

PERSPECTIVES ON THE PROMOTING ENVIRONMENTAL EDUCATION AND ENVIRONMENTAL AWARENESS OF PRIMARY PUPILS BY USING SENSES THROUGH OUTDOOR ACTIVITIES

Vesa-Matti Tauriainen¹, Eila Jeronen², Matti Lindh³, Marjatta Kaikkonen⁴

¹M. Ed. Vesa-Matti Tauriainen, Kimmontie 3 A 6, 90570 Oulu, Finland, e-mail: atx@suomi24.fi

²Dr. Eila Jeronen, Ph. D., Adjunct professor, Nokikanantie 6 C 16, 90150 Oulu, Finland, e-mail: eila.jeronen@mbnet.fi

³Dr. Matti Lindh, D. Ed., University lecturer, Räihänkuja 7, 90540 Oulu, Finland, e-mail: matti.lindh@oulu.fi

⁴Dr. Marjatta Kaikkonen, D. Ed., Oulu University Teacher Training School, P.O.B. 9200, 90014 University of Oulu, Finland, e-mail: marjatta.kaikkonen@oulu.fi

Abstract: This article provides perspectives on the promoting of environmental education by using senses. As underlain by the different environmental education models, the base of environmental educational ideas lies on positive attitudes to nature. Thereby it was studied to which extent attitudes could be affected by emphasising senses in a lesson held outdoors. The study is a qualitative phenomenographic case study in which a total of 18 pupils participated voluntarily in the research. The empirical data was gathered in the April 2012. The conceptions of third and fourth graders – children of age 9 and 10 – were studied. They were given outdoor education that was mostly based on using different senses, namely sense of hearing, touch, sight, smell, and taste. Children drew images on how they perceived the nearby forest and lake area before and after the outdoor lessons. The data was analyzed by using deductive content analysis. Based on the drawings, five children were interviewed before and after the outdoor lessons. The outcome was that even a short teaching period in nature has a positive effects on the pupils attitudes to nature.

Key words: attitudes to nature, environmental educational models, outdoor education, primary education, phenomenographic case study.

Human beings like every other species depend upon healthy ecosystems for survival. Nature provides us essentials like clean water, food, and medicines. Intact but also threatened and damaged ecosystems help regulate our weather and climate. It is a recognised fact that contact with nature can play an important role in the educational and social development of children; and that early contact with nature plays an important role in developing pro environmental values and behaviours. Our research topic, Perspectives on the promoting environmental education by using senses, is very current in Finland, because the Finnish National Core Curriculum (2004) for primary and lower secondary schools is about to change. The aim of our study was to clarify, to which extent attitudes to nature can be affected by having a lesson outdoors based on senses. The research question was presented as “How does children’s relation to nature develop in a sense-based nature education?” At first, we will describe environmental attitudes and environmental education models used in Finland. Then we will move on to the outdoor education. After that, before our research description, we will tell both about outdoor education and sense education in the Finnish curricula.

Background

In order to portray the different aspects of children's human-nature relation and to distinguish them of each other different categories are formed based on previous studies and philosophical viewpoints.

Attitudes to nature

Attitudes to nature concern nature, human and human rights over nature (Pietarinen, 1987, 42; 1992, 33). The discussion of human rights over nature raises questions of nature's intrinsic and instrumental values and thus ethics. Understanding of intrinsic or instrumental value is considered as nature attitude, which in turn guides actions and behaviour toward nature (Merchant, 1992, 62; Norton, 1987). The ethical dimension comes from admitting the intrinsic or instrumental value of nature (Vilkka, 1993, 125). If nature is used for human ends, nature is given instrumental value. If nature in itself is appreciated, it's valued as intrinsic. Instrumental values refer to anthropocentric relationships to nature. It means that we have right to use nature for our living. Intrinsic values refer to ecocentric relationships to nature which holds a strong sense of respect for nature in its own right (Norton, 1987).

Anthropocentrism

Utilism, humanism and mystism represent antropocentric attitudes to nature. In utilism, nature is taken for an energy and a resource supply, which exists only for human well-being. By increasing and enhancing production utilists aim to provide highest possible welfare for the whole society. Although welfare could merely stand for a basic feeling of being secured and safe - a healthy and a comfortable life, welfare usually means luxury. Luxury grounds itself in a ownership based egoism and as so it is the most common form of utilism (Pietarinen, 1987, 43–44). Environmental issues are solved by developing new technology, which is why such thought patterns can be considered also as technocentric (Pietarinen, 1987, 43; Palmer, 1998, 88–89). van Matre's presents similar ideas under the term of horn of plenty, cornucopia, in which it is believed that an economy without limits solves all energy and resource issues (van Matre, 1998, 38, 59). Utilism equals Norton's concept of strong anthropocentrism, because central idea of the latter is the unlimited use of nature based on freewill (Norton, 1987, 136). This is typical for the materialistic Western world view, where human disconnected from nature has an ethical right to use nature, the value of which is defined by human appreciation (Norton, 1987, 13; Palmer, 1998, 100–101). Merchant's egocentrism presents the idea in its strictest form claiming that individual good benefits the society (Merchant, 1992, 63); thus it does not even think the common good of human. Nature can therefore be used as seen fit, if it doesn't violate other's rights (Merchant, 1992, 63). Utilism's nature would change completely, if it was to include animals (Singer, 1993). In this paper, utilism is considered completely anthropocentric a view. Even then considering nature having instrumental value is interesting: Vilkka (1993, 134) considers instrumental value as something that results in good outcome. Therefore it can be questionable, if nature is given even instrumental value in utilism, if it eventually leads to impoverishment of biodiversity.

Humanism differs slightly from the core ideas of utilism, though it also emphasizes human needs. Nature is a mean to aid intellectual and ethical progress, and the non-intellectual matter gains its value from serving intellectual ideals as well as social justice (Pietarinen, 1987, 46–48; Merchant, 1992, 71). It is noted that all anthropocentric values do not consume nature because of ethical and moral restrictions. Nature can also be used recreationally, for seeking experiences and for hobbies such as hiking (Norton, 1987, 12, 99–100). Using nature

wantonly does not fit well in the idea of perfecting and civilizing human (von Wright, 1988, 16–17). Therefore it is noteworthy how nature is used righteously for human ends (Pietarinen, 1987, 48–49).

Mystism aims to unite the spirits of human and nature without reasoning (Pietarinen, 1987, 51). Nature is needed to fulfill the mystique and religious needs (Pietarinen, 1992, 32). Technology breaching the spirituality of nature and thus preventing unity is condemned. Mystism can be considered neglecting the true issues such as environmental problems (Pietarinen, 1987, 51, 53).

Ecocentrism

Sentientism, vitalism and ecosystem's view represent the ecocentrism. The ecocentric views consider nature having intrinsic value as a whole where everything is connected to everything and human as a biological being is equal with other beings (Pietarinen, 1987, 53, 55; 1992, 39–40; Merchant 1992, 76–77). As a species human adds to natural variety (Pietarinen 1987, 56).

Sentienism states that human is morally obliged not to hold from causing pain to sentient animals (Pietarinen, 1992, 40). The fact of an animal avoiding pain creates interests to itself and there is no reason to neglect this. As there is no right to neglect human rights based on skin colour or intelligence it should not be allowed in the case of animals (Singer, 1993, 56–57). Though not being moral subjects, animals are objects to moral actions which means they are to be treated as respectfully as humans (Pietarinen, 1992, 41).

Vitalism disregards notes of being sentient and claims all life forms have equally intrinsic rights to exist. Human cannot control ecosystem where everything depends on each other. Practical solutions for such dogmatism sets apart primary and secondary interests, where primary interests of others may not be violated when fulfilling secondary needs (Pietarinen, 42–43). Such considerations are presented by Næss (2008, 111) and by Linkola (1990). They both consider all life important in itself and that life is not valued by its usefulness. For life to flourish on Earth, there should be less people (Linkola, 1990, 11–13; Næss, 2008, 219, 221).

Vilkka widens the perspective in a view the centres around ecosystem, adding inorganic nature in to the view. Nature's beauty, unity and diversity are emphasized. The idea of animal suffering is extended to plant life and ecosystem's right to its natural rhythm (Vilkka, 1993, 107).

