

# Emotional Nature

*- A learning experience to explore how materials relate to emotions -*



Master's Thesis  
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Image 1. Part of *Emotional Nature* toolkit.

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My sincerest gratitude,  
Sara Lucía Rueda Mejía  
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## *Abstract*

*Emotional Nature* is a hands-on learning experience and toolkit that connects different tangible and intangible tools for educators to visualise, grasp and engage in a dialogue with emotions in relation to materials. The *Emotional Nature* toolkit is also a temporary safe space for educators and children to motivate their understanding of emotions, as well as meaningful connections with nature. The learning is enhanced through a creative and fun process combining tools like value cards, storytelling, meditation, natural inks, and mainly wood-based biomaterials.

Having regular contact and meaningful connections with nature have several benefits for humans from playful learning to wellbeing, from bonding relations with other beings to inner self. This research is focused on the specific relationships between emotions and materials, and it is supported by a bigger academic context - The CHEMARTS strategy.

The research process is designed in response to the main findings from the initial exploratory phase of *Emotional Nature*. First, biomaterials as a key tool to feel nature, as well as express and materialise emotions; second, the difficulties in dealing with emotions in the classroom; and third, the reduced availability of safe and comfortable spaces to share and transform emotions in Finnish educational context.

This study is an explorative approach based on self-experimentation and participatory design research practices done mainly with teachers and field experts. The research design seeks to inspire educators to explore and grasp relationships between emotions and nature through the experimentation with biomaterials and diverse tools in Finnish School Context.

The main audience for *Emotional Nature* Learning Experience are educators of children between 10 and 13 years old. However, based on the co-creation sessions with different populations, such as parents and postgraduate students, the hands-on learning experience also proved to be effective for other age groups and settings.

**Keywords:** nature, emotions, materials, co-design, learning experience design, tools exploration, Finnish school context.

*Table of content*



## **1. Introduction | p. 8**

## **2. Background | p. 14**

Human and Nature: Increasing disconnection of children with nature  
Nature-deficit disorder and influences on emotions  
Nature and emotions: A sense of oneness  
Key terms definition  
Nature and materials: The phenomenon of biomaterials in CHEMARTS  
Self-experiments of feeling nature while touching biomaterials

## **3. The Research Context | p. 24**

The role of Finnish education in exploring relations between emotions and nature  
Co-design and experience design as a bridge for sustainable experiences

## **4. The Methodologies and Process | p. 32**

The research approach  
The methods  
Other considerations  
Limitations  
The process: The steps and 4 cycles

## **5. Outcome: The *Emotional Nature Experience* and Toolkit | p. 48**

Components of the toolkit  
Educators' guidelines  
The 4h steps description  
Experts appreciations

## **6. Discussion | p. 62**

Findings and interpretation  
Recommendations for further research  
Relevance of the research  
Reflections on journey  
Conclusion

## **7. Bibliography | p. 72**

References  
Images and figures  
Appendices



1. *Introduction*



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*“No one will protect what they don’t care about; and no one will care about what they have never experienced.”*

David Attenborough (as cited in Moss, 2012)

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The reduction of children's meaningful experiences with nature has inspired many researchers around the globe to study this increasing phenomenon. Charles and Louv (2009) define such occurrence as nature-deficit disorder: the lack of children relationships with the natural world and its implications in their well-being. In a bigger picture, children disconnection from nature has also been linked to several challenges in the planetary well-being, from conservation of wildlife to human physical, mental, and emotional health (Moss, 2012).

To the field that encloses this research, Creative Sustainability Master Programme, disconnection from nature also means disconnection from emotions. Recent sustainability theories that address emotions as a critical element in sustainability (Kim, 1999; Goodman, 2002; Senge, 2006) mention that the core of the significant sustainable challenges in the world is rooted in our behaviours, human-based actions, mostly build by our pre-established mental models as our perceptions, beliefs and emotions.

Then, we may ask: why specifically materials and emotions? This research aims to understand the meanings and relationship between materials and emotions while co-designing a suitable way - an experience for learning - to nurture children relationship with own and others' emotions, as well as nature. The starting point of the research (chapter 2) is mainly based on the phenomenon defined earlier: nature-deficit disorder (Charles and Louv, 2009) and a previous personal experience developed in CHEMARTS courses. Back then, I did some self-experiments focused on the exploration of different biomaterials as wood-based

celluloses and natural inks from berries. Such explorations led me into some crucial, empirical insights for this research. While handling biomaterials, I awoke repeatedly specific type of emotions and attitudes like joy, calm, and encouraging expressiveness. Then, I began questioning the real meaning and value of materials; I started to perceive how touching and crafting with biomaterials was at the same time, nurturing my relationship with nature.

In chapter 3: Research Context, is highlighted a study conducted by Eila Jeronen and Juha Jeronen (2012) in Finnish outdoor education. The study describes the importance of developing educational activities that relate to emotions and nature. Driven by those key observations, my passion, my prior self-experiments with biomaterials and my previous experience of co-creating learning experiences, the practical side of the research began. Such side is documented in chapter 4. These entry points inspired me because for a couple of years I have been wondering and learning how individual and collective perceptions and emotions can influence the actions of individuals and societies. In addition, during my master's studies, I have also been interested in exploring meaningful experiences with nature and its effects on my own emotions and beliefs.

At this point, I wondered how other individuals outside the university, in particular children in Urban Finnish Schools could access to this opportunity of having a meaningful experience with nature through the exploration of biomaterials while understanding emotions. In chapter 4, the research process is divided into 4 iterative cycles of Participatory Action Research (PAR). These cycles are mainly composed

of co-creation sessions and workshops with some of the stakeholders: experts, children, and educators.

For *Emotional Nature* research in practice materials - and especially biomaterials - plays a decisive role to create a meaningful experience that nurtures children's relationship with nature while understanding emotions. The intersection of biomaterials with other tangible and intangible tools is what makes the complex background of *Emotional Nature* experience into a simple experience understandable and joyful from children to adults. For instance, the following is a paragraph from the *Emotional Nature* experience that explains the intersections between biomaterials, and the materials and emotions metaphor:

“Participants sense with their hands a piece of wood and a plastic bottle in silence. While touching things, participants are also emotionally touched. After they share their experience while feeling the differences between the materials, they also talk about an emotional memory related to the materials they have in their hands. Then, the metaphor is explained. The metaphor focuses on making sense of the similarities between materials as wood and positive emotions, as well as plastic material with negative emotions.”

As a result of the workshops and sessions with the different stakeholders, a learning experience and a toolkit are designed. These are explained in chapter 5 and discussed in chapter 6. *The Emotional Nature* hands-on learning experience focuses on inspiring educators to enquire and grasp relations between emotions and materials by looking at materials and emotions as part of nature.



Image 2. Elements of the *Emotional Nature* toolkit

The toolkit serves educators as an ephemeral and temporary space by providing a booklet with the guidelines for implementing the experience with children indoors or outdoors. It also provides samples of the tools and biomaterials to develop the *Emotional Nature* experience or any that they would like to develop further with the related tools.

Overall, this thesis project aims to provide an empathic art-practice-based story with primary scientific evidence that provides insights and inspires educators in Finland to explore further possible relations between emotions and materials - originally from nature. Eventually, the experience nurtures empathy of both, educators' and children's, towards nature and other beings.

I thoroughly enjoy to deepening my understanding of the world we live in, and how younger generations express, relate and interact with their mental models and emotions in everyday life, and particularly with nature.



Image 3. *Emotional Nature* booklet and materials for educators

### Research question

Following the above introduction, the research question of this project is:

What can educators do with biomaterials and other tools in a classroom to nurture children's relationship with nature and emotional growth?

As a subsequent research question the project also aims to answer the following:

What role can design play in exploring the relations between emotions and nature in the Finnish educational context?

### Objectives

Thus, the research's main objectives are:

- Discover what educators need and set possible solutions to explore and share knowledge around relationships between emotions and nature.
- Co-design and test a learning experience with different stakeholders: educators and children.
- Understand the role of the designer in

co-designing learning experiences in Finnish educational context.

### Desired outcome

- To develop and test the design of a learning experience suitable for both, indoors and outdoors environments, that inspires educators to explore relations between emotions and nature, including guidelines for educators (i.e. description of a process).
- To provide an inspirational art-based story with primary scientific evidence as guidance to allow further insights for educators in the Finnish schools on the tools and combinations that enhance children's empathy towards their own emotions, other beings, and nature. The scientific evidence is based on the explorative and participatory approach.

### Key stakeholders: co-creators

The primary stakeholders, who also played the role of co-creators of the thesis project are educators of children between the ages of 10 to 13 years old, located in urban areas. Nevertheless, based on the co-design sessions with educators, children,

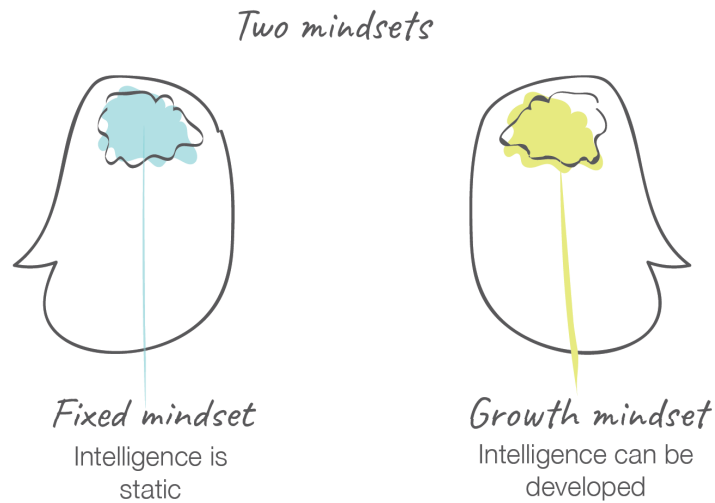


Figure 1. Two mindsets, Carol S. Dweck. Adapted from Holmes, N.

and experts in the field, all developed in the Finnish educational context, the hands-on learning experience also proved to be valid for other age groups.

According to The Mindset Theory established by professor Carol Dweck (2012), adults and children can develop their capacities at any age. This theory emphasises that what matters is if the individual believes that those capacities and intelligence are set - fixed mindset - or are changeable - growth mindset. For instance, a person with a growth mindset believes that they can improve their intelligence and achieve their goals through learning, feedback, and practice.

In this order, Dweck and a group of Finnish scholars (Dweck, 2012; Hakkarainen, Korhonen, Lonka, Lavonen, Seitamaa-Hakkarainen, Juuti & Salo, n.d.) mentioned the work should be focused on providing learning processes that motivate learners to improve their capacities through effort and practice as much as they can. In this case, co-designing with the different actors: experts, children, and educators can support the creation of learning experiences that incentivises participants to develop their

capacities through learning and practice.

Additionally, in the report *Natural Childhood* (2012, pp. 11), the Natural Health expert William Bird suggests that children can have difficulties to connect with nature in adulthood if they do not engage with nature before the age of 12. Moreover, children can also drastically decrease the resilience capacity that nature develops in human beings, especially in cases under a high level of stress.

In broader aspects of sustainability, children are also a key audience to promote various desirable, sustainable behaviours at home. For instance, in 1989, Jaime Lerner, the city mayor of Curitiba, Brazil, was able to encourage the participation of 90% of the city population in a new recycling programme (Adler, 2016). Lerner and his team led a campaign to foster a new culture of separation of materials at home through an educational programme with school-aged children and interactive actions related to the exchange of waste (Gratz, 2013).

A photograph of a field site. In the center, a clear plastic bag is filled with dried, yellowish-brown plant material, possibly grasses or reeds. To the right of the bag lies a piece of weathered, light-brown driftwood. Further to the right is a smaller, clear plastic bag containing several dark, smooth stones. The entire scene is set on a dark, textured rock surface covered with patches of green moss. The background is a blurred natural setting with more vegetation. A white rectangular box with a thin border is superimposed over the plant material in the bag, containing the text "2. Background".

2. Background

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*“People need to understand what they’re missing out on – something really fundamental, a connection with the rest of life.”*

Dr William Bird, Outdoor Nation (as cited in Moss, 2012, pp. 9)

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In the following chapter, I describe and discuss the most relevant topics and definitions to provide the theoretical framework. This chapter mentions what is useful for the research topic and sets the base for a common understanding of how this empirical case elucidates the broader issue: the increasing disconnection of children from nature in relation to emotions. Additionally, the chapter illustrates the role of handling materials, especially biomaterials, as part of a bigger academic context - CHEMARTS strategy.

### **Human and Nature: Increasing disconnection of children with nature**

There is growing public concern about reduced opportunities for children to spend time in the natural world. Previous research found that there is an increasing disconnection between children and nature. For instance, in the UK, children's engagement with nature has declined by around 90% (Gaster, 1991). The same report states that during the 1970s, 40% of the children were playing regularly in natural places. In 2009, it decreased to less than 10%. The nature writer Stephen Moss (2012, pp. 14) asserts that this reduced connection with nature is due to several reasons, in particular, the informal and formal education and activities at homes and schools are not enhancing children relationship with nature, which in turn reduce children's motivation for learning and being aware of the natural world.

Similarly, Sitra, Innoma, and the National Well-being Network published a report in Finland titled Well-being from Nature for Children and Young People (Polvinen, Pihlajamaa & Berg, 2012). According to Lea Konttinen

(2012) from Sitra, this research illustrates that going outdoors in nature enhances long-term youngster's mental and emotional well-being. For instance, exploring the wild world benefits children and youth to release stress, improve their mood and concentration, and increase their initiative and imagination. Konttinen also describes that "well-being can be promoted by attracting people to nature as well as by bringing nature to the built environment" (Konttinen, 2012).

### **Nature-deficit disorder and influences on emotions**

During the last decade, various studies were done by experts with different backgrounds as Monbiot (2012), and Charles and Louv (2009) have shown that a growing gap between children and nature can have negative impacts on health and well-being. This gap is an issue that Finnish teachers have also mentioned in the workshops developed for *Emotional Nature* research. In the detailed study done by Charles and Louv (2009), numerous evidences were collected from different areas around the world, particularly from northern countries, to describe the phenomenon of nature-deficit disorder: a term that highlights the relevant role of nature in children's lives, as well as the different effects of lacking nature experiences in their everyday life. Some of the samples that illustrate the existence of this phenomenon are the reduced amount of time in the lives of children to move and explore independently in the open air, including the spaces to walk or learn about nature. Another sample is the increasing number of children with overweight issues due in part to technology, and physical inactivity; and the reduction of exposure to sunlight and lack of vitamin D, which has





Image 4. Photo of nature in Seikkailupuisto Korkee, Helsinki

also implications in children's health and emotional well-being (Charles & Louv, 2009).

