education from a romantic perspective, a more general descriptive research approach was chosen.

The second sub-study (II) was based on a small sample of teachers, whose backgrounds may have biased and limited the range of SD conceptions found in the study. A bigger number of participants could have brought up conceptions, ideas,

and values, that were not uncovered in this sub-study. Moreover, the materials used to stimulate the participating teachers before the research interviews may have affected how the teachers expressed their understanding of SD. However, since the teachers had many years of experience in teaching and researching SD, it is likely that they were nevertheless well prepared to express the central aspects of their conceptions. In addition, the preliminary exercise may have stimulated the teachers to reflect on the concept of SD more extensively than they would have done without it, and the exercise, together with the in-depth approach of the whole research, may have elicited some new and specific aspects of the teachers' SD conceptions.

In sub-study III, many of the psychometric constructs did not perform as expected. This may have been caused by cultural reasons, but also issues that had to do with the survey situation, such as questionnaire clarity or translation issues. However, problems concerning the survey situation were anticipated and an effort was made to eliminate these problems by testing the questionnaire with a pilot study before the actual survey. In the final model of sub-study III, some of the constructs (self-assessed knowledge and climate change concern) are based on only one item, which is a clear deficit of the analysis. Single item constructs often have problems of validity, as they cannot be considered reliable estimates of stability in individual students' responses. Therefore, caution is needed when interpreting the results of the sub-study III. Future studies should use objective, multiple-item constructs to measure knowledge and concern. The piloting phase should be more profound than in sub-study III, especially in cultures where psychometric constructs used in the research have not been tested before. It would probably be useful to apply a mixed method (quantitative combined with qualitative methodology) approach for better understanding the cultural as well as situation-specific factors that underlie participants' survey responses.

5 Conclusions

This dissertation aimed at increasing theoretical understanding of the multifaceted view of the role of values and worldviews in EE and SE, as well as finding some new perspective to this role. The research was based on three empirical studies focusing on three themes in different contexts: early nature-related education by a Finnish NGO, sustainable development in Finnish higher education, and climate change in Cambodian secondary schools.

The study supported the view that to understand educators' or learners thinking or concern related to the environment and sustainability, it is important to understand their values. The study showed that the sustainability-related values and conceptions of people committed to promoting sustainability, such as higher education teachers, may differ considerably. The results are in line with the view of environmental psychology that knowledge, emotions (e.g., concern) as well as values and worldviews are interconnected, and EE and SE education should take them all into account in a holistic manner.

Furthermore, this dissertation found support for the often proposed and demonstrated idea that two value dimensions, intrinsic and instrumental values of nature and altruism and biospherism, underlie people's environmental engagement (cognitive, affective, and behavioural responses that benefit the environment) or sustainability thinking. In this study, these value dimensions were found to describe the relationship that the studied education stakeholders in different contexts had towards animals, the environment, and sustainability.

In addition, the research brought up such perspectives to the values and valuation of nature, that cannot be classified according to the above-mentioned dichotomous divisions. In these ideas the interaction or intertwining between humans and non-human nature become central, and value is located in the relationship between humans and other humans or non-human animals or nature. Thinking based on this type of values – relational values – does not see the human-nature relationship as a tension or a trade-off, but rather as a relationship, which is beneficial for both parties. Relational values have been discussed as part of EE, albeit with different labels (e.g., connections, care, responsibility, and stewardship).

The operating environment of EE and SE has become very complex due to globalization and the extensiveness of global environmental problems. All the results presented above were in line with previous views presented in the literature that the need for pluralism, interdisciplinarity and understanding of other cultures in EE and SE has grown. In theory and practice, pluralistic EE and SE education could benefit from including relational values as a third category alongside nature's intrinsic and instrumental values, as these may resonate with the lived experiences of people from different cultures and reflect their environmental worldviews. Moreover, it may be worthwhile to study interest in interspecies relations as one of the explanations for environmental engagement alongside egoistic, altruistic and biospheric interests.

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