The aim of this study is to describe children's attitude to nature. Utilism cannot be the answer in its purest form, exploiting limitlessly, as it turns on itself. The functioning of nature is at stake. (Pietarinen, 1987, 58–59). Utilism is not considered to be actually very anthropocentric, something that would serve human good (Vilkka, 1993, 90). The issues involving nature are beyond the perspectives focused on human and society which is why answer needs to be sought elsewhere (Pietarinen, 1987, 58–59; Merchant, 1992, 74). The problems lie in the consumptive attitudes and values and not as much in technology or insufficient knowledge. This calls for ethical education (Vilkka, 1993, 129). As mystism seems to be of little help, humanism and nature-centered attitudes seem better - possible and efficient - solutions. There are already some good environmental education models that also set themselves apart from utilism.

Environmental education models

Environmental education is defined many times to mean only unbuilt, natural environment. However, environmental education grounds itself in values and attitudes aiming to understand and appreciate environmental diversity (Wolff, 2004, 19–20). It can be justified by environmental issues (Käpylä, 1995, 32). Models to practice environmental education are presented to bind sensing the nature to researching environmental attitudes.

The central idea of sustainable development has been stated so that the fulfilling the needs of present day does not compromise the future generation's possibilities to meet their needs (United Nations General Assembly, 1987). Same idea is included also in environmental education (United Nations, 1992; Wolff, 2004, 21). Finland adapted to United Nation's declaration of decade of education for sustainable development by forming a national strategy (Opetusministeriö, 2006, 12–13, 56; 2012). It is stated concerning environmental education, that education needs to be integrated and that school needs to look for studying environments from the surrounding society (Wolff, 2004, 22–23; Opetusministeriö, 2006, 59–60). Children are to be brought up be active subjects instead of passive, submissive observers (Allas, 2001, 106–117).

The four environmental education models presented below all set senses to their core in a way. Uitto (2005a, 195) characterizes environmental education as experience based. Models also emphasize active citizenship and taking action. Models aim to inform and develop personal relationship to environmental issues, the one without it is not likely for anyone to react on long-term changes (Wilson, 1984, 120).

The model by Hungerford and Volk (1990) aim at bringing up children to responsible and active citizenship; thus the chart is named Behavior flow chart describing the major and minor variables awareness not automatically leading to favourable behaviour. involved in environmental citizenship behaviour (Figure 1).

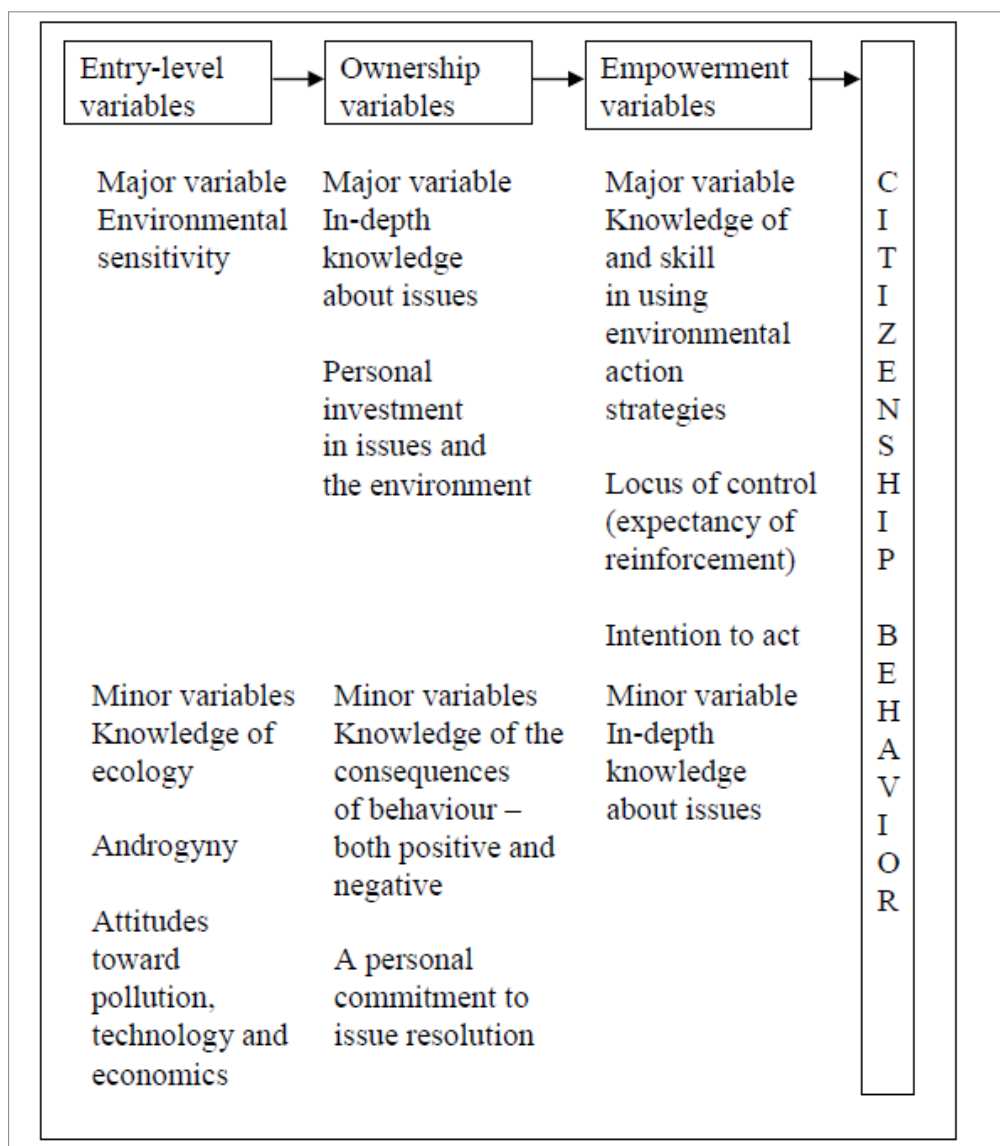


Figure 1. The model of environmental education by Hungerford and Volk (1990).

The model consists of three different categories, namely entry-level variables, ownership variables and empowerment variables, all of which have major and minor variables. The most important variable in entry-level variables is environmental sensitivity, which is about relating empathetic to nature. Minor variables include knowledge of ecology that affects decisions made and so possibly affecting behaviour indirectly. Androgyny refers to people who show properties generally affiliated with opposite sex. Attitudes toward pollution, technology and economics also have some significance. (Hungerford & Volk, 1990, 11–12.) Ownership variables refer to matters that make issues personal. The understanding of the environmental issues and the ability to lead the ecological and human consequences is crucial. Personal investment is about the will to work for nature's good. Empowerment variables are important in directing toward responsible behaviour as they give meaning to actions. Environmental education. It builds self-confidence in students and – considering responsible citizenship – results in a feeling of being incorporated into society. Knowledge of environmental action strategies and the skill to act accordingly is tightly knit with previously presented: skill is strongly connected with knowledge, and it is easier to predict actions than it would be basing on knowledge alone. Expectancy of reinforcement lowers the threshold to take action and to try.

It can be helped by teaching citizenship skills and by offering a possibility to work for the community. (Hungerford & Volk, 1990, 12–13).

The ideas of participation and action are the most important part of the model by Hungerford and Volk. Also the emphasis on ownership variable of environmental sensitivity is valuable. Nevertheless, the model is still very theoretical compared to Palmer's tree model (Figure 2).

Palmer responds to the requirements presented earlier by United Nations, International Union for Conservation of Nature, Brundlandt commission and Agenda 21 by bringing up the topics of attitudes and education. Traditional schooling is too one-dimensional in the sense that it mostly includes knowledge about nature (Palmer, 1998, 66, 77–78). The tree model, Palmer presents, brings forth the equal need for knowledge, skills and attitudes in education. In order for children to be able to react reasonably to environmental problems, school should present knowledge created by different branches of science (Palmer, 1998, 78, 140). Tree model exists also to criticize the presentation the goals of environmental education as too vague (Palmer, 1998, 136). The tree's top consists of three intersecting sections. Education about the environment stresses experience, studying and gaining information, which serve decision making and evaluation. While information come from problems concerning students personally, this element is closely related with the ethical aspect of this model. (Palmer, 1998, 137, 140, 143, 271.) Teaching in/from the environment concerns developing studying methods and using nature throughout the education; this is inert knowledge (Palmer, 1998, 137, 144.) Education for the environment introduces taking nature into account. This is to guide behaviour and to develop personal relationship to nature and to stress personal activity. Even though improving of attitudes aims to wide appreciation and conservation of nature, it is not a question of single-minded protection. (Palmer, 1998, 137, 140, 142, 267.) The core in the intersection cannot be reached by educational programs, although it interacts with then, feeding other experiences (Palmer, 1998, 271). Formative influences depicted as roots remind that teaching is more likely to succeed, if it grounds itself in students' earlier information. (Palmer, 1998, 110.)