Another example gave by Layard and Dunn (2009) state that the lack of freedom in children to explore the natural world has implications in a reduction of mental and emotional well-being. According to the authors,

“physical and mental health problems are the most obvious consequences of a lack of engagement with nature... our children are suffering an ‘epidemic of mental illness’ with significant increases between 1974 and 1999 in the number of children suffering from conduct, behavioural and emotional problems”. Besides, Stephen Moss (2012) mentions that “one in ten children aged between five and 16 have a clinically diagnosed mental health disorder, one in 12 adolescents are self-harming, and about 35,000 children in England are being prescribed antidepressants.”

Charles and Louv (2009) also mention that the phenomenon of nature-deficit disorder may in part be related to the increasing amount of families moving to urban areas and living more sedentary lifestyles, far from the natural world and the possibility to have meaningful experiences with organic life processes. In this case, *Emotional Nature Learning Experience* is giving the opportunity to educators and children to learn and interact closely with natural processes, such as using berries and leaves to understand how to extract inks from plants.

In a bigger picture, the lack of engagement with nature and its implications in emotions have also been related to the core of most of the sustainability challenges that the world faces today. Studies that recognise emotions as relevant in sustainability (Kim, 1999; Goodman, 2002; Senge, 2006) highlight that human perceptions, emotions and beliefs are the backgrounds of the human actions that are provoking the critical sustainability issues like pollution and resources depletion.

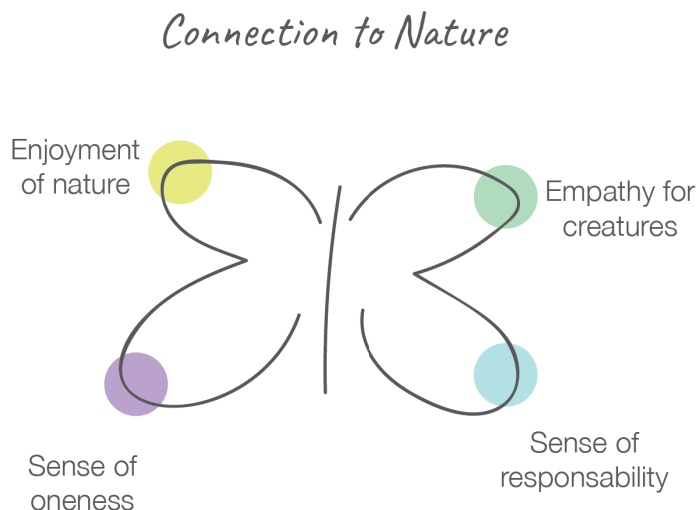


Figure 2. What is Connection to Nature. Adapted from the RSPB

It has demonstrated that emotions are among the main drivers in human cognitive and decision-making processes such as human consumption choices and habits (Lerner, 2014; Rezvani, 2017). This problem can be illustrated by the disconnection that individuals have from materials as professor Pirjo Kääriäinen (2018) from CHEMARTS has mentioned in couple of discussions “the user is still far from where things come from, the origin of the materials - natural sources, the cycle of production and exactly where things are going.” The above example is a shared perspective on looking into things and their materials as separate resources with no link to their original source.

Studies in Finland and the UK, performed by The University of Helsinki (2017) and The Royal Society for the Protection of Birds (RSPB) (2013) evidence that it is beneficial for children to strengthen their relationship with nature to improve their physical and mental well-being and empathy towards other beings. For instance, the research made by

University of Essex together with the RSPB (2013) defines the connection with nature as: “enjoyment of nature; having empathy for creatures; having a sense of oneness, and having a sense of responsibility for the environment.”

### **Nature and emotions: A sense of oneness**

From different angles, researchers have been investigating the interrelations between human and nature (Coob, 1977; Gibson, 1986; Rolston, 1986; Bennett, 2010). For this research, I would like to focus on the particular understanding of the sense of oneness, feeling one with nature - Planet Earth, as well as the meaning of materials, Just as the psychologist James Gibson (1986) mentions in his theory of affordance:

“This is not a new environment—an artificial environment distinct from the natural environment—but the same old

environment modified by man. It is a mistake to separate the natural from the artificial as if there were two environments; artifacts have to be manufactured from natural substances. It is also a mistake to separate the cultural environment from the natural environment, as if there were a world of mental products distinct from the world of material products. There is only one world, however diverse, and all animals live in it, although we human animals have altered it to suit ourselves.”

Besides the different environmental divisions mentioned earlier that tend to fade the feeling of belonging and interconnectedness between the human animal and the rest of the world, George Monbiot (2018), a naturalist expert, also argues that this division is reinforced through other phenomena, such as giving a numeric value to nature, as well as the power of words in human perceptions. For example, he mentions that words like “environment”, “protected zones” and “natural capital” are misleading people’s emotions and actions towards nature. Instead, he suggests using words like “living planet” for “environment.”

### Key terms definition

The main concepts for this research are emotions and nature. These key terms are defined below.

#### Emotions

Emotions are continually guiding human behaviours (Lerner, 2014). As Heini Saarimäki (2018) mentioned, emotions are closely related to different human activities as a basic need of protection of our body and mind, social interaction, and many other more complex somatic and neural functions in the cognitive and decision-making

processes.

Although, emotions are part of the everyday activities of individuals as learning practices, during the discussions with the different educators that participated in the research, most of them will agree that emotions is a topic they will try to avoid in the classroom settings since they lack the understanding and clear ways on how to approach it with the students.

Moreover, emotions can also affect a human’s physical and mental health directly (Lerner, 2014). Mikko Sams (2018), Professor in Cognitive Neurosciences at Aalto University, illustrates the relations between human emotions and nature by mentioning the relevance of the appearance of the sun to feel happy and energetic. In particular, the cultural shock of international and in some cases, even Finnish students in winter. As mentioned by the professor, the sun is necessary to produce certain types of chemicals in the human body that foster the feeling of happiness or human capacity to work for longer periods of time a day. Humans are also nature beings that need to understand how nature affects us in everyday life; for example, some types of bears hibernate in the coldest months, plants and trees lose their leaves: they are not the same as in summer. We also need to understand and reconnect with nature in that sense (Sams, 2018).

#### Nature

Before we continue using the term nature in this research, I would like to discuss the complexity of the word and introduce the way it is used in this master’s thesis.

The concept of nature can be as broad as



Image 5. Wood and plastic materials, elements of the *Emotional Nature* toolkit.

to refer to everything existing in the planet: living and non-living beings and objects, the built environment, the individual itself, as well as the interactions/relations between the different “things”. It is a concept that has been studied across diverse contexts and disciplines for centuries. For example, the Philosopher Debora Rose (2013, pp. 94) has evidenced that for the modern human, there is a dualism or “hyperseparation” between nature and culture that drives mostly western society nowadays, where nature is seen as one thing and human, even the built environment, as an another one.

The meaning of nature varies from person to person, from culture to culture, as well as from situation to situation. For instance, during the discussions with the educators that I had during this research project, nature could mean a walk in the forest or a relaxing walk on the streets of the city, depending on who you ask. Consequently, this led me to decide not to provide an exact definition of nature during the practical work with educators and children.

For this research, the term nature is used based on the studied key stakeholders and context: children and educators of Finnish schools located in or near urban centres. The local context is essential in how concepts of nature are understood. It has been considered that Finnish people have a strong relationship with nature and especially

with the forest. One example among many is the article by the children’s book author Linda Liukas (2018), in which she highlights the relevance of forest as a common good for Finnish people, also known as everyman’s right: an opportunity and freedom for all to “roam, wander, collect berries, and get lost in the wilderness”. Nevertheless, these meaningful connections with nature have reduced. Charles Louv (2008), recognised as the founder of the term nature-deficit disorder, also commented that nowadays, this freedom for children to enjoy natural play is disappearing, and children experience of nature is changing radically. For instance, “Today, kids are aware of the global threats to the environment—but their physical contact, their intimacy with nature, is fading.” They are spending their free time more and more in artefacts like instant messaging and Nintendo (Louv, 2008).

In the context of this research, it is crucial to emphasise humans and materials as part of nature. That, to first acknowledge existing divisions with nature, and next, to embrace and to bring back the connection with nature. For instance, one of the fragmented relationships that are highlighted in *Emotional Nature* experience is the one between plastic and its original source. Even though plastic is considered a synthetic material, it is still a material that comes from prehistoric plants and animals - fossils -. However, it is a material that takes more time for nature



Image 6. Natural Fantasy Project at CHEMARTS Summer School 2017: test samples with biomaterials.

to develop and process at the end of its life cycle.

In addition, some of the other inanimate nature used in this research are renewal materials as colour inks from berries and cellulose-based glues from wood. For this type of materials, it is easier to recognise its link with nature thanks to the organic qualities of the elements.

### **Nature and materials: The phenomenon of biomaterials in CHEMARTS**

Materials, and particularly biomaterials can be seen as a connecting medium between human and nature in the context of CHEMARTS courses at Aalto University, primarily, by having the opportunity to interact with the nature of the materials when using our hands. The above premise is based on my personal experience and interpretations of the observed phenomenon.

Primarily, biomaterials are a term used in the medical context for the type of materials that interact with living cells. Nevertheless, biomaterials in CHEMARTS (Vuorinen, 2018) are considered as materials that are renewable and easily degradable by organisms; they originate from sustainable source of biomass, e.g. wood-based cellulose materials, nanocellulose, carbon fibres from lignin, biochemicals, paper pulp, and natural inks like paprika for red/orange pigments or blueberries for purple colour.

One of the most well-known biomaterials in Finland is wood. Currently, wood-derivative materials are an opportunity to replace fossil-based materials like plastic, or cotton, or metal. This approach to wood-based biomaterials, especially cellulose-based, is one of the strategic points defined by Sitra for the vision of Finland and the future of the planet in the book *Lost in the Wood(s)* (Kääriäinen & Tervinen, 2017), as a “society built on organic materials.” Moreover, cellulose-based materials also project Finland as a leading country in sustainable



Image 7. Natural Fantasy Project at CHEMARTS Summer School 2017: samples with biomaterials.

well-being.

In CHEMARTS some of the latest explorations have been in the areas of wood-based cosmetics, interior design, as well as textiles. In the global scale, biomaterials and their possibilities for future applications can also be found in the development of new interactions and integrations between the materials and forms through new technological processes. Both, biomaterials and new technological processes, can be focused to reinforce the capabilities and functions of the human body, improve health conditions, and even create a new type of relations between products/buildings and their existing environment (Oxman, 2013).

CHEMARTS is a long-term strategic collaboration project between the School of Chemical Engineering (CHEM) and the School of Arts, Design and Architecture at Aalto University. It has its beginnings in December 2011 (Kääriäinen & Tervinen, 2017), under a common goal of exploring the intersections between material research, chemistry and design, especially looking at possible initiatives on wood-based biomaterials that can be designed and developed for “more sustainable ways of being, creating and designing” (Kääriäinen & Tervinen, 2017). CHEMARTS strategy is founded and led by professors Pirjo Kääriäinen from the School of Arts, Design and Architecture, and

professor Tapani Vuorinen from the School of Chemical Engineering.

“In Nature tiny seeds grow into plants, and in favourable conditions the plants flourish and create a durable ecosystem. That has been happening within CHEMARTS.”  
(Kääriäinen & Tervinen, 2017)

At the moment, CHEMARTS has two main courses: Design meets Biomaterials and CHEMARTS Summer School. During the first course - Design meets Biomaterials (About Teaching and learning, n.d.), students get to experiment and familiarise with the characteristics, properties and processes of the biomaterials, as well as designing concepts and prototypes. During CHEMARTS Summer School (About Teaching and learning, n.d.), participants explore more in-depth materials of their interest and develop a project/product based on biomaterials.

### **Self-experiments of feeling nature while touching biomaterials**

Right from the first course, I started the exploration of biomaterials such as different types of wood-based cellulose. During the summer school, as a part of my project Natural Fantasy - I further explored biomaterials as natural inks and more



Image 8. Participant working with biomaterials.

wood-derived materials (Rueda Mejia, 2017). In both courses, some key insights I got while manipulating biomaterials were the enhanced sense of touch, the type of emotions that can be aroused while working with biomaterials, and the increasing sense of closeness and oneness with nature.

This sense of oneness was enhanced day by day. While making various self-experiments at CHEMARTS Lab, I began to understand the closeness of the human relationship with nature. I started to feel that my perception of materials was widening. The more I interacted with berries to get their colours and with wood celluloses to give cohesion to structures, the more I understood materials further than individual sources. An invisible relation between materials, nature and I began to disclose. While having this interactive and joyful experience of sensing the materials with my nose, eyes, and particularly hands, I also thought that this experience could be fun for other audiences like children. Therefore, and after some theoretical review and discussions with experts, children became the target group for this research.

In CHEMARTS courses, the sense of touch seems to be, in various cases, the medium to create a constant feeling of joy during the creative process. For instance, based on my classmates and personal experiences,

another notable characteristic of grasping biomaterials as natural inks and wood celluloses is their versatility. Such versatility provides the possibility to play and embrace emotions, like curiosity and joy, during the exploration process: it gives the opportunity to use our imagination. Those emotions, mainly aroused while using the tactile exploration of biomaterials, also open a space for students to exercise their expression and creative skills through giving greater freedom to their imagination and fantasy (Antolinez, 2016).

“The act of making something with one's hands in a material is a way of participating in the world. It is a conversation, interaction and negotiation between the person and her environment. By manipulating material, we affect the world and are simultaneously affected.” (Groth, 2017, pp. 14 )

Moreover, and regarding the subtopics of the research, different studies in which Professor David Whitebread has contributed (2010, 2012, 2017), state that experiencing joy in learning processes enhance different skills such as emotional self-regulation. For instance, in one of the studies is highlighted that playfulness is strongly related to the capacity of humans to cope with change (Whitebread, Basilio, Kuvalja & Verma, 2012). In addition, joy has been linked to enhanced “memory, attention, mental shifting, creativity, and motivation” (Liu et al., 2017). Therefore, there is another potential link to explore between nature and human emotions related to the sense of touching biomaterials and the feeling of joy for emotional regulation.

Consequently, one of the objectives of this research is to explore materials, primarily biomaterials in interaction with hands, as one of the main creative tools in the design of a hands-on learning experience to inspire educators of older children to disclose, inquire and grasp relationships between human emotions and nature.



*3. The research context*



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*“Increasing contact with nature enables them to develop the vital connections between the outside world and what educationalists call children’s ‘interior, hidden, affective world.’”*

Robin Moore (as cited in Charles & Louv, 2009, pp. 9)

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This chapter describes the Finnish educational context around the previous topics. In addition, it also explores the idea of the role of Design as a bridge between different knowledge, stakeholders, and tools to create a human appealing and holistic experience for this master's thesis project, as well as in response to my professional background as a designer majored in Creative Sustainability.

### **The role of Finnish education in exploring relations between emotions and nature**

Finland is world-known as a leading country in Education, as well as for its constant innovation in the sector. One of the latest multidisciplinary co-creations in the Finnish education system is Phenomenon-Based Learning (PhenoBL). PhenoBL is a disruptive pedagogy that removes the traditional way of learning by subjects and focuses on learning and teaching by topics. It promotes 3 main sets of skills: "information and communication; critical thinking and creative problem solving; and interpersonal and self-directional" (Mattila & Silander, 2015), which are considered the 21st-century learning skills by this method.

Recently, Sitra announced another innovation in the educational system titled "Education for a changing world" (n.d.). Such innovation mainly focuses on Sustainability, well-being and education for a globalised society and a changing planet. However, no results are available yet, since it is still being tested and the report will be published later this year.

The Scandinavian countries, and especially Finland national culture, are well-known

for its close relationship to nature. Results from the literature review show that Finnish education - and Finnish culture in general - is on the top list of countries that promote nature and environmental education, as well as empathic social behaviours towards nature from early stages in life (Jeronen & Jeronen, 2012). Moreover, Finnish education has a long tradition in promoting such education and behaviours. In early times, it was not uncommon for Finns to spend their entire school day outdoors (Wood, 2017). However, and despite all the efforts, there is an increasing trend in Finnish younger generations to spend more time in digital devices than outdoors (Jeronen & Jeronen, 2012).

"If I think about the influence of living close to nature in my actual life, it is a lot. I had the opportunity to live in the middle of nature and the freedom to explore it at any time, even in school days. When there was good weather, we will go outside the classroom and play in nature. While, during the raining time, we will go back to the classrooms and continue learning math or any other indoors subjects. This close relationship with nature deeply shaped my personality, as well as my steps in professional development." (Kääriäinen, 2018)

Some of the Finnish key efforts in outdoor education are the National Strategy for Environmental Education (1991), the strategy for Sustainable Development Education (Loukola, Isoaho & Lindström, 2002), and the traditional Forest Schools (Svens & Juvonen, 2016). For instance, these schools will teach children from a very early age about the different materials and the importance of recycling to take care of the forest.



Image 9. Biomaterials used in *Emotional Nature* Learning Experience

The diversity in topics and approaches to the nature-related activities are also another advantage of the Finnish focus on Environmental Education. For instance, one of the relevant topics instructed in teachers' training at the University of Oulu is the relationships between human and nature (Jeronen & Jeronen, 2012).

In addition, Finnish outdoors education is not only teaching about nature but also developing different skills, such as sciences and values (Jeronen & Jeronen, 2012). However, Mabie & Baker (1994) argue that, in the educational context, there is a lack of learning experiences in focused on emotions in relation to nature. Experiences centred on emotions and nature allow the students to have thoughtful discussions around the topics, to learn about Sensitivity Education, and to develop emotional and social skills (Jeronen & Jeronen, 2012).

Regarding the *Emotional Nature* Thesis Project, even though there are relevant

educational developments in the areas of emotions and outdoors activities separately, it has been challenging to find learning activities in the Finnish school context that relate both of the subjects: human emotions and nature. Further, it has been even more challenging to find indoors activities that link both of the topics. Here, I saw an opportunity for the *Emotional Nature* project to contribute to the creation of knowledge in practice.

### **Co-design and experience design as a bridge for sustainable experiences**

In this master's thesis, I explored the idea of looking at design as a bridge - and specifically the field of co-design - by bringing together different areas of knowledge, experts, stakeholders, and tools to create a holistic learning experience. Such experience pursues that aims for the benefit of three core sustainability aspects: "environmental, social, and economical" (Creative Sustainability Master's Degree Programme, n.d.). It also attempts to understand further materials and

the meaning(s) of these materials.

The process was designed to be co-created with and by school teachers, validated with students, having co-creation sessions with field experts when needed. The co-design process has shown to create mutual learning for the different participants by a systematic and collective “reflection-in-action” (Robertson & Simonsen, 2012), which is at the same time hands-on and active. However, co-design is a controversial term due to the extensive range of methods that can be considered as part of this field. For this reason, the INUSE research group at Aalto University developed an overview of the methods and grouping them by families. This research is better related to Co-Creative Design subdivision. INUSE Research Group (2015) defines Co-Creative Design as a process co-created between users and designers. The designer shares the first prototype with the audience and they built on it.

Given the objective of this thesis (design of nature-based learning experience that is suitable for both indoors and outdoors), another crucial field for this work is Experience Design (ED). Its focus is on the totality of the audience experience, being careful with the design details at all levels and bringing together ideas from the different disciplines that can be related to the experience. Its objective is to create “cognitively and emotionally engaging, compelling, memorable, joyful, functional, and purposeful experiences” (McLellan, 2000).

ED is considered an ancient human practice with the design of ceremonies and architecture (McLellan, 2000). Nowadays,



Image 10. Educator working with biomaterials during *Emotional Nature Experience*

it has broadened to other fields, such as the design of environmental experiences that focus on physical and psychological activation; these experiences bring together experience design and environmental psychology in the urban landscape and adapt them to different needs of different stakeholders (Ma, 2017).

There are several tools and frameworks to proceed in the creative process in the ED field. Based on my previous works and expertise on ED, I deem this method a flexible and versatile way of proceeding because it recognises the central topic from a systematic approach, mapping and understanding the possible relations between the different disciplines involved, while taking care of every detail. Figure 3 shows an example of a framework of the disciplines of ED made by Envis Precisely, a European leading company in ED (2013).

Sometimes ED can be confused with other Design disciplines as Service Design, Social

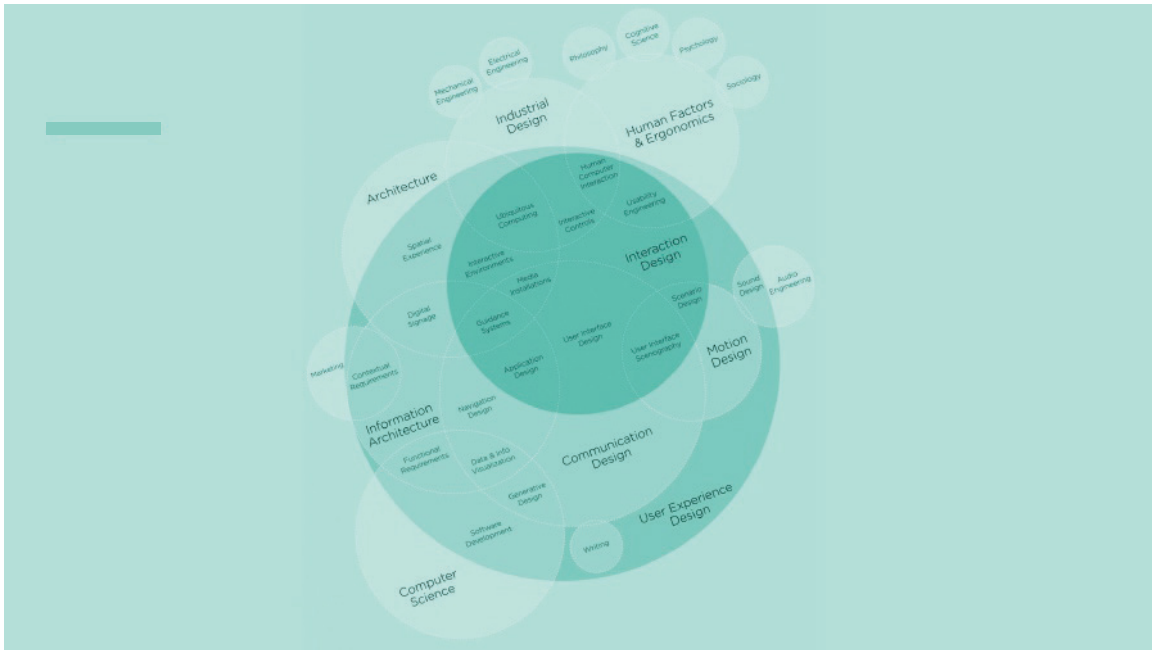


Figure 3. Disciplines of Experience Design original by Dan Saffer. Redesigned by Tiago Varandas

Innovation Design, Human Centered Design (HCD), User Experience Design or Interaction Design. Nevertheless, ED is characterised by its complexity and flexibility. These features allow the combination of an infinite number of tools and fields of knowledge to create an integral experience. It acknowledges the tangible and intangible aspects of the designed piece while establishing an emotional connection with the audience (Pullman & Gross, 2004).

An example of this is represented by how my personal experience with biomaterials in CHEMARTS led me to conceive the *Emotional Nature* project. Based on my curiosity feeling around the premise of having the possibility “to grow my things”, I began my journey experience of self-disclosing the sense of oneness with nature, with specific attention to the relations between emotions and nature in the CHEMARTS courses.

ED is one of the most dynamic disciplines within Design. It is an ancient practice,

and still, it is continuously evolving. As Richard Grefé, the executive director of the Professional Association for Design (AIGA), mentioned, there are 3 main aspects to carefully take into account when it comes to design experiences: form, content and context.

Since *Emotional Nature* research focuses on ED, still with particular emphasis on education, I also explored the subcategory of Learning Experience Design (Leinonen, 2010; Niels Floor, 2015). Learning Experiences for learning is a human-centred process concentrated on creating experiences that are goal-oriented, allowing the audience to maximise the learning potential. In this regard, researcher Taneli Tuovinen (2018) has spoken about the aspects of learning experiences at Aalto Experience Platform. He has mentioned that the experience results depend on the designer’s interpretation of the collected information. Those interpretations are mostly ideological and also have ethical concerns:

“A learning experience is this kind of strange experience or everyday experiences. ...I can not decide for myself when I will learn something, and you can not make me learn if I don't want to. It requires time and interaction and something else than yourself.” (Tuovinen, 2018)

In addition, professor Mikko Sams (2017) also describes experiences as emotional feelings. He mentions that in order to create a more holistic approach, and to further understand the practical qualities in the design of experience, it is crucial to include neurological, as well as psychological aspects.

Figure 4 is my interpretation of the different disciplines that ED glues for the specific case of the *Emotional Nature* research project. It recognises that even though ED and Learning Experience Design are the core of this research, there is a bigger field that encloses everything: nature.

In my perspective, the *Emotional Nature* Learning Experience supported by CHEMARTS contributes to the education system in Finland by creating meaningful connections between humans and nature, by bringing participants closer to the natural source of the materials, while learning about emotions. As professor Virpi Roto (2018) mentions in a video, the goal of the design of experience should be centred on making life more meaningful.

In this order, for *Emotional Nature* project, the use of tangible and intangible tools was essential to create a meaningful learning experience. One of those selected tools

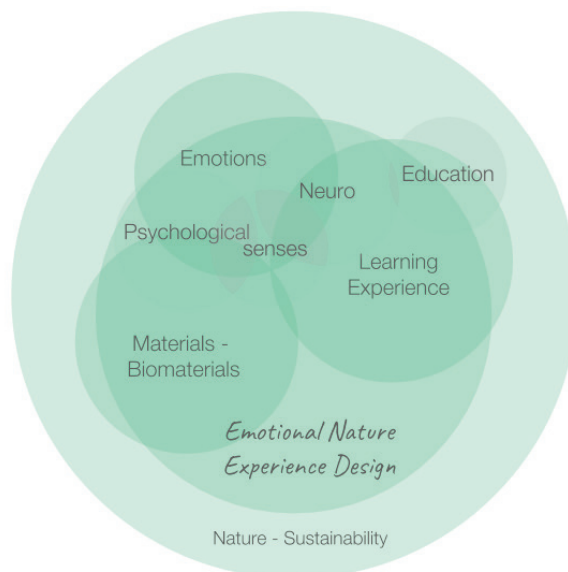


Figure 4. The core disciplines of *Emotional Nature* Experience

is metaphors. In the study *Design through Metaphors*, Sun Bae (2012) explains that, in the field of design, metaphors are useful to understand complex concepts and rare relations. In the *Emotional Nature* case, metaphors are being used to explain the relationships between materials and emotions to participants. The created metaphor explains the similarities between materials like wood and positive emotions, as well as plastic materials with negative emotions. While the participants sense a piece of wood and a plastic bottle with their hands, they discuss the differences between the materials and they also talk about an emotional memory concerning the materials. While touching the objects, the participants are even touched emotionally by sensing an internal emotion. The following is a fragment of a constructed metaphor for *Emotional Nature* Learning Experience:

“In the case of the materials, both of them come from the same place - nature-planet (wood from trees and most of daily

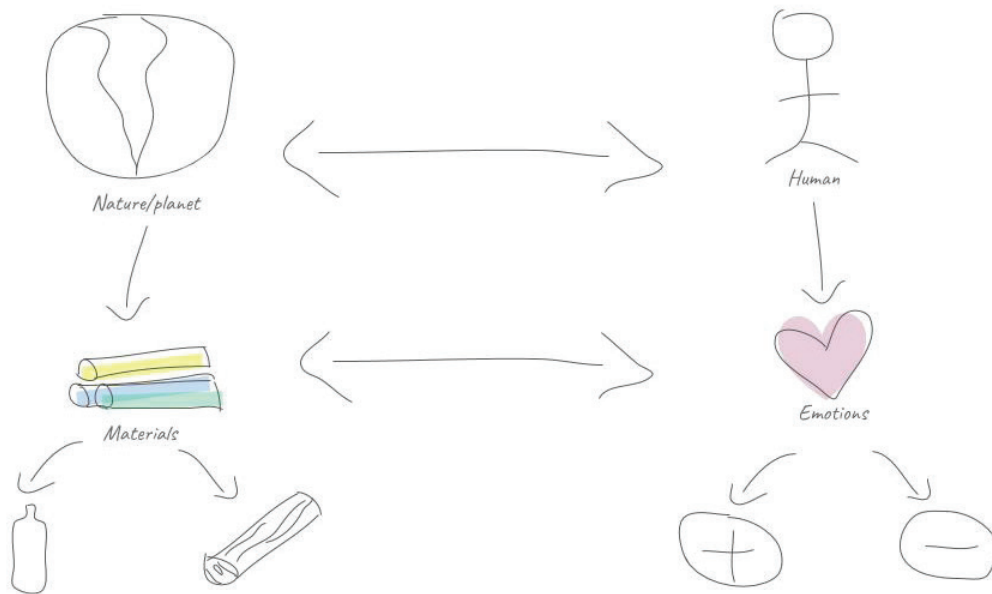


Figure 5. Metaphor relations between materials and emotions for *Emotional Nature Experience*

use plastics from fossils underground) still, they need different processes to transform them and give a new use/value to the material. And it does not mean that any of them is good or bad; they are just different and need different ways to deal.