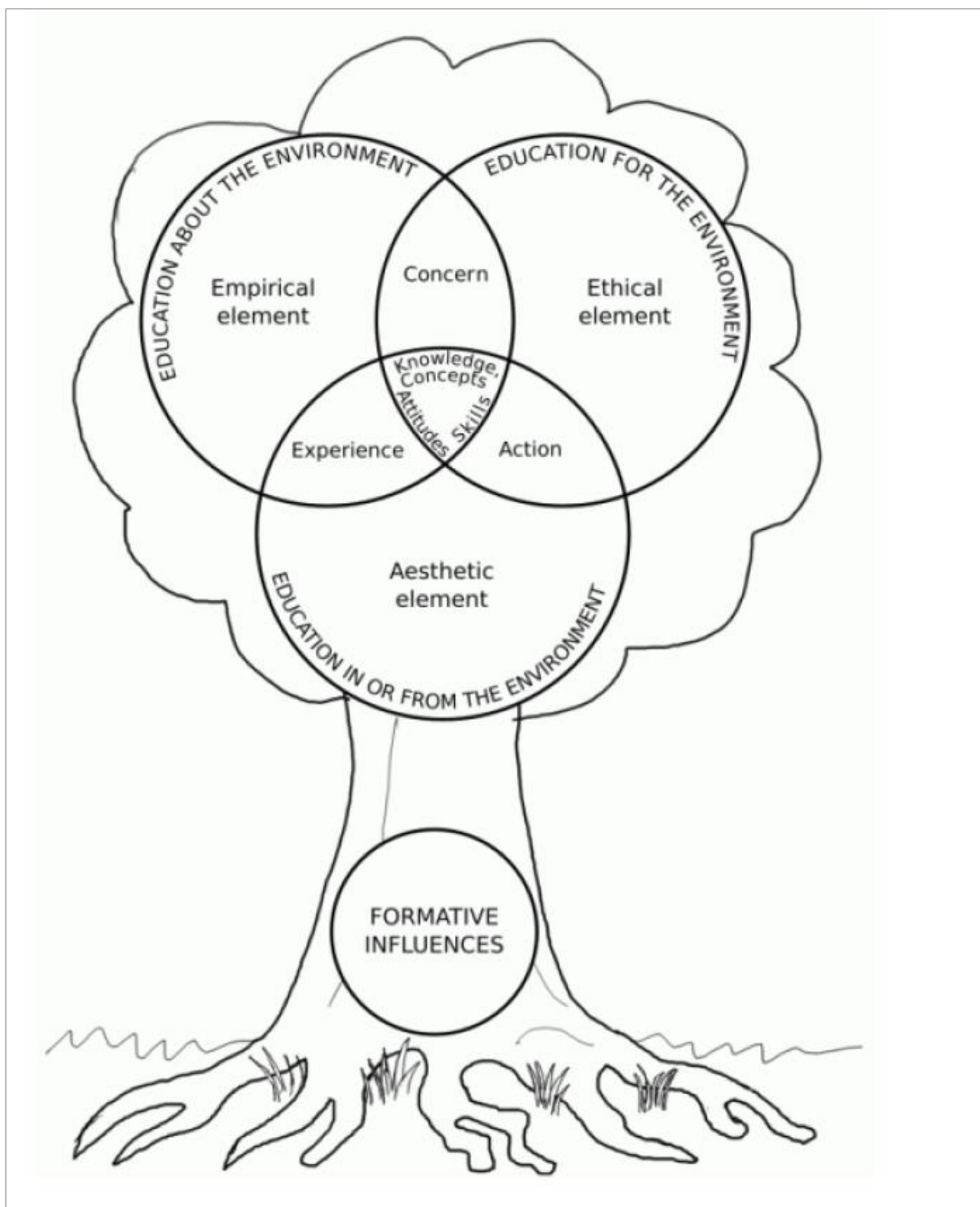


Figure 2. Palmer's tree model for environmental education (Palmer, 1998).

Käpylä's onion model (Figure 3) criticizes the idea of knowledge free from values and culture, as one should acknowledge and understand the political and cultural nature of environmental issues. Natural science is mostly inert knowledge and it should develop critical examination and acknowledgment of culture. Thus environmental education should point the way. The threat rising from environmental issues is partly a social construct and partly real. (Käpylä, 1995, 29–30, 34.)

The onion model is based on Käpylä's ideas of holism and the inseparability of knowledge and emotion, which in onion model are introduced as layers, each layer depicting the organization of learning experiences and cultural effect on experience (Käpylä, 1994, 10, 13, 17, 35). Feelings are foremost, which is why senses and experience are the core of the model. Physical and spiritual/cognitive are not separated. Observing is based on searching for meanings, hence observations are felt as experiences.

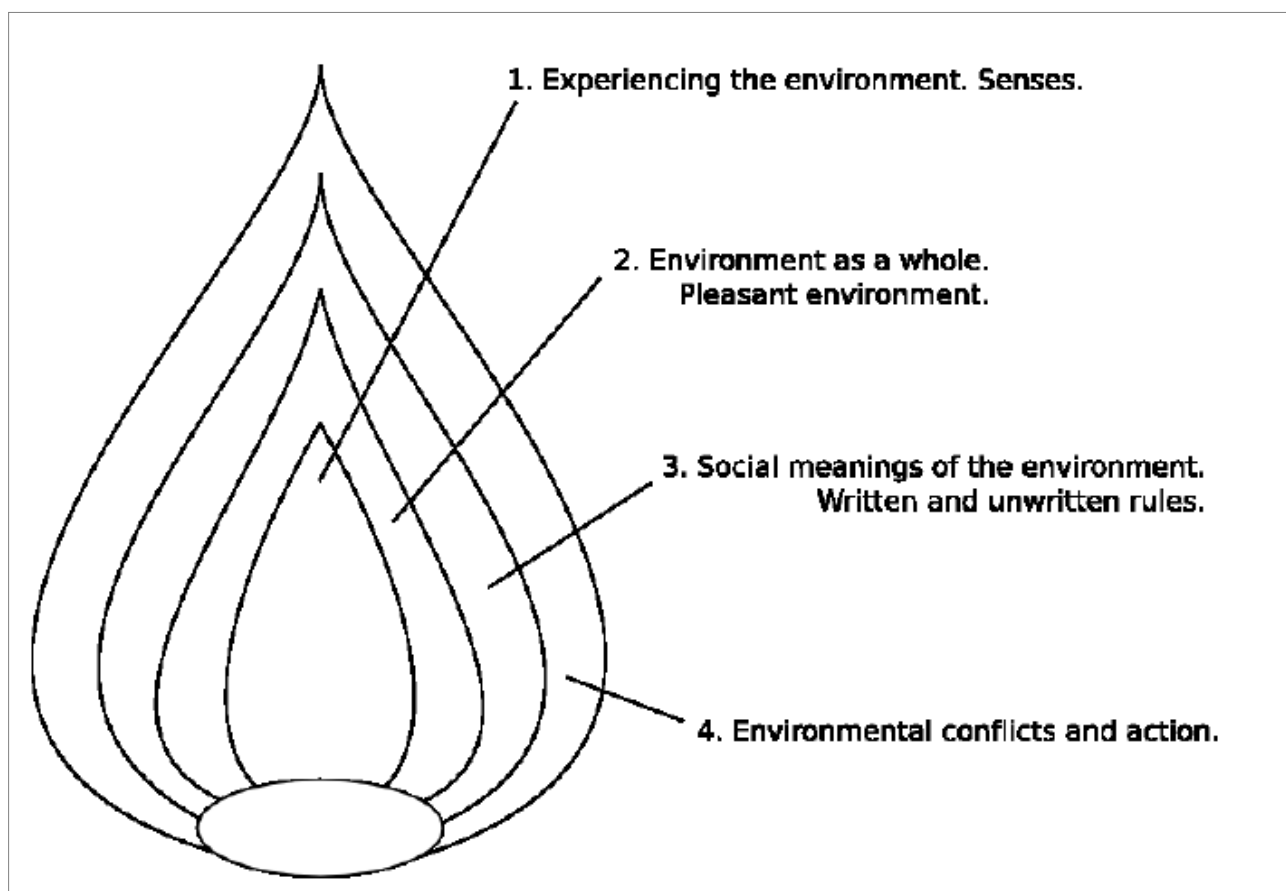


Figure 3. Käpylä's Onion model (Käpylä, 1995).

Onion model proceeds layer by layer towards society and more theoretical understanding. It also progresses from single senses to observing environment in its entirety, opening eyes to familiar environment. In deconstructing of social meanings, highlight is on recognizing such signs in built environment as hierarchy, openness and introversion. After developing evaluation skills, an individual is able to examine environmental issues, which are social in construct. (Käpylä, 1995, 35–36.) All in all, senses are the core of Käpylä's model, from which he aims to educating active citizens, little by little.

House model by Jeronen and Kaikkonen (1995; 2001) (Figure 4) is to aid teachers and educators in the practice of environmental education in the areas of goals, environment, methods and evaluation. Jeronen and Kaikkonen cherish environmental sensitivity as the core of their model as does Kämpylä. The Goals wall depict, how nature experiences in early childhood and the empathetic relation to nature promotes responsible behaviour. Slowly knowledge is introduced to deepen understanding of the human-nature relation. Readiness and responsibility are sought in a way that is expressed as criticism and creativity, courage of thought and as a will to act for the environment. Environmental awareness keeps developing with experiences and teaching when contextualised in the environments presented on the Environment wall; thus aesthetic, social, nature, ethical aspects and things concerning built environment are to be considered. (Jeronen & Kaikkonen, 2001, 25–27.)



Figure 4. House model of environmental education by Jeronen and Kaikkonen (Jeronen & Kaikkonen, 1995, 23; Jeronen & Kaikkonen, 2001).

On the gable labeled Evaluation are shown the different dimensions of evaluation, which stem from cognitive, affective and ethical objectives. E. g. self-evaluation refers to developing metacognition in students, which in turn could be advanced by encouraging talking. Teaching methods presented on the roof under Methods have been divided into value, science and sensitivity education. Value education aims at bringing up rational, self-directed and socially

enabled adults (Jeronen & Kaikkonen, 2001, 29). Information, action and affections need be to interconnected, because commitment requires values to touch feelings (Jeronen, Kaikkonen & Räsänen, 1994, 7). Science education is an introduction to scientific thinking, methodology, information and developing problem-solving skills. In sensitivity education senses are sharpened and observational skill advanced. (Jeronen & Kaikkonen, 2001, 27.)

The use of senses is well argued in the former models of environmental education. The environmental behaviour model by Hungerford and Volk (1990, 9, 11–12) looks for citizenship behaviour. Sense-wise the model includes an entry-level variable called environmental sensitivity describing the empathic relationships towards nature. This is strongly connected with behaviour.

As for Palmer's tree model the use of senses relates partly to earlier experiences located in the roots of the tree (Palmer, 1998, 110, 272). Considering the study subjects to be 10–11-year-old children, the sense-based outdoor lesson was seen as a basis for later studies. Sense-based education is arguable also from the viewpoint that the field introducing education about the environment emphasises experience, education in/from the environment emphasises using nature throughout education and lastly the field of education for the environment aims to mould a personal nature attitude (Palmer, 1998, 137–144). Onion model by Käpylä presents a sociological approach to environmental education. Käpylä's idea is to bring children up to active citizens who can and will act for the good of nature. The core of the onion highlights the significance of feelings, senses and human experience. (Käpylä, 1995, 31–36). The house model by Jeronen and Kaikkonen is an aid for teachers for organizing environmental education and to see the different aspects included. It is based on the idea that behaviour flows from experience, on which learning is based. This is why it is important to develop environmental sensitivity as a child before progressing towards adulthood and the knowledge that acting responsibly requires. (Jeronen & Kaikkonen, 2002, 341–363; Jeronen, Jeronen, & Raustia, 2009, 1–23.)

A forementioned show, by building environmental sensitivity, that using senses is tightly knit with developing environmental sensitivity. If there is no environmental sensitivity, there is no base for environmental education. The models also question the role of sole knowledge and holding back as an observer. The thoughts of personalization come alive in the act of sensing: what would be more personal than observing nature using one's own senses? Senses help gaining inert knowledge, that Käpylä says environmental knowledge mostly consists of.

A value educational point of view might be, that direct nature experiences could have value and preference altering meanings, which would lead to a change in nature attitude. Through nature experiences one might see human as a developed animal and as a part of ecosystem on the way to a change in consumption preferences (Norton, 1987, 11, 189), but this is assumption is highly philosophical.

It is interesting to notice that declarations and statements by United Nation, IUCF and Brundlandt commission reflect a humanistic relation to nature: conservation is justified by the needs of future generations and human welfare as the main goal of nature and development procedures. Even shades of utilism can be seen, if nature is conserved to secure economic growth (Palmer, 1998, 60–62).

Outdoor education

A number of public perceptions and specialist reports that suggest that children are increasingly separated from the natural environment, that they have little opportunity to learn to deal with risks in

modern society, and that they exercise physically less than they should (Nicol et al., 2010). Nature is important to children's development in every major way – intellectually, emotionally, socially, spiritually, and physically (Kellert, 2005). There is a growing awareness that many aspects of young people's education could be addressed by enhanced outdoor experience (Nicol et al., 2010). The phenomena and the atmospheres of nature send out the invitation to penetrate deeper into them and to get involved in them (Kellert, 2005).

An empathic relation to nature (Palmberg & Kuru, 1998), nature sensitivity (Nykänen & Kinnunen, 1992), environmental awareness, attitudes, and conceptions can be fostered by repeated nature experiences (Gilbertson, 1990) and long-term nature education (Palmberg, 1989). Pupils' knowledge can be built up by concrete experiences, interests, emotions, and values through outdoor education (Bogner, 1998). Students who have had a meaningful experience in nature are more likely to prefer spending time outdoors, express concern about environmental issues, consider themselves strong environmentalists, and express interest in studying the environment or pursuing an environmental career (The Nature Conservancy, 2011).

Advantages with outdoor education are its deductiveness (Dahlgren & Szczepanski, 1997) and hands-on activities (Kolb, 1999). As outdoor education traditionally focuses on personal and social educational issues like the 'capacity' to become 'successful learners', 'confident individuals', 'responsible citizens' and 'effective contributors' (Nicol et al. 2010), there are innumerable possibilities of how education through all senses can teach practical everyday knowledge (Becker, 2001). Nundy (2001) explains activation of different senses as reinforcement between the affective and the cognitive domain where one influences the other and provides a bridge to higher learning. First hand experiences and interactive learning situations are important in forming of personal opinions, attitudes, and values (Balschweid, 2002). The benefits of outdoor education include improved interpersonal and intrapersonal skills; environmental awareness and stewardship ethics; physical, mental, and social health; and ability to learn and concentrate (Cottrell & Raadik-Cottrell, 2010). Positive attitudes of pupils toward environment have also been found to increase (Mittelsteadt et al., 1999). In the childhood adopted, positive nature attitudes can pave the way for good nature behaviour in the adulthood. For environmental education and outdoor education, it is important to know the conceptions of pupils, because the conceptions have effects on learning and construction of new issues. The main purpose of the present study is to clarify, using the drawings and interviews of young Finnish pupils done before and after a lesson outdoors, to which extent attitudes to nature can be affected.

Outdoor education and Sense education in the Finnish curricula

In the primary school curriculum, use of senses is highlighted in environmental and natural sciences, where senses are used to enliven studying and for the basis of observations and studies. Experiential stance is also considered to develop positive relationship with nature in itself. Environmental and natural studies embraces sustainable development as one of its ground-laying perspectives. The idea of sustainable development is central also in lower secondary school when environmental and natural sciences are broken down into biology and geography, where information builds up the appreciation of nature more or less at the expense of senses; senses are not namely required as earlier during the grades 1–4 (National Core Curriculum... , 2004, 170–179).