We may all share that this piece of wood can be put back directly in nature and it will easily transform - degrade - and become part of it. While, for most of the plastics, we need to take time and resources to process it and give different use as recycling.

A similar situation happens with our positive and negative emotions. As Plastic and wood materials come from nature/planet, positive and negative emotions come from the human body. Still, they need different processes and times to transform them. Positive emotions are easy to process like wood in nature. Once we feel them, they expand in our body, and we feel balanced and happy after a

short time. While negative emotions need more time to be understood, as plastic, negative emotions have a more careful process in order to transform them, we need first to understand them and see what we can do with them, so we do not pile them up and create a mountain of plastic or negative emotions in the forest or inside ourselves." (Notes from *Emotional Nature Experience*).

Some of the selected methods for the design of the experience were Participatory Action Research (PAR), and interviews and workshops with multiple stakeholders and experts. The next chapter describes the selected approach and methods to design the *Emotional Nature Learning Experience*.

A high-angle photograph of two children kneeling in a snowy outdoor setting. The child in the foreground, with blonde hair, is wearing a dark grey quilted jacket and blue jeans. They are holding a clear plastic container filled with blackberries. The child in the background is wearing a dark jacket and a bright orange hat with yellow polka dots. They are holding a glass jar of yellow jam. The ground is covered in snow, and a wooden fence is visible in the background. A white text box with a thin border is overlaid on the image, containing the text '4. The methodologies & Process'.

*4. The methodologies & Process*





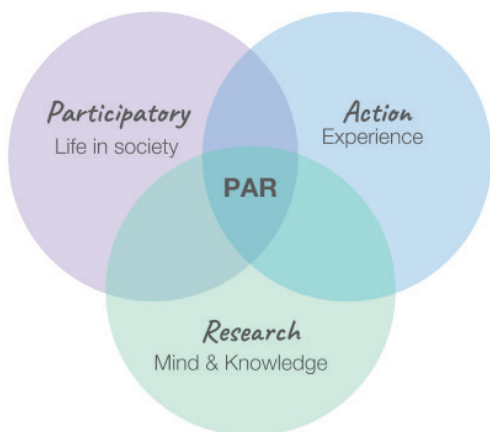


Figure 7. Three pillars of Participatory Action Research - PAR



\* All the steps had a co-creation component using different methods such as co-creation sessions with experts, open discussions between participants, etc.

Figure 8. Graphics of the 4 PAR steps for the *Emotional Nature* research project

This chapter describes the research process for the *Emotional Nature* Master's Thesis project. All the components of the process are detailed, including the selected research approach and methods that were implemented in practice. The process begins with the bases collected in the background and the research context (chapters 2 and 3), and continues with the steps and cycles of the Participatory Action Research approach (PAR), primarily presented in PAR table (p.40-47).

### The research approach

The PAR approach focuses on creating knowledge (research), while involving different actors in a democratic way (participation), and engaging with experience and history (action) (Reason & Bradbury, 2008). In short, PAR is action integrated with research in a continuous reflection that aims for the empowerment of the actors. Moreover, PAR is based on various perspectives rather than a single one (Baum, 2006).

Primarily, the PAR approach was selected because it involves the different stakeholders in the research, under a co-creation process. PAR concentrates on obtaining constant feedback from the different parts involved. It aims for change and creation of knowledge through cycles, as well as for positive use of the available resources through making cost-effective prototyping.

Usually, PAR is an iterative process that follows 4 main stages, in which one step feeds into the next to create consciousness and social change (Kelly, 2005). The stages are:

**Plan:** Clarify the purpose of the research, identifying and involving stakeholders, defining the steps to follow.

**Act:** Implement the previously identified and agreed steps.

**Collect** (Drama, n.d.): "Collect data and determine if the purpose has been met."

**Reflect:** study the data, discuss the finding and recognise to what extent the action has assisted the accomplishment of the research purpose. For this research, I added another

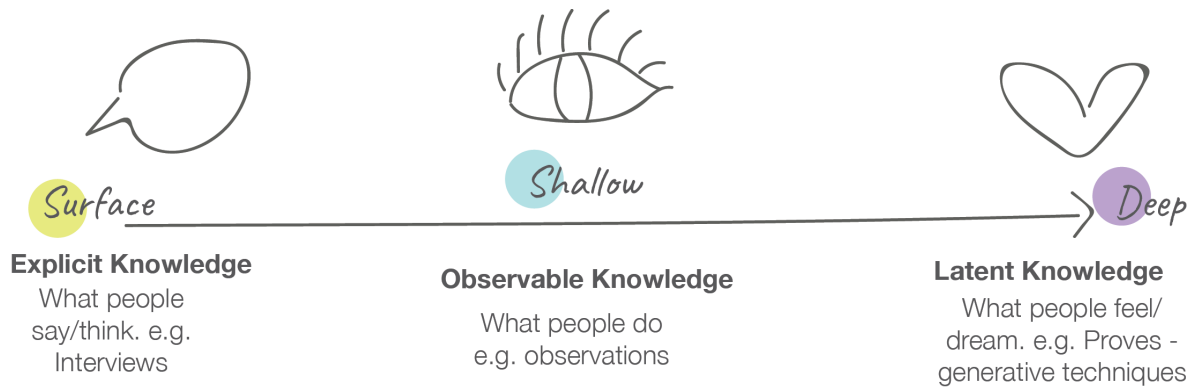


Figure 9. My interpretation of Proves: users understanding levels.

step, which I called "step 0: Starting Point". This extra step is essential since Emotional Nature research is based on previous work.

## The methods

The following paragraphs describe fundamental methods that were selected for understanding the context and collecting the data during the steps and cycles. Also, I classified the methods following the levels defined by Probes techniques. Probes are generative techniques for gaining insights and mindsets (Mattelmäki, 2006). In my understanding, there are 3 primary levels for identifying needs of users: Surface - explicit knowledge, Shallow - observable knowledge and Deep - latent knowledge (Esser, n.d.).

### 1. Surface (explicit knowledge)

**Questionnaires:** I used the same questionnaire in the different workshops as a tool for co-creating and obtaining feedback to, eventually, improve *Emotional Nature* as a research project. Also, surveys were useful to compare and assess the development

of the experience over time (Haddon, n.d.). I formulated the questions using Likert Scale parameters, which is a standard psychometric approach with 5 or 7 points in the scale (Li, 2013).

### 2. Shallow (observable knowledge)

**Interviews and co-creation sessions with experts:** I conducted 11 interviews and co-creation sessions with experts composed of open-ended questions and dialogues. Those encounters with experts were vital for developing the project in a feasible direction.

**Workshop and observations:** the primary goal of the 6 workshops was to prototype and improve the learning experience. This experience is composed of the exploration of intangible and tangible tools like biomaterials. During the workshop development, I observed the participants' expressions and their interactions with materials and with other participants. The data analysis is performed by drawing a conclusion. I reported the findings in written reports, photographs and video recordings (when feasible).

**Multistakeholder dialogues** (Phillips, 2011): The dialogues were mainly done at the end of the workshop within the different participants. This method supports the process of creating meaning because of its multidimensional, dynamic, and context-dependent characteristics. Later, I summarised the main discussed points, and they are reported by photographs, audio recordings (whenever participants give their consent), and verbal transcription of the main points of the dialogue.

### 3. Deep (latent knowledge)

**Generative techniques:** With generative techniques like context mapping, I was able to have a deeper understanding of people's knowledge, feelings, and dreams through the ideas they generate while respecting their privacy (Esser, n.d.). They allowed me finding patterns, clusters, and stand-outs. Additionally to the generative techniques, I used intuition as a tool to obtain this tacit knowledge and make decisions. For example, the researcher Olli Hyppänen (2013) mentions that during a creative process, intuition is often used during decision-making processes.

### Other considerations

Privacy is a high concern. Although some research laboratories were interested to collaborate in the project actively, it is essential to consider the ethical concerns as the General Data Protection Regulation (Krzysztofek, 2019), the use of the video recording and photographs of the children for future pedagogical and promotional material of the thesis project (Rutanen, de Souza Amorim, Marwick & White, 2018). This ethical concern is solved by providing to

the participants a confidentiality agreement (see appendix 1) and for children a parental consent agreement.

### Limitations

There are different types of limitations that I confronted during the development of the project. Some of them are:

The language barrier posed a limitation when creating a direct dialogue with the children and with some of the parents during the first prototype of the experience. In addition, it was also hard to find academic information that relates to the topics of nature and emotions in the Finnish context in English. I could hypothesise that there may be more information provided only in Finnish.

The cultural differences to understand the intrinsic meanings of words like collaboration. For instance, it took me a couple of months to fathom how collaborations between different parties work in Finland. I noticed these collaborations have significant differences with the Colombian culture.

Time and expertise are always limiting factors, and they were also the case for this master's thesis project. With more time, there are more possibilities to investigate all the topics presented in the thesis framework in major depth, even to include other relevant subjects. Also, crucial areas for this research such as emotions, cognitive sciences, and education are not part of my professional background.

Another practical limitation is the physical space where the workshops were developed. Most of the participants suggested a different place than a laboratory setting. Particularly,

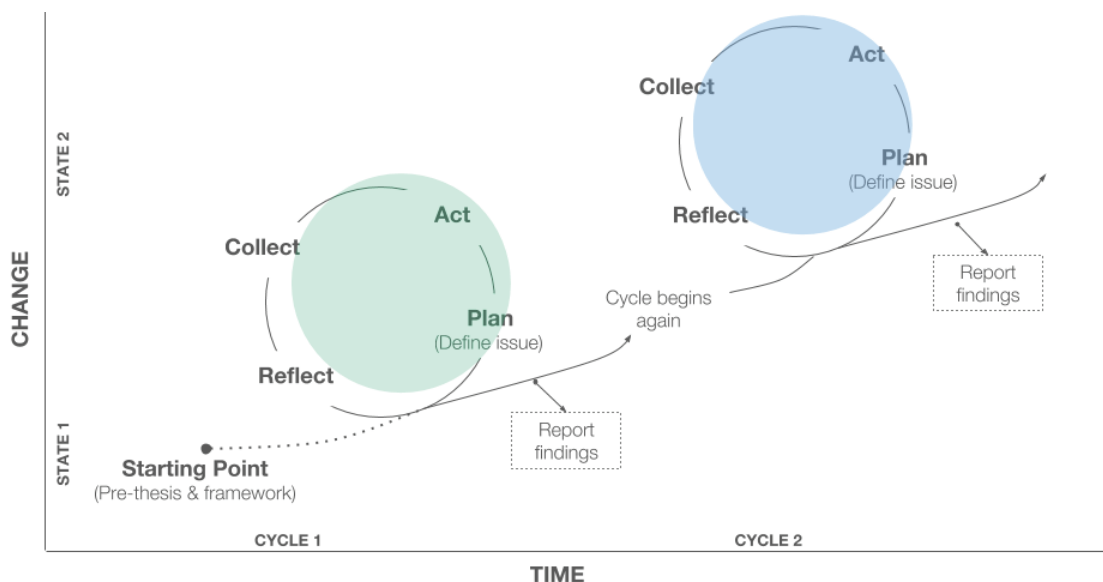


Figure 10. Graphics of the process for the *Emotional Nature* research project

they suggested a warmer space with more comfortable seats.

### The process: The steps and 4 cycles

The process begins with the starting point based on literature review, self-explorations with biomaterials and initial design of the learning experience. After, the research process continued with 4 cycles of the PAR approach. These cycles are presented in chart 1. All the cycles share the same general objective and assessment criteria. At the same time, each cycle is oriented in specific needs in time. Since all the goals were achieved during the development of cycle 4, no additional cycles were needed. Figure 10 depicts how this cyclical system works in time and states of change.

From the start of the thesis project, I wanted to give particular emphasis to the environmental-nature side of the research in practice. This premise was crucial to keep the determination to continue and understand

what may be the most challenging area of sustainability to fulfil. Based on my experience in this project, sometimes it is needed to go back and amplify the human-centred perspective that creates tension, for more holistic and balance relationships, that recognise the impossibilities and boundaries with nature.

#### Step 0: Starting point

As mentioned in chapter 2, the development process of the *Emotional Nature* Master's Thesis has its bases on previous work and literature review in which the main research approach was self-exploration.

**Stakeholders:** the primary method that I used in workshops is co-design with different stakeholders. The main stakeholders are children, experts, and teachers, primarily from the subjects of Art and Biology in a Finnish educational context. Thus, the immediate audience of the thesis project is educators of children between the ages of 10 to 13 years old.

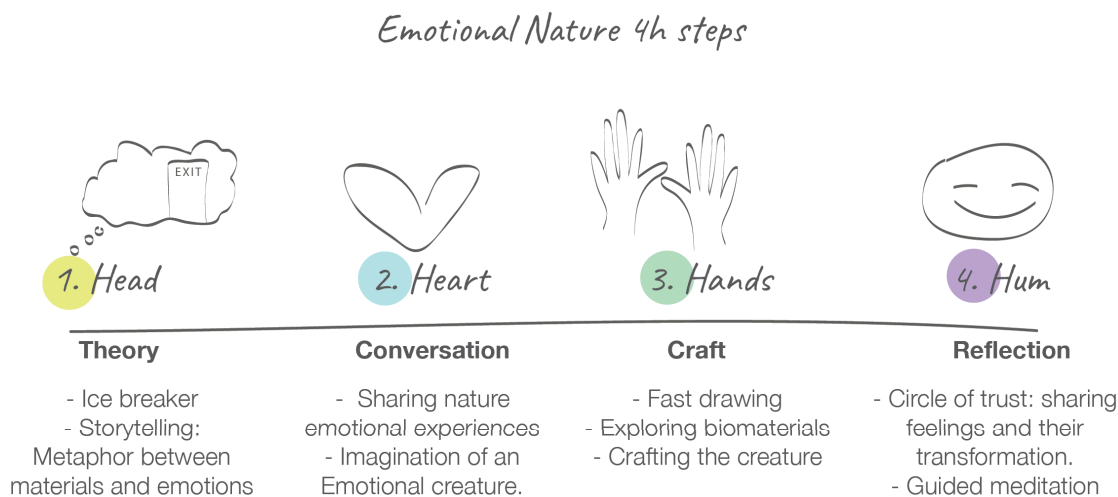


Figure 11. The 4h steps of *Emotional Nature* Learning Experience

List of stakeholders and collaborators:

- Educators (in particular from the subjects of Art and Biology)
- Students (between 10 -13 years old)
- Parents
- Creative Sustainability Master programme (CS)
- CHEMARTS strategy
- Biofilia and Aalto University Junior Lab
- Msc Student from the Department of Neuroscience and Biomedical Engineering (NBE)
- Experts (from Aalto University and externals)

**An intuitive selection of the tools and biomaterials:** The hands-on learning experience is mainly designed based on an intuitive process guided by an initial stage of personal experimentations and practical learning outcomes on tools and biomaterials. Asta Raami (2015) shows how relevant intuition is for the process of thinking and in creative practices, especially in the field of Design. Moreover, Olli Hyppänen (2013) also

mentions that during a creative process, it is most likely to use intuition at the beginning and end of the process, mostly when it comes to making decisions.