The Finnish National core curriculum for basic education (2004, 176) in Biology and Geography states that pupils should learn to value and foster biodiversity in nature and to understand human beings as a part of nature. The pupils should understand responsibility of biodiversity conservation. They should be able to make observations and investigations

concerning environmental changes in their native land. In the integrative theme named environment responsibility, well-being and sustainable future, it has also been stated that pupils should engage to work for environmental protection (The Finnish National core curriculum ..., 2004, 41.) In addition, the cross-curricular theme of "responsibility for the environment, well-being and a sustainable future" introduces the named topics in everyday life (National Core Curriculum... , 2004, 39–40). Also the conception of learning presented in the Finnish New National Core Curriculum (2012) sides with outdoors education's idea of experiencing things but no guidelines have yet been set how to teach these topics (Curriculum reform 2016).

Material and methods

Our research topic is current in Finland because the National Core Curricula for primary and lower secondary schools are changing at the moment. The new curriculum will be used in 2016. The findings of this study could be used to promote the need to make nature environment more available for pupils. Through the senses, children get nature experiences which help them to better understand the meaning of biodiversity conservation. Outdoor education also supports environmental knowledge construction.

This qualitative phenomenographic study (Syrjälä ym., 1994, 114–125) was carried out in April 2012 on four days which span over two weeks. It was constructed of four different parts, namely preparing of drawings, interviewing, nature education, second preparing of drawings and second interview.

The first week consisted of two days: first one of introduction, presentation of the study and drawing, and the second one of interviewing. 18 pupils of age 9–10 from the Oulu University teacher training school participated in the study. Pupils of this age were considered apt for the study by the means that they could already put their thoughts to words but still present drawings which might not be accurate in scientific sense, therefore giving away ideas, conceptions and approaches. Being a teacher training school pupils had little or no difficulties participating in the study.

The pupils were asked to prepare a drawing on “The nature of Kaijonharju at this time of year”, Kaijonharju being the district with forests nearest the school in question. Because of the limited time of 20–25 minutes, only coloured pencils, felt-tip pens and crayons were allowed. Excitement varied, so to help the pupils with subject problems, areas near Kaijonharju, such as the ones on the other side of the district's lake were introduced; this fitting in well with the nature of the study. It was considered that enough material would be produced anyway and the ones with exceptions might bring in something unexpected and enriching. Some pupils were allowed to work for 30 minutes for them to achieve a satisfying level of work.

The pieces of work were collected for an analysis of what kinds of attitudes to nature were depicted. It was studied whether colours were used greatly or little; if the drawing was rich or poor in content; if facial expressions were depicted; if senses were indicated in any way; or if attitudes to nature were expressed in some other way.

Three girls and two boys were then picked for the sample (Table 1). This sample of five pupils was a result of their work but also a compromise of presenting both classes and genders. With relatively small sample group it was also possible to take in the sixth pupil if something came up in the latter part of the study.

Table 1. Notifications for categorization of drawings and ideas for interviews.

Pupils	Notes of content	Expectations and grounds for interviewing
Antti (boy)	Notably reduced content.	Possibly uninterested, indifferent.
Panu (boy)	Emphasizes built environment in detail; in the latter piece steers to more a natural approach.	Possibly considers nature as a resource; has not visited unbuilt natural environments.
Eeva (girl)	Very little or no built environment. Rather accurate, e.g. pine tree is easily recognizable.	Possibly interested in nature; associates environment with something else than built environment.
Maria (girl)	Imaginary content with animals making sounds.	The very kind hoped of the chosen age group with imaginary elements. Likely to express feelings of the environment.
Veera (girl)	Rather accurate drawings with recognizable animal trails, birds and plants; also cigarette butts.	Possibly nature-oriented with strong opinions: accurate nature-centered drawing also includes cigarette butts.

On the second day of the first week, pupils were interviewed. The half-structured interview had questions made in advance. The pupils were first asked, what was the space described in their work. To bring forth meanings behind the subject in question, the pupils were asked why they had concentrated on the particular space and what did the space mean to them personally. The content was specified and opened by asking, what is described, why the content has been chosen and what is shown concerning nature or human.

Group interview was started with the sample group as a whole. This led to unexpected problems as girls would not tell about their drawings at boys' presence. This is why the interview group was divided into two groups based on the gender. This calmed down the situation. Regardless of the group interview nature, the interviewer addressed the pupils separately for depth and rigour. Discussion was guided by the aforementioned questions. The first interview lasted for 22 minutes, with eight minutes with all the five pupils, nine minutes with the three girls and five minutes with the two boys. The recorder was half-way between the interviewer and interviewees. Pupils were interviewed in a book storage room, where there were also some stuffed animals. This led to minor disruptions, but pupils' attention was led back to the interview. Interviews were considered concluded, when the pupils couldn't come up with anything new even after questioning.

At noon after the interview, the pupils were taken for a 60-minute outdoor education lesson based on senses near lake Kuivasjärvi. The researcher had familiarized himself with the environment beforehand searching for possible education sites (cf. Uitto, 2005b, 126). The exercises were designed to support the on-going teaching of spring and its manifestations.

The sense-based exercises were first conducted sense by sense until the final section, in which pupils used all the senses alternately. Activities began by forming a sound map in the fashion of Cornell (1989, 34) and describing in words what snow, wind and gravel sound like. Pupils were asked to describe how snow felt and what it was like, e.g. how grainy or moist it was. Pupils were asked how the snow in question differed from snow fitting for snowballs. In this section there were problems in directing the pupils to topic compared to other sections.

Sight was included in a photography play described by Cornell (1989, 74–74), in which students are paired and the other one is a camera, the other one a photographer. After taking a photograph – telling the camera to open their eyes for a second by tapping on the shoulder – the photographer asks what the camera remembers from the view. Students were given palettes, the colours of which students had to refer to when describing nature. There was also a form, which had also tasks for other senses.

There was not enough time for everyone to go through all the tasks. This was not an issue for the study, because the nature of the final tasks was repetitive and they were considered differentiating for the quickest. There still were activities for smell and taste, and the activities were finished in the classroom. Table groups of five were given crushed samples of aspen, birch, spruce, pine and lingonberry in sealed plastic bags. Pupils were asked to identify the samples. There was no special task for taste, so it was presented as a closing for the study: children were given blueberry and lingonberry. Regardless of the berries commonness, all the pupils were not familiar with them. They were reminded to think, what Kaijonharju related they would like to draw next week.

The following week pupils drew new pictures of the topic “Kaijonharju’s nature this time of year”. At the beginning of the class they were reminded of the topic after which their experiences, sound maps and invented words were presented. Pupils wanted to draw so eagerly that the introduction was decided to keep short. They were reminded of the allowed methods of coloured pencils, felt-tip pens and crayons. Because of the short introduction drawing time was slightly increased from the first session, approximately 35 minutes. Everyone came up with a topic quickly. Nothing radical came up in the drawings, so the sample was kept the same.

The following day – the fourth day of the second week, the final day of the study – the sample group was interviewed again, the boys separately from the girls, until they had nothing to add. The interview pattern and space were the same, although they were also asked to describe the similarities and differences in their drawings from different sessions. Interviewing the two boys took 12 minutes and the three girls 24 minutes.

Drawings can be interpreted based on relative sizes and colours of depicted subjects. It is considered that the relative sizes can describe the pleasantness or unpleasantness of the subject (Picard & Lebaz, 2010, 187; Burkitt, Barrett, & Davis, 2004, 335). Colours can also reflect person’s relation to subject (Burkitt, Barrett, & Davis, 2010, 338–339; Crawford, Gross, Patterson, & Hayne, 2012, 205, 209–210). Ideas concerning sizes and colours have been studied under rather clinical circumstances in earlier studies, which is why such results

should not be taken for granted remark. The children of this age aim for realism (Picard & Lebaz, 2010, 186–187; Crawford et al., 2012, 201). The sampled pupils in our study also used colours relatively realistically, and therefore the pleasantness of the subjects could not be interpreted. For these reasons, we used the drawings as grounds for interview rather than material in itself, although some conclusions have been drawn from the contents of the figures, too. Interviews show an active relation towards nature meaning what can be done in and to nature (Aho, 1987, 193), though no people were drawn.

Results

Boys' drawings emphasize built environment. This feature is highlighted in Antti's works so, that only the first drawing includes sun and water (Figure 5, left). Colours have been used only a little and snow is mixed with undrawn part. He was reluctant to tell about his drawings in the interviews, which seemed partly stem from being uninterested in the, but also from underestimating his own drawing skills: "I don't know, I couldn't come up with anything else." During the first interview he was interested in a pizzeria shown in Panu's work (Figure 6, left), which might have partly governed the contents of the latter drawing (Figure 5, right).

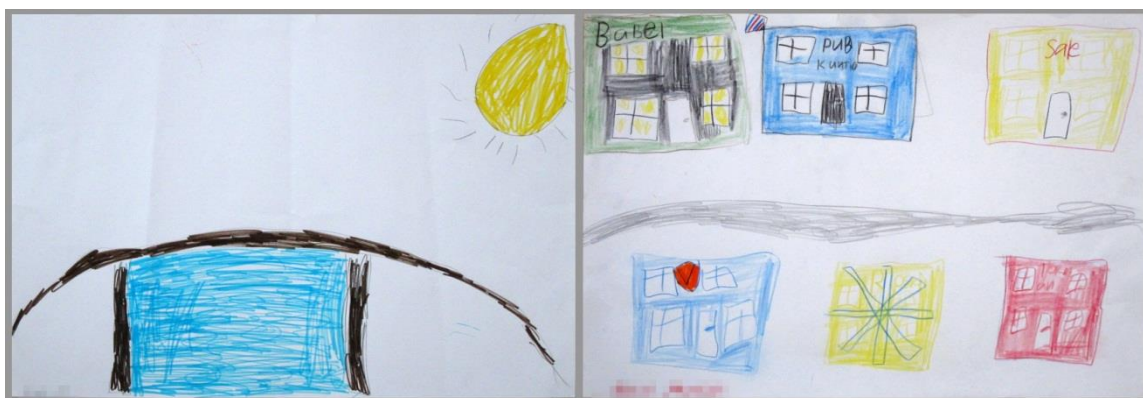


Figure 5. The drawings of Antti on the topic "Kaijoharju's nature this time of year" before and after nature trips.

Latter work has no nature content, only built environment. There is a path drawn on the horizontal centre of the paper. This is later defined to be a cycleway. Antti could not present any reasons for either of his works: "It's all I came up with. I just made it such." [On how nature is shown in the drawing.] "I don't...it's not shown at all." He was not really interested in the educational part in itself, although he was excited about having lingonberries for the first time.

Panu has drawn first the centre of Kaijoharju presenting trees and Sun in the background, stores and pizzeria in front of them and foremost the parking lot (Figure 6, left). It is interesting, how he arguments drawing the district centre with material produced from nature being used in the buildings: "Well, there's the Sun, and some sky, too, and, well, right here, they've used all kinds of material from nature." Also the undrawn, white front stands for unbuilt, empty area: "Well, like, nature, what it's been like, when, well, nothing's been built yet." Cars he left undrawn, "because the produce exhaust fumes". His latter piece of work emphasizes nature although it depicts a beach, worked environment (Figure 6, right). There is still snow on the beach and ice in the water. Panu did not want to draw animals in his pieces

of work, because he felt he was not good enough. He told his latter drawing that “well, I wanted something, that didn’t show any stores or such”, “well, I wanted, thought, that now I could draw, like, Kuivasranta for a change” and “a place where people spend time in the summer”.



Figure 6. The drawings of Panu on the topic “Kaijonharju’s nature thistime of year” before and after nature trips.

Girls’ drawings have animals instead except Eeva’s first piece of work, in which she had not enough time animals (Figure 7, left). The drawing is unique in that has no built environment at all. Eeva did remark that trees have been planted. The view is near her home, and she’s been there with her mother. She’s been there also to celebrate New Year. “It’s a nice place.” “It has a nice view.” “I’ve walked dogs there.” “I’ve been here many times here always, for example shooting rockets

with mom.” In her other drawing she depicts a view from Hirvaskoski (Figure 7, right). A flock of swans was a sight so impressive, that she wanted to draw it: “Because I always like to draw all kinds of places, for example if I see something [...] that I don’t see so often, so I draw them.” Bridge is the road the observation was made from.



Figure 7. The drawings of Eeva on the topic “Kaijonharju’s nature this time of year” before and after nature trips.

Maria drew a picture, in which she combined imaginary elements with elements she has seen in Kaijonharju (Figure 8, left): “Well I drew here two spruces and then a birch, then one bear, one squirrel, one bunny and then a sort of a bridge over a river.” [Where Kaijonharju can be seen in the picture] “Everywhere else besides that and that. But there’s never been any bears.” Animals in this drawing are the only ones in the sample with facial expressions: all the animals smile. In addition bear has growling drawn in its speech bubble.



Figure 8. The drawings of Maria on the topic “Kaijonharju’s nature this time of year” before and after nature trips.

Latter piece of work seems the emphasize built environment, but it was revealed in the interview that the planted trees near the school had a great meaning and that there are more trees than what have been drawn (Figure 8, right). When going through the details it was also said that “I put it [car] there for an example of, that, if we’re to like drive cars, it then will pollute nature.” At the end of the interview Maria reserved a turn for her declaration: “Right, I’ll tell you now, what is right for nature.”

Veera's drawings were connected to her experiences on her way to school (Figure 9, left). "I drew here that, from Kuivasranta a kind of bridge, and, like, I thought it looked kind of fine and then there was that river and it was a little frozen." "I didn't want to draw the spray paint it had." She didn't like the limits being set to include Kaijonharju alone, but unlike Eeva she could not come up with any alternatives. The cigarettes in the latter drawing (Figure 9, right) and a question of attitudes to nature inspire Veera in Maria's fashion to tell, how nature should be protected and treated:

"Highschoolers are killing it, because they smoke, drop it on the ground, litter, every day there's more trash." "[...] then the nature is ruined and we won't have nature anymore [...]". Veera expressed her wish to draw a picture of the World after 20 years, as polluting and littering continue. In the last, independent part of the outdoor education lesson she headed deeper into the forest with her pair, away from the others, to finish the tasks in peace.



Figure 9. The drawings of Veera on the topic “Kaijonharju’s nature this time of year” before and after nature trips.

The most important observations of drawings and the conclusions of attitude changes based on them are summarised in table 2.

Table 2. The most important observations on drawings and the conclusions of attitude changes.

Pupil	Observations on drawings	Conclusions
Antti	Drawn subjects very similar, no notable difference.	Indifferent to nature despite of the educational part.
Panu	Subject of the second drawing has a lot more natural approach although second drawing still has built environment.	Sense based education might have had an impact in conceptions and preferences.
Eeva	Second drawing has a human-made element but also animals.	Educational part might have had an impact on examining the experienced: there are animals, there is man-made.
Maria	Subject of the second drawing begins to emphasize built environment and is more accurate in detail.	Imaginary elements are reduced a lot. Judging by drawn area natural elements are not notable, but as brought up in the interview, the few trees and the car carry the most meaning.
Veera	Both drawings have a road, but latter has fewer animals and signs of human presence in the form of cigarette butts.	Nature-orientation is still key but human actions and consequences are highlighted in the form of cigarette butts.

Discussion

Antti seemed very reluctant in both interviews. He was enthusiastic about the task at first, but already at the beginning of the first interview he was bored. His works were very reduced in content-wise and aesthetically, which could also be his way of expressing things. It could also mean that he found the task boring, but as other pupils had concentrated deeply, his attitude towards nature has been taken for uninterested and indifferent. Panu focused on telling about the Kaijonharju mall and its surroundings. He spoke about nature's material as building material and referenced the white part of his paper as unbuilt area. During the second interview he justified his shift of subject by saying that he did not want to draw "any stores or such". Although beach is environment moulded by human, the direction seemed to be away from built environment and controlling the environment. His relationship to nature in his first piece of work seemed to be guided by thought of nature as a resource. Eeva argumented her first scene by word, that point to experiencing nature aesthetically and recreationally. She told in her second interview that she draws places in which she sees something unique or rare; this could be interpreted applying to the first picture as well. Therefore both the pictures are meaningful and of familiar places. Her validation contrasts starkly the one of boys. Maria clearly expressed her interest in nature. She listed gladly the different nature subjects and justified, why she had presented imagery concerning human. During the second interview she brought up more a protecting point of view as she pointed out about using cars and nature's rights. Maria had her justifications in nature. Veera's view also shifted from aesthetics to more a caretaking direction between the two interviews. Judging by her words the grounds for protecting nature is firstly because of human: "then we wouldn't have nature anymore".