Intuition is linked to the case of *Emotional Nature* research. At the beginning of the experience design, I based my decisions mostly on intuition. For instance, I used intuition to decide which tools to use to build an emotional connecting experience with the audience. I made the initial proposal of the learning experience in January 2018 based on previous experiences and intuitive decisions (see figure 11). Moreover, the metaphor between emotions and nature was mostly built through practising intuition. Later, the experience continued development through the feedback and co-creation with experts and participants in the workshops. In the end, when it came to finding the main insights, I practice intuition again to make final decisions, like selecting the elements to include in the kit or the tools to remove from the experience.

In my experience, intuition is not only a tool that is practised but also combined with previous practical learnings and tools, like brainstorming. Asta Raami (2015) also comments in her research that intuition is a skill that individuals can develop. My practice is linked to a meditative process- bringing all my attention to the present moment, as well as some designed processes such as the somatic dialogues created by the specialist in awareness Devageet (2007) or the “reflection-in-action” practice discussed by professor Donald Schön (1987).

In addition, I also supported this initial selection process with Single Subject Research Methods - first person in sciences. In this method, the designer or developer of the experiment takes on, at the same time, the role of the user (Roberts, 2010), understanding the researcher embeddedness in the studied phenomenon (Hobson, 2014) and the environment itself, with no possibility to step out of the experience. As described by the psychiatrist-researcher Allan Hobson (2014) first person in sciences is also closely connected with intuition. The chosen technique for this process was a visual and learning diary. The selected tools were also validated with experts in meetings and co-creation sessions.

Explored and selected tools:

- Natural Inks: Paprika (red-orange colour), Curcuma (yellow), green peas (green), blueberries (purple), strawberries (red colour), recycled coffee grounds (dark brown/black).
- Wood-based materials: Carboxymethyl cellulose (CMC) and recycled paper pulp.
- Recycled materials from nature: Wood sticks, small rocks, dry leaves and flowers.
- Meditation

- Storytelling
- Video
- Printed images related to nature
- Value cards
- Circle of trust
- Inner and outer dialogues with emotions
- Sketching
- Sculpting

**The design of the *Emotional Nature* Learning experience:** The design of the experience is the most creative part of the process and it is focused on the possible combinations of the selected tools, biomaterials and the design of the experience itself. For the initial design of this experience, I used tools like intuition, brainstorming, ideation, and prototyping.

The *Emotional Nature* learning experience is divided into 4-core steps called the 4h: Head-theory, Heart-conversation, Hands-creative activity, and Hum-relaxing time.

### **PAR table: The 4 steps & 4 cycles**

I executed 4 cycles for the design of the *Emotional Nature* learning experience. From my personal view, the hardest goal to achieve was to promote empathy towards nature. Indeed, this goal proved to be difficult. After completing the first 2 cycles (see chart 1, below), I felt as if new ideas were difficult to find. Nevertheless, I decided to continue with a 3rd cycle focused on co-creating the experience with expert designers from different backgrounds. After the feedback from the 3rd cycle was implemented, I started the 4th cycle. Verbal and written results from all phases show that the objective of promoting empathy towards nature was met, similarly as the other core objectives of this research.



Chart 1. PAR Table

**STEPS / CYCLES**

**CYCLE 1**

**CYCLE 2**

**STEP 1: PLAN**

Clarify the purpose of the research, identifying and involving stakeholders, defining steps to give

**Purpose (general objective):**

Inspire educators and students to explore diverse relations between human and nature, specifically between emotions and materials using different tools.

Alongside the practical work done during all cycles, there was a constant literature review of different relevant topics and research matters.

A confidentiality agreement and parental consent agreement were implemented for the data collection.

**Specific objectives:**

- Validate the appropriate age of the children for the designed learning experience (Workshop 1).
- Define the educators' audience: parents (Workshop 2) or school teachers (Workshop 3).

**Experts Interviews & co-creation session:**

**Highlights with Devageet (2017):** Expert on spiritual growth, emotional and mental health.

- Discussion about tools as guided meditation and dialogues based on questions to work on emotions.
- The relevance of emphasising on values like uniqueness, expressiveness and respect in work-related to emotions.
- Suggestions: a guided process that embraces individuals creativity and reconnects with their human nature.

**Highlights with Maarit Mäkelä (2017):** Practice led Design Research and Pedagogue.

- Discussion around the children ages, their needs and capabilities. Suggestion for the validation of the target groups: Educators of children of minimum 8 and maximum 14 years old.
- Suggestion to focus on the natural inks exploration concerning emotions.
- Discussion around the concepts of body and mind.

**Specific objectives:**

- Enhance the flow of the experience by assessing and improving the selected tools.
- Validate the relevance of the experience in the Finnish Educational Context.
- Select and test measurements tools.

**Experts Interviews & co-creation session:**

**Highlights with Kai Hakkarainen (2018):** Professor of Psychology and Educational Sciences.

- Discussion around the terms of growth and fixed mindset.
- Understanding of the Finnish School context. Trends in Finnish educational system: Phenomenon-Based Learning (Finnish National Agency for Education, 2014; Mattila, 2017), emotional skills and education for well-being (...). (Hakkarainen et al., (n.d.).

**Highlights with Mikko Sams (2018, March 2):** Professor of Cognitive Neuroscience.

- Defining terminology: empathy, emotions regulation, emotional skills and others.
- Discussion around the relevance of evidence in science, and non-invasive methods with the participants to measure the research. Selected ones: questionnaires (Likert scale) and interviews (individual cases). Conclusion: an artistic story with scientific evidence.
- Looking at emotional tools from Western and Eastern thinking. The relevance of physical contact in ritualistic interactions and mutualistic effects in healing processes.

**Highlights with Ana Triana (2018):** Research Assistant at Brain and Mind Laboratory.

- Review of the different ways to measure and analyse the collected data. Specific feedback in the questionnaire.





### CYCLE 3

**Specific objectives:**

- Prototype the experience with different experts to clarify the objective(s) and details, while making it less intimidating for educators to lead it.
- Balance the nature component of the learning experience with the emotional one.

**Experts Interviews & co-creation session:**

**Highlights with Na Young Kang (2018):** Master student in Life Sciences Technology and co-facilitator in the workshops with educators.

- Discussions around different specific matters of the experience, especially in relation to theoretical bases around emotions.
- Multiple suggestions on the experience instructions like “transition sentences”, etc...
- Comment: having the possibility to experience the emotion with your hands is a therapeutic activity.

**Highlights with Pirjo Kääriäinen (2018):** Co-founder and co-leader of CHEMARTS and Professor in Practice in the Department of Design.

- Discussion about natural inks and other biomaterials.
- Understanding and defining the term biomaterials.
- Talking about the relevance of nature in her childhood and influences for the next steps in life.
- Comments on the calming effects of nature.

### CYCLE 4

**Specific objectives:**

- Prototype sharing and working on a nature-based emotional story instead of a personal one.
- Test the experience with the different improvements, learning goal, and objectives.
- Design and test the toolkit for Educators.

**Experts Interviews & co-creation session:**

**Highlights with Tapani Vuorinen (2018):** Co-founder and co-leader of CHEMARTS and Professor in the School of Chemical Engineering.

- Defining the term biomaterials.
- Revising the selected biomaterials.
- Feedback on the toolkit for educators.

**Highlights with Bartaku (2018):** Artist Researcher mainly in cognitive ecology.

- Looking at the concept of oneness with nature.
- Discussion about new materialism and the term nature.

**Highlights with Kasper Mäki Reinikka (2018):** Researcher and Coordinator for art and interdisciplinary practices at Aalto Junior Lab.

- Emphasising on the multidisciplinary research aspect and the relevance of the research project to incentivise Phenomenon-Based Learning.
- Possibilities for further developments of the experience.

**Highlights with Helena Sederholm (2018):** Professor in Art Education.

- Discussion around emotions in learning processes.
- Looking at intersections between arts and sciences.
- Possibilities for further developments of the experience.

**STEPS / CYCLES**

**CYCLE 1**

**CYCLE 2**

**STEP 2: ACT**

Implement the identified and agreed steps.

The Learning experience consists of 4 main steps, which were permanently reviewed and updated in every cycle based on the collected data and findings.

Colour code:  
 Green: new  
 Purple: will be removed  
 Yellow: will be modified in the next workshop.

**Workshop 1: Children with translator**

Date: 21.01.2018  
 Number of participants: 5  
 Age range: 11-13 years old

**Workshop 2: Parents with translator**

Date: 21.01.2018  
 Number of participants: 5

**Workshop 3: Educators (in English)**

Date: 25.01.2018  
 Number of participants: 4  
 Areas: Biology teachers

**Main Tasks for the 3 workshops (70 min)**

- **Intro (10 min)**  
 (Agreement of confidentiality, questionnaire, Introduce facilitation team, objective, 4 steps & values, biomaterials and tools).
- **Step 1: Head (10 min) - Theory**  
 (Video, pictures and question).
- **Step 2: Heart (10 min) - Conversation:**  
 (Talking piece, talking circle & guided meditation).
- **Step 3: Belly (20 min) - Creative activity**  
 (Sketching canvas, crafting emotional creature, talking piece and circle, bringing back the creature to nature - snow).
- **Step 4: Belly button (20 min) - Relaxing time**  
 (Two guided meditation, thanking, conclusion, closing questionnaire and feedback discussion).

**Workshop 4: Educators (in English)**

Date: 05.04.2018  
 Number of participants: 6  
 Areas: Art teachers

**Main Tasks for the workshops (90 min)**

- **Intro (15 min)**  
 (agreement of confidentiality, presentation, questionnaire, Introduce facilitation team, objective, 4 steps & values, biomaterials and tools).
- **Step 1: Head (12 min) - Theory**  
 (Plastic and wood icebreaker, forest question & metaphor relations between emotions and materials).
- **Step 2: Heart (20 min) - Conversation**  
 (Talking piece, talking circle & guided meditation).
- **Step 3: Hands (28 min) - Creative activity**  
 (Sketching canvas, crafting emotional creature, talking piece and circle, bringing back the creature to nature - snow).
- **Step 4: Belly button (15 min)- Relaxing time**  
 (Guided meditation, thanking, conclusion, closing questionnaire and feedback discussion).

**STEP 3: COLLECT**

Collect data and determine if the purpose is met.

For this research, the methods to collect the data were divided into 3 main levels:

**1. Surface (explicit knowledge):**

Questionnaires using Likert scale. Useful to compare and assess comprehensive development over time.

Colour code:  
 Yellow: to improve  
 Green: advantage

**1. Surface - Questionnaire**

The following results of the questionnaire correspond to the workshop done with the 3 educators (selected audience), and that can be related to the ones in the next cycles.

Topic	Agree	Neutral	Disagree
Regulate and transform emotions	2	1	0
Empathy towards nature	1	1	1
Increase creativity	3	0	0

**1. Surface - Questionnaire**

Due to time constraints, 5 out of the 6 participants responded to the questionnaire. Additional questions were included in the survey for this workshop and further ones.

Topic	Agree	Neutral	Disagree
Regulate and transform emotions	4 (1 strongly agree)	0	0
Empathy towards others' emotions	4 (1 strongly agree)	0	0
Empathy towards nature	1	4	0
Increase creativity	4	1	0
<b>The experience in general</b> scale from 1 (not relevant) to 10 (highly relevant)	7,6 (on average)		

**CYCLE 3**

**Workshop 5: Designers & expertise (in English)**  
 Date: 27.04.2018  
 Number of participants: 7  
 Areas: Different types of expertise (ecology, pedagogy, parenting, Finnish context, biomaterials, experience, play and communication design).

**Main Tasks for the workshops (90 min)**  
**- Intro (15 min)**  
 (Agreement of confidentiality, presentation, questionnaire, experts feedback page, Introduce facilitation team, objective, 4 steps & values, biomaterials and tools).  
**- Step 1: Head (12 min) - Theory**  
 (Plastic and wood icebreaker, forest question & metaphor relations between emotions and materials).  
**- Step 2: Heart (20 min) - Conversation**  
 (Talking piece, talking circle & guided meditation).  
**Step 3: Hands (28 min) - Creative activity**  
 (Sketching canvas, crafting emotional creature, talking piece and circle).  
**- Step 4: Belly button (15 min)- Relaxing time**  
 (Guided meditation, thanking, conclusion, closing questionnaire and feedback discussion).

**CYCLE 4**

**Workshop 6: Educators and experts (in English)**  
 Date: 28.08.2018  
 Number of participants: 7  
 Areas: Art and chemistry educators, experts and parents.

**Main Tasks for the workshops (90 min)**  
**- Intro (15 min)**  
 (Agreement of confidentiality, presentation, questionnaire, Introduce facilitation team, objective, 4 steps & values).  
**- Step 1: Head (12 min) - Theory**  
 (Plastic and wood icebreaker, forest question & metaphor relations between emotions and materials).  
**- Step 2: Heart (20 min) - Conversation**  
 (Talking piece, talking circle & guided meditation).  
**- Step 3: Hands (28 min) - Creative activity**  
 (Sketching canvas, biomaterials explanation, crafting emotional creature, take pictures, talking piece & circle, bringing back the creature to nature - pots).  
**- Step 4: Hum (15 min) - Relaxing time**  
 (Guided meditation, thanking, conclusion, closing questionnaire and feedback discussion).

**1. Surface - Questionnaire**  
 All 7 participants responded to the questionnaire.

Topic	Agree	Neutral	Disagree
Regulate and transform emotions	3 (4 strongly agree)	0	0
Empathy towards others' emotions	1 (5 strongly agree)	1	0
Empathy towards nature	2 (1 strongly agree)	2	2
Increase creativity	4 (3 strongly agree)	1	0
<b>The experience in general</b> scale from 1 (not relevant) to 10 (highly relevant)	9 (on average)		

**1. Surface - Questionnaire**  
 All 7 participants responded to the questionnaire.

Topic	Agree	Neutral	Disagree
Regulate and transform emotions	6 (1 strongly agree)	-	0
Empathy towards others' emotions	3 (4 strongly agree)	-	0
Empathy towards nature	3 (3 strongly agree)	1	0
Increase creativity	2 (5 strongly agree)	-	0
<b>The experience in general</b> scale from 1 (not relevant) to 10 (highly relevant)	9,15 (on average)		

## STEPS / CYCLES

### 2. Shallow (mid-level, observable knowledge):

Observations and feedback sessions with multi-stakeholders.