In our studies, two different main nature attitudes were found. Nature can thus be viewed as if it exists only for human ends, which means anything from constructing material to recreational use or even protecting the nature for human themselves. Nature can also be viewed as human's equal; this point of view was only brought up by Maria. She did not base her views on human as she considered that nature has a right to remain unpolluted. By this she still does not state that nature would come before human. Stating by the given excerpts the nature attitudes of neither Antti or Eeva did change. On the other hand Panu's, Maria's and Veera's conception seemed to shift into a somewhat more nature-centered direction. The changes were, however, very small. Teacher of the studied class pointed out, that the class has dealt a great deal with nature topics; this could be seen as easily recognizable trees, for example. Compared with nature topics the ones dealing with human might have been easier to draw ("I really didn't feel like covering the area with trees", "I can't draw animals very well"), which might explain the emphasis of topics.

Judging by the facts above the nature trail might have a positive effect on pupils' nature attitude. Three out of five had began expressed change in their attitudes with emphasizing or protecting views, but two out of five did not. It should also be noted that Eeva's first work (Figure 3, on the left) was the only one completely dealing with nature, meaning her attitude changed to a less nature-centred one. The protective angle presented by girls has both the human-centred aspect ("then the nature is ruined and we won't have nature anymore") and the nature-centred aspect ("I'll tell you now, what is right for nature") (Norton, 1987, 99–100; Pietarinen, 1987, 53–55; 1992, 39–40). Nature is also referenced as a living organism ("Highschoolers are killing it"), which can be considered having shades of nature-centrism, mysticism and Earth education. Boys, on the other hand, present utilistic ideas in Panu's technology-centred attitude and in Antti's inertness for unbuilt nature. In their case egocentrism is not considered, however, as they do not promote individual's rights. Antti's

inertness may reflect lack of environmental sensitivity that Hungerford and Volk (1990), Kämpylä (1995) as well as Jeronen and Kaikkonen (1995, 2001) write about. Insufficient environmental sensitivity is considered on the basis of simple imagery, which in addition expresses built environment. In Panu's case it is more about ownership variables presented by Hungerford and Volk (op. cit.), education for the environment presented by Palmer (1998) or nature awareness and knowledge presented by Jeronen and Kaikkonen (op. cit.). In other words Panu is capable of observing the environment, but he is not committed to work on its behalf. Girls instead have taken a step further from the perspective of given models: they have the will and the reasons to work for the environment.

In a study focusing on children's concepts of human and plants carried out by Laaksoharju and Rappe (2010, 692–693), it was concluded that the children brought up near nature recognized trees better and drew people in their drawings of nature more often than their city counterparts. Of main interest is that in the study in question, too, boys considered themselves independent of plants more often than girls specially in the city, whereas girls were more interested in plants themselves. In the study described in this paper most topics include built environment and none describe nature as such. Every pupil has included cultural environment which means landscape moulded by human for their end (Sepänmaa, 1987, 169). Closest to a purely nature-centred work came Eeva with her first drawing (Figure 3, on the left). In the interview, however, she told she knew that human had intervened with the landscape.

Senses could be used more analytically in environmental and natural studies as they introduce the empirical grip peculiar to natural sciences. Observations themselves in nature require one to be calm and use senses (Pojärvi, 1989, 16–17). Such ideas have been taken notice in Teacher training school of the University of Oulu, which is because teaching of environmental and natural science is based on the house model of Jeronen and Kaikkonen (Oulun normaalikoulu, 2012; Jeronen & Kaikkonen, 2001). The Finnish National Core Curriculum (2004, 170, 172) regards senses as mainly a way to acquire information, not as much as a way to improve nature attitude. Experience is also needed in forming a positive nature attitude, which could mean senses. Emphasizing the role of the senses could be of use in promoting the cross-curricular theme of Responsibility for the environment, well-being, and a sustainable future.

Conclusions and implications

Environmental education and outdoor education are no longer seen as being just about field studies or adventures, or as the remit solely of geography or biology teachers. The possible locations of environmental education and outdoor learning include schools' grounds, urban spaces, farms, parks, gardens, woodlands, coasts, outdoor centres, wilderness areas, etc. In this context, environmental education and outdoor education have to be a teaching approach for all teachers as a way of enhancing and integrating a wide range of topics and activities across the whole curriculum, thereby potentially connecting learners with their environment, their community, their society and themselves. (Nicol et al., 2010.)

Pupils could more than nowadays participate in the curriculum development process. They are very articulate about how they value a range of outdoor learning experiences. However, pupils appear confused about the concept of sustainability and their relationship with the nature (Nicol et al., 2010). Therefore, when developing curricula, it would be good to give more guidelines on how take environmental education and outdoor education into account during school days. Important questions to be solved in this meaning are: What are the most important goals, and how evaluation should be done for supporting the set environmental goals? How should value and

knowledge education to be included and to be carried out in different subjects? What are the approaches and educational methods that are suitable and interesting for pupils? And how long and how many times should a pupil study in nature to reflect on and maybe to change his or her environmental attitudes and behaviour? In addition, important is to develop a support structure and resources to help teachers overcome the barriers that prevent them going outdoors.

References

- ALLAS, A. 2001. Kulttuuriympäristö ympäristökasvatuksen uutena haasteena. (Cultural environment as a new challenge). In: Jeronen, E. – Kaikkonen, M. (eds.): *Ympäristötietoisuus – näkökulmia eri tieteenaloilta* (Environmental awareness). Oulu: Oulun yliopisto. pp. 106–118.
- AYRES, A. J. 2008. *Aistimusten aallokossa. Sensorisen integraation häiriö ja terapia.* (Waves of perceptions). Opetus 2000. Jyväskylä: PS-Kustannus.
- BALSCHWEID, M. A. 2002. Teaching biology using agriculture as the context: perceptions of high school students. *Journal of Agricultural Education*, 43 (2), 56–67.
- BECKER, P. 2010. Into the woods. Some Remarks on the Cultural and Biographical Significance of Woods and Wilderness in Youth Work. Presentation in Metsäkartano 7–10 October, 2011, Finland. Translated by G. Vill-Debney. Retrieved 24th November from www.seikkailukasvatus.fi/binary/file/-/id/25/fid/211/.
- BOGNER, F. X. 1998. The influence of short-term outdoor ecology education on long-term variables of environmental perspective. *Journal of Environmental Education*, 29 (4), 17–29.
- BURKITT, E. – BARRETT, M. – DAVIS, A. 2004. The Effect of Affective Characterizations on the Use of Size and Colour in Drawings Produced by Children in the Absence of a Model. *Educational Psychology*, 24 (3), 315–343. Retrieved 22nd October from <http://dx.doi.org/10.1080/0144341042000211670>.
- COTTRELL, S. – RAADIK-COTTRELL, J. 2010. *Benefits of outdoor skills to health, learning and lifestyle.* A literature review: Association of Fish & Wildlife Agencies' North American Conservation Education Strategy. Retrieved 24th November, 2013 from: http://outdoornebraska.ne.gov/Education/pdf/BenefitsofOutdoorSkills_WhitePaper_11-2010_Final%20with%20cover.pdf
- CRAWFORD, E. – GROSS, J. – PATTERSON, T. – HAYNE, H. 2012. Does Children's Colour Use Reflect the Emotional Content of their Drawings? *Infant and Child Development*, 21, 198–215. Retrieved 22nd October 2013 from <http://dx.doi.org/10.1002/icd.742>.
- CURRICULUM REFORM 2016. Renewal of the core curriculum for pre-primary and basic education. Retrieved 24th November 2013 from http://www.oph.fi/english/education_development/current_reforms/curriculum_reform_2016.
- DAHLGREN, L. O. – SZCZEPANSKI, A. 1997. Utomhuspedagogik – Boklig bildning och sinnlig erfarenhet. Ett försök till bestämning av utomhuspedagogikens identitet. Linköpings universitet, *Skapande Vetande*, 31.
- GILBERTSON, K. L. 1990. Environmental Literacy: Outdoor Education training and its Effect on knowledge and Attitude toward the Environment. *University Microfilms International*, 237. USA, Michigan: Ann Arbor.
- HUNGERFORD, H. R. – VOLK, T. L. 1990. Changing Learner Behavior Through Environmental Education. *Journal of Environmental Education*, 21 (3), 8–21.
- JERONEN, E. – JERONEN, J. – RAUSTIA, H. 2009. Environmental Education in Finland –