### 3. Deep (latent knowledge):

Generative techniques like context mapping technique (more profound understanding of people's knowledge, feelings and dreams while respecting their privacy). These techniques make it easier to find patterns, clusters and standouts.

## CYCLE 1

### 2. Shallow - Observations & multi-stakeholders dialogue (feedback)

- The three different target groups manifested that the experience was fun and relaxing. They all enjoyed working with biomaterials, meditating, drawing and building the creature. Still, the experience is missing instructions and revising the tools. E.g. there was a verbal manifestation from the children considering the video tool boring. It is essential to check the relevance of the video tool, what are the video trends for teens or alternatives for this tool.

- The language was a barrier to communication. Also, having one of the mothers of the kids as a translator created challenges for the freedom of the children to express their emotions fully.

### 3. Deep - Generative techniques for getting Insights and mind-sets

- **Emotions & information:** Educators identified links between the information they teach and the emotions that can be aroused in students by the lessons. E.g. An individual can feel fear when hearing about climate change related topics.

- **Misleading social belief about teens expressing their emotions:** Discussing and sharing emotions with children seem a difficult goal to achieve according to some of the teachers; nevertheless, working with them allowed me to disagree with such shared social belief. Teens are open to sharing their emotions with others, even the shy ones. The issue is more related to open proper spaces to understand and share emotions, where teens feel safe, listened to and accepted.

## CYCLE 2

### 2. Shallow - Observations & multi-stakeholders dialogue (feedback)

- Even though the nature side in the experience is not yet as strong as the emotional one, participants manifested that feeling both of the materials (wood and plastic) brought them a lot of memories. e.g. "when I was touching wood and paper pulp, I got many memories close to nature."

- Educators consider Biomaterials and meditation the 2 most important tools. Furthermore, several of the educators took pictures of the value cards which allows me to conclude that they also appreciate the prominence of the value cards.

### 3. Deep - Generative techniques for getting Insights and mind-sets

- **Biomaterials for emotional skills:** Biomaterials are a key tool in the process to express, regulate and transform emotions:

"Working with the paper pulp sculpture helps me to feel that the heaviness of the feeling where it was located just moved from my body to sculpture in front and I don't feel it inside anymore."

"I was feeling irate when I started to shape the creature. The more I will mould it, the more it keeps changing its form. Now, comparing with the one I drew, the 3d model is not that ugly, I even feel closer and better with the final result of the creature."

"I made a pointed creature because that is how the emotion was feeling inside me. Now, after moulding it for a while, it has got more beautiful."

CYCLE 3

2. Shallow - Observations & multi-stakeholders dialogue (feedback)

**Ecology, Pedagogy & Parenting:**

- Define more accurately terms such as biomaterials and nature. The biomaterial term feels distant from nature.
- Check instructions and connecting phrases between activities and give more relevance to values and 4 main steps of the experience.
- The experience also emphasises on the topic of nature conservation with the activity of reflecting on wood and plastic.

**Finnish context and materials:**

- Finnish materials: perhaps birch stick, paper pulp, small forest blueberry, porridge, green from spinach, Voikukka for yellow, red - lingonberries. "direct flowers and leaves from the forest were very nice."
- "It was nice to see how materials support us to express our emotions and feel better."
- "It was wonderful to experience how deep handling materials allow us to go into our own emotions, even though I consider materials to be neutral when it refers to emotions."

**Play, Communication and Experience Design:**

- "In general, it is an enjoyable and rewarding experience. The most fun part is the biomaterials and crafting of the emotion, even if it can be tricky because it is something new."
- It could be done in the forest and ask participants to collect the biomaterials themselves.
- "Information is well presented, nice and simple."
- Some confusing questions in the questionnaire.
- The emotional part of the experience is stronger than nature one. Missing balance. Suggestion: share emotions towards nature.
- A safe environment to express ourselves. "it was relaxing to talk about feelings and interesting to hear about other stories".
- Three most relevant topics in the experience according to participants: emotions, biomaterials and meditation.
- Even though the experience takes 90 min, it feels shorter and felt the very natural, very calm atmosphere.
- Missing intro about the goal, why are we here?
- How could educators take it further, maybe a toolkit? What could be the other barriers?

3. Deep - Generative techniques for getting Insights and mind-sets

**An experience for all:** It is an experience that can work in most contexts and audiences. Participants manifested:

"The hands-on experience combined with emotions was delightful, and it works well for everyone: adults and kids."

"I could use this with my kids to understand their thoughts and feelings."

CYCLE 4

2. Shallow - Observations & multi-stakeholders dialogue (feedback)

"It was a lot of fun, and the hands-on approach allowed my mind to be more still and generates a direct experience of meditation."

"I consider this experience the best way to be able to connect emotions with hands-on creativity."

"I needed an experience like this after having a couple of very stressful weeks."

"Great interactive way of combining awareness of feelings, our relationship with nature, having an impact on nature and being conscious about it with the meditation aspect."

-In terms of aesthetics and design with materials, adults can develop Interesting/vibrant textures and colours with the biomaterials while creating the creature.

3. Deep - Generative techniques for getting Insights and mind-sets

**Bonding with nature:** The new emphasis on emotions towards nature experiences allowed participants to develop an emotional creature that becomes a type of "spirit of nature". This type of emotional creature bonds the relationship between participant and nature, provides a deeper awareness of the emotional issue, and a willingness to take a particular action.

"I see myself deeper and connecting my biological body with nature."

**Feeling like a child:** At the beginning of the crafting activity with biomaterials, there is a mental rejection expressed verbally "it is disgusting to touch the materials and get their hands dirty." Nevertheless, after some time touching and working with the material, the bodies of the participants (hands and faces) reveals the opposite. They communicate something closer to the excitement and pleasant sensation, they get curious asking about the materials, their hands begging to explore all the different materials, and their faces reveal smiles, and usually, they become more talkative and friendly even if they do not know anyone in the table. In general, Participants manifested that it was a long time ago that they got dirty and did things with their hands.

"Amazing! I felt enthusiastic! I felt like a child."

"I felt like a child! I have a lot of fun."

STEPS / CYCLES

CYCLE 1

CYCLE 2

STEP 4: REFLECT

Analyse and discuss the findings. Recognise to what extent the action has supported to achieve the purpose of the research.

Key findings

**Empathic sharing and vulnerability:** The facilitator/educator of the experience can create a closer and empathic relationship with the participants by showing him/herself as vulnerable as them, which also builds a two-way relationship of trust and respect. E.g. being the first who shares an honest emotional story makes it easier for children and adults also to open themselves and share their emotions. In the 3 workshops, everyone shared their emotions.

**Lacking emotions related environments:** Based on participants' receptiveness to the experience, it seems that everyone, from kids to adults, desire spaces to share and understand emotions. During the discussions with the participants, they highlighted the lack of this type of spaces in Finnish schools and at work.

Pros

- The primary audience was selected: educators of children between 10-13 years old, mainly from
- Art and Health fields, suggested in the teachers' workshop.
- The experience, in general, was well received and usable for all ages (kids and adults).

To improve

- Steps and flow of the experience.
- Measurements - improve scale.
- External translator if it is needed.
- Tools, steps and used concepts need improvements.

Key findings

**"Artsing":** The workshop was developed mostly with art teachers from different schools levels, and the majority got inspired to work towards the relations between emotions and nature, even though they felt it could be intimidating. One participant commented "The experience is opening new ways and approaches to arts."

**Inspiring collaboration:** Two of the teachers manifested that they would like to collaborate to develop the experience in their school and one of them for an Interdisciplinary learning course between arts, chemistry, biology and physics.

**Ancient human tools in new contexts:** Opening spaces like "talking circles" and using elements like "talking pieces" are essential for creating a proper and safe environment to share emotions. One of the participants commented that she was not planning to share a true story, but once she saw that everyone was honestly sharing, she decided to do the same.

Pros

- The relevance of the selected topics and a peaceful atmosphere "It was very relaxing and encouraging", "It was enlightening and fun!"
- Opportunity to develop the experience in schools.

To improve

- More about the science side (chemistry) and different biomaterials.
- More space to work and flexible place (sitting closer to the ground may work or in the forest).
- The nature side is not that prominent.

REPORT FINDINGS

Main Reason to start the next cycle.

Once the learning experience with children was validated, and the main audience was identified - educators of children between the ages of 10-13 years - the following cycle is to determine and implement the major adjustments in the experience related to the tools that did not fit for the experience and improving the existing ones.

In addition, to achieve one of the objectives of having a primary scientific background in the research, it is essential to explore and select feasible methods.

Indeed, art educators are the appropriate audience for the experience based on their receptiveness. All the registered participants were from the field of art, even if the call was made for art and health educators.

The precise objective(s) and details of the experience need to be revised and understood on depth (why). In one hand, the emotional side of the experience has strengthened. On the other hand, teachers feel that leading activities related to personal emotions is intimidating. Besides, I felt that I run out of ideas and I needed something else than the individual co-creation sessions with experts to enhance the nature aspect of the experience.

### CYCLE 3

#### Key findings

**Grasping emotions:** The activity allows the materialisation of something abstract as it is emotions. It also allows an understanding of how each person perceives emotions differently.

**Deeping into connections:** The sharing and crafting of the emotion activity create a profound emotional connection and bonds people.

#### Pros

- Good for promoting imagination and fantasy.
- Participants were delighted with the icebreaker with the wooden stick and plastic bottle, crafting their emotions, as well as the metaphor between emotions and materials.

#### To improve

- Nature element could be enhanced by sharing emotions related to experiences in nature or related to nature.
- Values can be more visible and have the possibility to add more if the participants want, to create a safer environment "wild card".
- Play sounds from nature, instead of having relaxing music.
- The 4 main steps of the workshop were confusing and not visible.
- The experience misses a closing reflexion that talks about the relations between emotions and nature.

So far, the experience has been approved by children and adults from different backgrounds and nationalities, bonding people interactions and allowing to openly and safely share emotions. Most of the suggestions are very pertinent. For the next cycle, the experience should be tested with the appropriate regular and profound changes. For example, I should try the new focus of the emotional story: moving from personal to a nature-based emotional story.

In addition, the learning goal(s) of the experience should be reinforced, especially at the beginning and end to give consistency and clarity.

### CYCLE 4

#### Key findings

**Opening minds:** The experience supports participants in understanding and respecting others' individualities and emotions. "I learn to respect others, different kind of people, more fun."

#### Expressing emotions and concerns towards nature:

Participants found it easier to express their emotions once they have built the creature. There, I was also able to witness how people have strong feelings and deep concerns towards nature. I could even compare with earlier versions of the workshops that it is easier to talk about emotions concerning nature than personal ones.

**Balancing nature and emotions:** Once the focus of the emotional story from personal story to nature related one was changed, the empathy towards other emotions decreased, while the empathy towards nature increased.

#### Pros

- To visualise and be aware of the emotions.
- It is connecting people by nature and emotions.

#### To improve

- The values were not that noticeable in the entire process.
- The place felt chilly.
- Explain better how to use the materials.
- The specific goal is still unclear. Start with why are we here.

In general, all the participants left very thankful for the experience. While in earlier experiences people will end more with a feeling of regulating and transforming emotions (sharing a personal emotional story), this time that the participants shared emotional stories towards nature, it created another type of understanding to emotions and straightening "powers" to understand and aim for action towards nature.

There is a lack of spaces for people to release their mind and be more in their body and different senses/feelings: "unexpected possibility to get out of the mind and focus on something else for a while."

There is a willingness from teachers and experts to collaborate further on the topics covered on the learning experience. The **next step** is to train a group of educators with the final guidelines and try it in a school with children.

A cardboard box is open, revealing picnic supplies. Inside, there is a blue plastic water bottle, a silver fork, two white plates, and a brown paper bag. The box is placed on a dark, textured surface, possibly a forest floor. The background is a blurred forest with sunlight filtering through the trees.

*5. Outcome: Emotional Nature  
Learning Experience and Toolkit*









### Components of the toolkit:

1. An A4 folder with the *Emotional Nature* Learning experience guidelines booklet and support materials.
2. Recipe cards.
3. Value cards: Uniqueness, respect, collaboration, and expressiveness.
4. Sketching canvas.
5. Small carton with 2 brushes and 8 containers: oat glue, CMC (Carboxymethyl cellulose), natural inks from blueberries, strawberries, paprika, curcuma, coffee and spirulina.
6. 3 small sample containers.
7. A plastic bag with recycled paper.
8. A container with recycled paper pulp.
9. 2 recycled paper mixing containers.
10. A plastic bag with dry leaves and small pieces of wood.
11. A small plastic bag with small rocks.
12. A box of colour pencils.
13. A spoon, a fork and 3 wooden sticks.

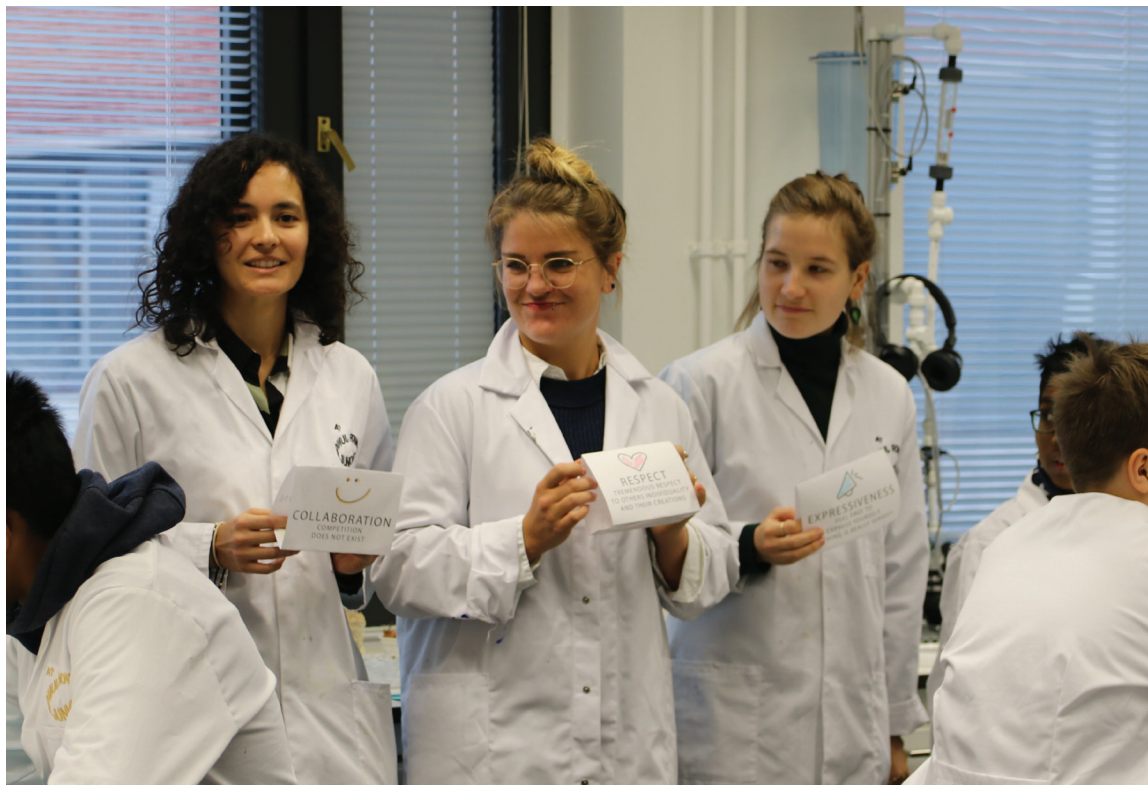


Image 11. The *Emotional Nature* Facilitation team

## Educators' guidelines

The following are the guidelines given to the facilitators during the workshop on the 29th of October, 2018 with 75 children from Espoo International School at Aalto University Junior Lab.