- A Case Study of Environmental Education in Nature Schools. *International Journal of Environmental & Science Education*, 4 (1), January 2009, 1–23.
- JERONEN, E. – KAIKKONEN, M. 1995/2001. Ympäristökasvatuksen kokonaismallin tavoitteet ja sisällöt arvioinnin kehittämisen tukena. (The goals and contents of Environmental Education). Oulun yliopisto. *Kasvatustieteiden tiedekunta, Selosteita ja katsauksia*, 139, 22–41.
- JERONEN, E. – KAIKKONEN, M. – RÄSÄNEN, R. 1994. Ympäristökasvatus opettajan työn eettisenä haasteena. (Environmental Education as Ethical Education.) In: Käpylä, M. & Wahlström, R. *Ympäristökasvatuksen menetelmäopas*. (Environmental educational methods). Jyväskylän yliopiston täydennyskoulutuskeskuksen tutkimuksia ja selvityksiä, 17, 1–9.
- KELLERT, S. R. 2005. *Building for Life: Designing and Understanding the Human-Nature Connection*. Washington, D.C.: Island Press.
- KOLB, D. A. 1999. *The Kolb Learning Style Inventory*, Version 3. Boston: Hay Group.
- KÄPYLÄ, M. 1995. Ympäristökasvatus koulun oppimis- ja tiedonkäsitteiden muuttamisen välineenä. (Environmental education and changes of learning and knowledge conceptions). In: Ojanen, S. – Rikkinen, H. (eds.): *Opettaja ympäristökasvattajana*, (Teacher as an environmental educator). Helsinki: WSOY. pp. 24–39.
- LAAKSOHARJU, T. – RAPPE, E. 2010. Children's Relationship to Plants among Primary School Children in Finland: Comparisons by Location and Gender. *HortTechnology*, 20 (4), 689–695.
- LINKOLA, P. 1990. *Johdatus 1990-luvun ajatteluun*. (Introduction to thinking on 1990s). Porvoo: WSOY.
- MERCHANT, C. 1992. *Radical Ecology. The search for a livable world*. New York: Routledge.
- MITTELSTAEDT, R. – SANKER, L. – VANDERVEER, B. 1999. Impact of a week-long experiential education program on environmental attitude and awareness. *Journal of Experiential Education*, 22 (3), 138–148.
- NATIONAL CORE CURRICULUM FOR BASIC EDUCATION. 2004. Retrieved November 24, 2013, from http://www.oph.fi/english/curricula_and_qualifications/basic_education.
- NICOL, R. – HIGGINS, P. – ROSS, H. – MANNION, G. 2010. *Outdoor education in Scotland: A Summary of recent research*. Retrieved November 24, 2013, from <http://www.snh.org.uk/pdfs/publications/education/ocreportwithendnotes.pdf>.
- NORTON, B. G. 1987. *Why preserve natural variety?* Princeton: Princeton University Press.
- NUNDY, S. 2001. *Raising achievement through the environment: The case for fieldwork and field centres*. Doncaster: National Association for Field Studies Officers.
- NYKÄNEN, R. – KINNUNEN, J. 1992. *Taivaan merkit – pienten lasten ympäristökasvatus*. (EE for children.) Helsinki: Mannerheimin lastensuojeluliitto.
- NÆSS, A. 2008. *Ecology of wisdom: writings by Arne Næss*. Berkeley: Counterpoint.
- OPETUSMINISTERIÖ. 2006. Kestävän kehityksen edistäminen koulutuksessa. Baltic 21E - ohjelman toimeenpano sekä kansallinen strategia YK:n kestävä kehitys edistävän koulutuksen vuosikymmentä (2005–2014) varten. (Ministry of Education. Sustainable development in education).
- OULUN NORMAALIKOULU. 2012. Oulun normaalikoulun perusasteen opetussuunnitelma. Oulun normaalikoulu. (Teacher training school of the University of Oulu. Curriculum for basic education.) Retrieved October 30, 2012, from <https://norssiportti oulu.fi/index.php?5069>
- PALMBERG, I. 1989. Lägerskolan i grundskolans biologi/geografiundervisning. Stoff och

- arbetssätt med tonvikt på lägersskolan i Äkäslöppö. *Rapporter från Pedagogiska Fakulteten*, 54–60. Åbo Akademi, Åbo.
- PALMBERG, I. – KURU, J. 1998. Outdoor activities as a source of environmental responsibility. In: Palmer, J. A. (ed.): *Environmental Education in the 21st century. Theory, practice, progress and promise*. London: Routledge. pp. 253–257.
- PALMER, J. A. 1998. *Environmental education in the 21st Century. Theory, practice, progress and promise*. London: Routledge.
- PICARD, D. – LEBAZ, S. 2010. Symbolic Use of Size and Color in Freehand Drawing of the Tree: Myth or Reality? *Journal of Personality Assessment*, 92 (2), 186–188. Retrieved October 22nd, 2012 from <http://dx.doi.org/10.1080/00223890903510464>.
- PIETARINEN, J. 1987. Ihmisen luontoa koskevat filosofiset perusasenteet. (Philosophical attitudes concerning nature). In: Aho, L. – Sivonen, S. (eds.): *Oikeutemme ympäristöön. Puheenvuoroja eri tieteenaloilta*, (Our rights concerning environment). Porvoo: WSOY. pp. 42–61.
- POIJÄRVI, V. 1989. *Biologian kenttätöitä ja laboroinnit*. (Field work and Laboratory work in Biology). Helsinki: Finn Lectura.
- SEPÄNMAA, Y. 1987. Ympäristön kauneus. (Beauty of environment). In: Aho, L. – Sivonen, S. (eds.): *Oikeutemme ympäristöön. Puheenvuoroja eri tieteenaloilta*, (Our rights concerning environment), pp. 169–187. Porvoo: WSOY.
- SINGER, P. 1993. *Practical Ethics*. Second Edition. Cambridge: Cambridge University Press.
- SYRJÄLÄ, L. – AHONEN, S. – SYRJÄLÄINEN, E. – SAARI, S. (1994). *Laadullisen tutkimuksen työtapoja*. (Qualitative research). Helsinki: Kirjayhtymä.
- UITTO, A. 2005a. Koulun ulkopuoliset oppimisympäristöt. (Outdoor education). In: Eloranta, V. – Jeronen, E. – Palmberg, I. (eds.): *Biologia eläväksi. Biologian didaktiikka*, (Education in Biology), Jyväskylä: PS-kustannus. pp. 194–198.
- UITTO, A. 2005b. Maasto-opetus ja kenttätöitä. (Field work). In: Eloranta, V. – Jeronen, E. – Palmberg, I. (eds.): *Biologia eläväksi. Biologian didaktiikka*, (Education in Biology), Jyväskylä: PS-kustannus. pp. 124–135.
- UNITED NATIONS GENERAL ASSEMBLY. 1987. A/43/427. Report of the World Commission on Environment and Development. Center for a World in Balance. Retrieved 31st July, 2012 from <http://worldinbalance.net/pdf/1987-brundtland.pdf>.
- THE FINNISH NATIONAL CORE CURRICULUM FOR BASIC EDUCATION. 2004. National Core Curriculum for Basic Education Intended for Pupils in compulsory Education. Finnish National Board of Education. Vammala: Vammalan kirjapaino.
- THE NATURE CONSERVANCY. 2011. Connecting America's youth to nature. Retrieved 24th November, 2013 from: <http://www.nature.org/newsfeatures/kids-in-nature/youth-and-nature-poll-results.pdf>
- VAN MATRE, S. 1998. *Earth Education. Maakasvatus... uusi alku*. Helsinki: Rakennusalan Kustantajat RAK, Kustantajat Sarmala.
- VILKKA, L. 1993. *Ympäristöetiikka. Vastuu luonnosta, eläimistä ja tulevista sukupolvista*. (Environmental ethics). Helsinki: Yliopistopaino.
- VON WRIGHT, G. H. 1988. *Humanismi elämänasenteena*. (Humanism as view of life). Helsinki: Otava.
- WOLFF, L-A. 2004. Ympäristökasvatus ja kestävä kehitys: 1960-luvulta nykypäivään. (Environmental education and Sustainable development education). In: Cantell, H. (ed.): *Ympäristökasvatuksen käsikirja* (Handbook for environmental education). Juva: WS Bookwell. pp. 18–29.