### General information

- Duration: 90 min.
- Number of participants: 75 children, divided in three groups of 25. Max.10 children per facilitator.

### Agenda and times

- Introduction: Introduce the facilitation team, objective, 4h steps, values and groups (15 min).
- Step 1: Head - Theory (13 min)
  - Icebreaker: A plastic bottle and a wooden stick (8 min).
  - Question forest: Throwing the materials

in the forest (2 min).

- Metaphor: Materials and Emotions (3 min).

- Step 2: Heart - Conversation (20 min)
  - Talking piece: Wooden stick (2 min).
  - Talking circle: Share an emotional story about nature (8 min).
  - Post- it: Main emotion from their own story (2 min).
  - Guided meditation: Imagining the emotional creature (4 min).
- Step 3: Hands - Creative activity (28 min)
  - Sketching canvas: Emotional creature quick drawing (2 min).
  - Biomaterials explanation (6 min).
  - Crafting emotional creature & pictures: Building an emotional creature (10 min).
  - Talking piece & circle + pots: Creature

story (10 min).

- Step 4: Hum - Relaxing time (15 min)
  - Guided meditation: closing moment (10 min).
  - Thanking (1 min).
  - Conclusion: Similar processes for materials and emotions (2 min).
  - Closing questionnaire: Questions and post-its feedback (6 min).

## The 4h steps description

### Introduction (15 min)

- Introduce the facilitation team (4 min): Each facilitator should mention their name and background.
- Objective (2 min): Share the goal of *Emotional Nature Learning Experience* with the participants: understanding in a practical way some of the possible relations between nature and us (humans), specifically between materials and emotional process, as well as comprehend where they come from.
- 4 steps (1 min): Inform the participants about the 4 main steps of the experience:
  - Step 1: Short theory (Head)
  - Step 2: Conversation (Heart)
  - Step 3: Creative activity (Hands)
  - Step 4: Relaxing time (Hum)
- Values (3 min): Share with the participants the 4 values that will be used during the experience:
  - Collaboration
  - Respect
  - Expressiveness
  - Uniqueness

Ask: is there any other value missing in

order to create a safer environment?

- Groups formation (5 min): Ask participants to count out loud from 1 to 4 to form the groups. Tell participants that those with the same number will form a group. For example, all no. 1s are part of the same group.



### Step 1 - Head: Theory (13 min)

- Icebreaker (8 min): Ask participants to feel the differences with their hands between the plastic bottle and wooden stick. Request them to share with everyone an emotion or memory that comes to their mind while touching the materials.
- Question (2 min): Ask "what would you feel if I throw both of the materials (bottle of plastic and wooden stick) in the forest? Why?"
- Metaphor (3 min): Explain to the participants the similarities between materials and emotions:

"The question was asked to understand the relationship between materials and emotions because something similar happens with the emotions. In the case of the materials, both of them come from the same place - nature-planet (wood from trees and most of daily use plastics from fossils underground) still, they need different processes to transform them and give a new use/

value to the material. And it does not mean that any of them is good or bad; they are just different and need different ways to deal with them.

We may all share that this piece of wood can be put back directly in nature and it will quickly transform and become part of it, and it will easily degrade. While, for most of the plastics, we need to take time and resources to process it and give different use as recycling.

A similar situation happens with our positive and negative emotions. As Plastic and wood materials come from nature/planet, positive and negative emotions come from the human body. Still, they need different processes and times to transform them. Positive emotions are easy to process like wood in nature. Once we feel them, they expand in our body, and we feel balanced and happy after a short time. While negative emotions need more time to be understood. As plastic, negative emotions have a more careful process to transform them, we need first to understand them and see what we can do with them, so we do not pile them up and create a mountain of plastic or negative emotions in the forest or inside ourselves.”



### Step 2 - Heart: Conversation (16 min)

- Talking pieces (2 min): Explain the goal of talking pieces (wooden stick) - to invite
- Post-it (2 min): Write in a post-it the main emotion from your story/experience.

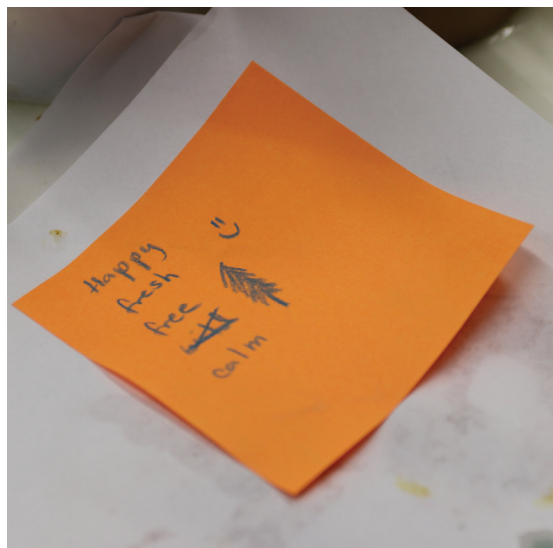


Image 12. Post-it activity in *Emotional Nature* workshop

each person to speak or to pass while the rest listen to whoever is holding the talking piece.

- Talking circle (8 min): encourage participants, if they want to, to share a story about nature that has created a strong emotion (positive or negative). It can be a story from any situation like a topic learnt in school, something that someone told them, read in media, etc.

Important: the facilitator should start by sharing his/her true emotional story about nature. It is important to share something that the facilitator has previously felt since people can easily perceive when someone is making up a story. E.g. when I learnt about the issue of plastics in the oceans I felt shocked and fear. Also, the facilitator should thank every time someone shares their story.



Image 13. Sample of sketching canvas for *Emotional Nature* Workshop

- Guided meditation (4 min): Tell participants to sit comfortably to close their eyes and visualise the emotion they wrote in the post-it through a guided meditation.

Read slowly (count mentally approximately 3 seconds after each dot) and feel what you read. Put yourself in the participant position, give time to the participants to feel/visualise each aspect you are mentioning:

“Now, close your eyes, bring back that feeling or emotion that each of you wrote in the post-it. Remember that moment when you felt that specific emotion. Feel it in your body. Look at the place where it is located. Probably it is in your heart, stomach or throat. It is different for each of us. Just feel it. Feel that it may be getting stronger. And stronger. And now, this emotion is so strong, that has taken shape. A shape of a strange creature. Check the colour.

The size. Maybe it has eyes or feet. Or maybe not. But NOW. That strange creature just jumped out of your body. And open your eyes.”

Important: mention as soon as they open their eyes the next step.



### 3. Hands

#### Step 3 - Hands: Creative activity (28 min)

- Sketching canvas (2 min): Tell participants to take a colour pen. The pen is used to do fast sketching of their creature in the paper canvas. The sketching should last between 30 sec to 1-minute maximum. After, participants can name the creature and choose the colour(s).
- Tools and materials (6 min): explain that for this activity, the participants will be working mostly with some necessary tools and biomaterials to build a model of the creature.

Support tools:

- Spoon or fork
- Colours and sharpener
- 2 containers per participant (for mixing colours and paper pulp)

Explain what biomaterials (Vuorinen, 2018) are: in CHEMARTS, biomaterials are considered as materials that are renewable and can easily degrade by the organisms in nature.

Natural inks: colours as yellow from



Image 14. Hands of students working with biomaterials at the *Emotional Nature* Workshop.

kurkuma, reddish from paprika blackberries or strawberries, purple from blueberries, dark brown from coffee (preferable recycled coffee grounds) and green from peas. Show the material cards related to colours and the samples.

How to prepare natural inks:

Mixing-up or pressing the material. For example,

- With a spoon, mix-up 1 spoon of Kurkuma with 3-5 spoons of hot water.
- With a fork, press 1 spoon of blueberries with 3-5 spoons of hot water.

Glues: Oat & CMC (carboxymethyl cellulose). Oat glue is made out of oatmeal, water and heat for around 30 minutes. Show the material card and sample.

CMC or cellulose gum is generally used for food, creams, and medicine. The usual goal is to create a solution similar to syrup (Mandal, 2017). The industry produces the original material. In the

sample, more than 90% is water and the remaining 10% is CMC. Show the material card.

Paper pulp mixture: it serves as based to build the model of the creature. The paper pulp is recycled paper cut in small pieces, and mix with water in a blender. Show the material cards related to paper pulp and samples.

How to make the mixture:

- Remove the extra water from the paper pulp,
- Add colour(s),
- Select and mix the glue (CMC or oat),
- Mix all them with your hands, fork or spoon.

Other materials for more details in the creature:

- Leaves, bark and wooden sticks that have fallen from the trees or plants.
- Small rocks.





Image 15. Teenagers in the *Emotional Nature* Workshop

- Sculpting time & pictures (10 min): Tell the participants to sculpt their creature with the biomaterials. While participants work on their creatures, promote an inner dialogue with the creature. Encourage the participants to pay attention to what they feel and what comes to their mind. If it is possible and participants agree, play some nature sounds. Tell them also to remember the 4 values.

Once they are done with their creature, they can tell us if they would like to have a picture of their creature so we can take it or they can also take their own.

- Talking circle + pots (10 min): Use the talking pieces and encourage participants to share a short story of the process and the creature they have created. What did they draw? If they name it, what is it called? What do they feel now? Has the emotion transformed? They can share anything that they feel like sharing. After sharing their own story, participants

should decide if they want to keep the creature or give it back to nature. In case they want to give it back to nature, they can put it in the pot with soil that can be placed in the middle of the talking circle space.

Important: The facilitator should thank every time someone shares a story. Also, should close the talking circle by collecting the main insights and sharing a general and short reflection with the participants.



### Step 4 - Hum: Relaxing time (15 min)

If it is possible, all the participants should move together to a commonplace and sit in a comfortable chair or the floor for this final step).



Image 16. Educators and experts in *Emotional Nature* Workshop

- Guided meditation (10 min): ask the participants to sit comfortably, lay down or relax in their place.

Read slowly (count mentally approximately 3 seconds after each dot) and also feel what you read. Put yourself in the participant position, give time to the participants to feel/visualise each part and place:

“Now close your eyes. Start by feeling your feet. Feel your ankles. Your lower legs. Upper legs. Feel the area around your hips. Your belly. Your lower back. Middle back. Feel your upper back. Feel your chest. Your throat. Your chin and lips. Feel your eyes. Forehead. Your entire head. Now, move to your shoulders. Feel them. Feel your arms. Your hands. Feel each of your fingers and fingertips. You maybe drift in your thoughts, but it is ok, bring your attention back and continue. Now,

bring your attention to your finger and fingertips. Feel that there is an electricity feeling in the fingers and fingertips. It may feel very soft, or you may not even feel it. Just try to feel it for a few seconds. Now, bring your attention to your head, visualise the mind like a clear sky, where your thoughts are clouds that are moving away, and it becomes more and bluer clear sky. Now, in this bright blue sky, Start to feel and remember how similar materials and emotions are. Visualise the piece of wood and positive emotions like joy. As you were able to experience earlier, they resemble each other in the shorter time that takes for them to appear and process it in a beneficial way for the planet, as well as in our body.

Now, visualise the plastic bottle and negative emotions like anger. They are also similar in a different way. Both of them take a longer time to grow and to process it to be beneficial for the planet



Image 17. Participant's drawn and 3d molded emotional creature and our body.

Now, move to the space where your emotion was or has been located. Feel the empty space in your throat, belly, head or heart where the emotion used to be located or feel how that emotion is now calmer. Remember that for each of us is different. Now, while you breathe in and out, feel that area of the body and all your body relaxing.

Slowly open a bit your eyes and look at the centre of the space. Now, open your eyes completely and look at each person that is sitting next to you. Starting with you.”

- Thanking (1 min): Give some seconds to everyone to return the attention to the room and thank everyone in general. Tell that this is the end of the experience.
- Conclusion (2 min): Share with participants:

“As it was discussed at the beginning of the experience, the main goal was to allow participants exploring some of the similarities that can exist in a creative, reflective and fun way some of the similarities that can exist between nature and us (humans) processes, specifically between materials and emotions, in a creative, reflective and fun way. For this experience, we mostly learn and explore the concept of biomaterials and some creative tools as meditation, storytelling, drawing and crafting.”

- Closing questionnaire activity (6 min): Ask participants to close their eyes and put their finger thumb up if the answer is yes. To the centre for more/less or neutral. And down for not.

Important: Someone should count how many fingers are up, down or in the centre.

Ask the following questions:

- In general, did you like the experience? Do you feel that you understand nature better than before?
- Do you feel that you understand more your own and other's emotions better than before?
- Open question: Would anyone like to share what do you like the least or the most?

Tell that they can also give us feedback in the post-it and deposit in the envelope for the pros, things to improve and suggestions about the experience.

*Thank you!*

Image 18. Educator during the Emotional Nature workshop



## Experts appreciations

The following are insights that I learned from and with two Finnish experts in the fields of education and emotions. The common objective of this sessions is to gain perspectives on the results of *Emotional Nature* research.

### **Veronika Navas (2018, September 13) Art teacher of school-aged children. Highlights:**

At first sight, *Emotional Nature* Learning Experience is exciting in terms of education because it is a multidisciplinary project that works in an unusual relationship between nature and emotions. So far, she does not know any learning experience that relates to emotions and nature in school settings. She also mentions that it is fascinating to have the opportunity of feeling, doing and touching the materials with the hands.

On the other hand, it is essential for teachers to receive a more academic background of the project. E.g. emotions, chemistry, biology and design. Also, to increase the interest of art teachers, it is important to expand the experience in the direction of designing some “object” or giving guidelines on how to continue developing the topics at the school with the students.

In her opinion, talking about emotions in Finnish schools is not as easy as it may be in other cultures. It does not come naturally. One of her ideas is to approach emotions from a more academic perspective, highlighting how feelings and emotions affect humans, as well as including some materials with images that describes the different types of

emotions.

### **Viivi Pentikäinen (2018, November 28) Expert on emotions and positive education. Highlights:**

It is a good concept which is not only interesting for schools, but it is also attractive for enterprises like forestry companies. Organisations in this sector are looking for this type of experimental ideas that use wood-based materials. She considers that creating some collaboration with the forestry industry would be positive for the project since most of the schools in Finland may not have the resources to implement the project by themselves.

It is also interesting to look at possible next steps of this project. For instance, how the understanding of the inner world can help to design and create a positive impact in the outer world. E.g. Designing with biomaterials as an alternative for plastic.

Until that moment, she does not remember any learning experience that relates emotions and nature in schools. So far, she recalls that mindfulness has some activities like walking in the forest and feeling some elements of nature. She also expressed the relevance of having a positive relationship with nature in people's everyday life.



*6. Discussion*

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*“We don't have to disparage the indoor world,  
which has its own rich ecosystem, to lament children's  
disconnection from the outdoor world.”*

(Monbiot, 2012)

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In this chapter, I discuss the key findings and interpretations, recommendations for further research, relevance, reflections during the journey, and conclusions. In particular, I describe how the findings support to build the final outcome - the *Emotional Nature* Learning Experience and toolkit - that answers the research question. I also exemplify the achievement of the objectives which are presented in the introduction chapter.

## Findings and interpretation

Here, I would like to make a brief summary of the core findings to answer the primary and secondary research questions, as well as address the challenges that this study faced. The main research question is: *What can educators do with biomaterials and other tools in a classroom to nurture children's relationship with nature and emotional growth?* The sub-question is: *What role can design play in exploring the relations between emotions and nature in the Finnish educational context?*

### **The links of biomaterials with other tools are crucial for sensing nature, as well as expressing and materialising emotions:**

Working with biomaterials enable participants to materialise something abstract, like emotions, and understand how each person perceives emotions differently.

Biomaterials are not an isolated case. They play a boosting role in the totality of the experience. The links of biomaterials with other tools are also vital for the correct flow of the activity with biomaterials. For example, the metaphor between emotions and materials, while holding 2 different materials in the hands, or the guided meditation to

visualise the emotion, followed by the rapid drawing in the canvas of the emotion.

On the other hand, the term biomaterials can be also contradictory. Being a popular term in the Finnish context, it arouses curiosity in educators to explore, learn and share knowledge about the topic. Nonetheless, biomaterials is a complex word to associate with nature. Based on the participants' comments, the use of the word biomaterials during the development of the experience creates somewhat distance with nature. Some of the suggested words by participants were "renewable natural resources" or "materials from nature".

### **Biomaterials in a classroom for enhancing multidisciplinary learning and multi-stakeholders collaboration:**

The nature of the *Emotional Nature* research project is a multidisciplinary research where different collaborators exist. One of the achievements of the experience was a new collaboration that began between Aalto University and Espoo International School. This accomplishment was out of the scope of the *Emotional Nature* research. The collaboration is an empirical and Phenomenal Learning Based course for 13 years-old students around the exploration of the phenomenon of biomaterials.

A relevant issue in the co-design of this type of extended learning experiences is to keep the balance between the ultimate goal and flexibility for exploration, keeping in mind that some details in the process divert from the expectation. For instance, It is essential to allow students to explore the phenomenon of biomaterials from different angles rather than focusing mainly on finding an ending solution/resolution.





Image 18. Participants during the *Emotional Nature* Experience

**The difficulties in dealing with emotions in the classroom:** I conclude that there are difficulties in dealing with emotions in Finnish schools based on two main observations. First, the scared facial expressions of the school teachers that participated in the different workshops. When I asked if they could lead an activity like *Emotional Nature* in their school, most of them manifested that they could not lead an activity related to emotions even if they enjoy the experience, and consider it pertinent. Second, the number of participants in the workshops when the word emotions is involved. For the first workshop, named Natural Fantasy, and full attendance was booked in less than 2 days. However, when the workshop name changed to Emotional Nature, only 2 teachers signed up, despite the description remained unchanged compared to the Natural Fantasy.

Besides, the physical toolkit box of the experience was created to reduce the intimidating feeling that can produce to work

with the topic of emotions. For instance, The Emotional Nature experience inspired one of the teachers that participated in the workshop to try to the experience in her school, as well as to develop a multidisciplinary course related to nature and biomaterials. Despite that, she recommended complementing the toolkit to reassure the school teachers to lead activities related to emotions. One of the suggestions was to include more theoretical background for teachers to understand the possible relations between emotions and nature clearly.

**The reduced availability of safe and comfortable spaces to share and transform emotions in the Finnish educational context:** Most of the participants believe that teens are not open to sharing their emotions in school settings. However, practical research with children has proven the opposite. Teens are open to sharing their feelings with others, even if they are shy. What matters is to open proper spaces to understand and share emotions.

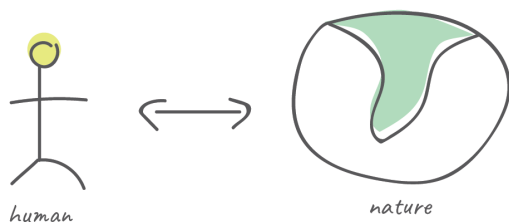


Figure 12. Linear relation between human and nature

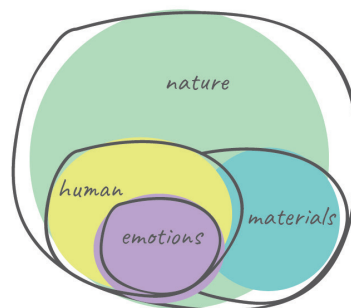


Figure 13. Enclosing relation between human and nature

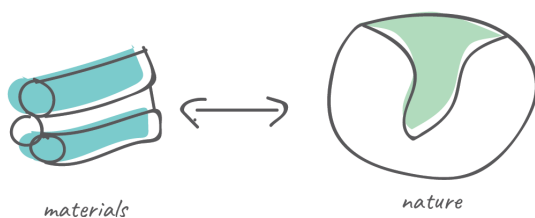


Figure 14. Linear relation between materials and nature

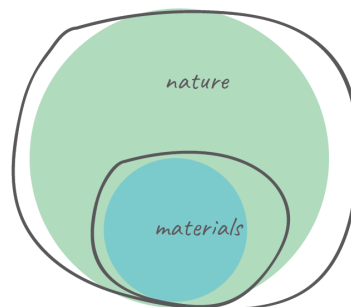


Figure 15. Enclosing relation between materials and nature

Spaces, where they feel safe, listened and accepted. In my opinion, children and adults desire spaces to share and understand emotions. The lack of spaces was a point highlighted in the discussions and co-creation sessions with the participants.

Based on the previous, the co-created *Emotional Nature* Hands-on Learning Experience performs as a temporary and ephemeral space in Finnish schools to initiate and inspire conversations around the topics of emotions and nature.

**Nature is hard to make noticeable:** The biggest challenge in the design of the experience was trying to make the nature aspect of the experience more visible. Nature itself is a problematic term because its definition varies from person to person, and context to context.

One of the achievements towards this direction was to change from talking about personal emotional stories to sharing

emotional stories about nature. It also allowed me to observe that it was less intimidating for participants to talk about emotions concerning nature than their life ones.

Moreover, after analysing the totality of the designed learning experience and feedback from the participants, one of the drawn interpretations is that the relationship between human emotions and nature is not linear (see figure 12), but rather one is contained in the other, where everything is part of a whole - Nature (see figure 13). The same happens between materials and nature (see figures 14-15), as well as emotions and human (see figures 16-17). Thus, I wonder whether it may be the reason why it was hard to make nature as visible as emotions. One contains the other, so in this case, nature contains emotions, and emotions become more present than nature.

In that sense, the concept of nature can mean “something we are immersed in all the

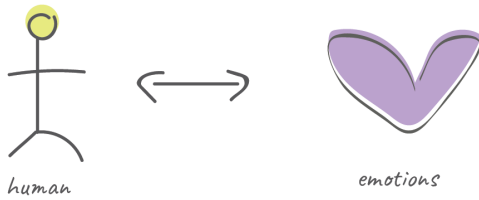


Figure 16. Linear relation between human and emotions

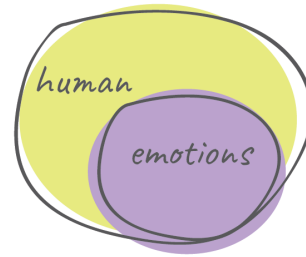


Image 17. Enclosing relation between human and emotions

time and dependent upon for our physical, emotional and spiritual health” (Moss, 2012, pp. 17). Based on my experience in this research project, I began to understand nature from a holistic approach that integrates everything, including living and non-living beings, material and immaterial structures, and myself - physical, emotional and spiritual.

### **Nurturing the relationship with nature:**

In terms of reconnecting with nature, participants reported an improvement in their sense of connectedness with nature after participating in the *Emotional Nature Experience*. Apparently, teens share emotions about nature with ease. They even go further in the process, and they can recognise and accept the responsibilities of their actions concerning nature.

**Altering perceptions towards materials and the use of hands:** Different parts of the experience are creating a direct and possibly temporary shift of perception, especially in relation to materials.

One of the challenged perceptions during the experience is the use of the hands. Most of the children will observe the facilitator's hands touching the materials, and they will express the word “disgusting” or synonyms. Nevertheless, after some seconds, their curiosity is aroused, and they start to touch and work with the different materials, even though, they keep repeating expression

related to the sensation of the material in their hands. At that moment, their faces change by showing a feeling of satisfaction and having fun.

### **Dealing with material meaning in design:**

In the field of design, materials are usually perceived as a source to produce what designers would like to create. Nevertheless, this research goes further from the functional meaning of materials and understand them as resources that come from nature and have a more profound impact in human life.

In *Emotional Nature Experience*, materials play a central role, making emotions simpler to understand. Materials also enable participants to become a medium to feel touch - to connect the body and mind - by recalling and sharing emotional memories, as well as materialise ideas and perceptions.

Besides, biomaterials also have a special meaning in terms of human reconnection with nature. For instance, extracting natural inks from berries awakes individuals' sense of curiosity for learning more about those plants. It also eases the identification of the organic qualities of the materials. These two, simultaneously nurture an empathic relationship towards nature.

**Key Stakeholders:** Based on the participants' comments, this is an experience that goes beyond children and works also



Image 20. Hands of participants working with biomaterials during *Emotional Nature Experience*

for adults. In addition, after working with different stakeholders, I concluded that one of the target groups of educators is university students with interest in the topics of emotions and nature.

**The relevance and scope of co-design for *Emotional Nature*:** In general, the experience with the final modifications got a score of more than 9 in a scale of 0 (not relevant) to 10 (highly relevant). In my opinion, this achievement is deeply related to the co-work done with the different stakeholders, which I called "co-creators". As the designer who led the entire co-creation process, for me it was crucial to keep myself open to other ideas and not to get attached to my own opinion. A good practice that I had with the co-creators was to listen carefully to their ideas and to ask a few questions to understand, make the connections and make sense of their points.

**The role of a designer and design as a bridge:** As a reflection in my own role as the designer of the *Emotional Nature Learning Experience*, I see the value of design in the Finnish educational context for supporting educators in shaping their lessons. For instance, co-designing educators' guidelines, learning materials, and interactions that consider students' insights and learning desires. The focussed on making lessons more enjoyable, inclusive, and appealing to the needs of each generation and types of personalities present in a classroom.

Furthermore, co-design played a core role in the achievement of an appealing learning experience for children and educators to understand possible relationships between emotions and materials. The participatory methods used in the research process brought various key observations in order to achieve a 90-minutes learning experience that is fun and easy to understand.



Image 21. *Emotional Nature* Toolkit: Set of Natural inks

## Recommendations for further research

The *Emotional Nature* Experience is merely a first inspirational step on what it could be a complete learning experience or a possible set of learning experiences. Such experiences that explore relationships between materials and emotions, allow educators to talk more confidently about emotions, while enhancing the connection with nature, mainly using biomaterials.

Another aspect that merits further research is the visual and verbal communication of the relationships between human and nature (figures 12 & 13). In particular, for designing meaningful visual pieces to share knowledge that explores the relationships between emotions and materials.

To improve the practical side of the project, some efforts should be made to investigate the possible mediums for educators and children to access to the experience and toolkit. That, to take further the practical side of the research project.

## Relevance of the research

The *Emotional Nature* master's thesis project contributes to the creation of knowledge in practice in the Finnish school context through the creation of a learning experience that relates human emotions and nature. Learning activities that build on emotional relation with nature (Jeronen & Jeronen, 2012) are relevant for outdoors education in Finnish schools and universities research. Despite the educational developments in the areas of emotions and outdoors activities separately, it has been challenging to find



Image 22. Participant during *Emotional Nature Experience*

learning activities in the Finnish school context that relate both of the subjects: human emotions and nature. Further, it has been more difficult to see experiences that work for outdoors, and indoors, linking both of the topics: emotions and nature.

In addition, the field of design - in particular, co-design and experience design - is presented in this research as a means to bridge knowledge, tangible and intangible tools, public matters, stakeholders, as well as to raise questions inside the design field in relation to the meaning of materials, emotions, and nature.

### Reflections on journey

Developing a thesis project focused on an open exploration rather than an ultimate goal has been challenging for my way of thinking



Image 23. Participant's emotional creature

and my usual design process. However, getting to this point, it allowed me to notice that there are other ways to approach and explore design processes.

This thesis is an individual work based on a careful collection of inputs from different types of co-creators that all together contributed to building the final result of what it is *Emotional Nature*. Mostly, my role as a design researcher has been the role of a person who interlinks the different parts in a particular order to guide, decide based on facts or intuition, and give sense and shape to the final outcome.

Time and professional background were limited; nevertheless, my interest and my sense of exploration were not. Those two have frequently allowed me to cross borders between academic fields and co-create with different experts for designing practical bridges. These bridges actively bring into society the knowledge that already exists in academia.



Image 24. Elements of *Emotional Nature* Toolkit

### Conclusion

*Emotional Nature* Hands-on Learning Experience and Toolkit is both, a tool and a temporary space that inspire children educators in Finland - school teachers, parents and university students - to explore and grasp relations between emotions and nature. It is based on four main steps: the 4h - head-theory, heart-conversation, hands-creative activity and hum-reflection.

It is the result of the research exploration in a variety of tools to co-design the way - the experience - to serve as a bridge to facilitate educators talking and thinking about relationships between human emotions and nature, particularly with materials.

In an ephemeral space of 90 minutes, *Emotional Nature* allows participants to understand new explored relations between emotions and materials mainly, through the combination of different tangible and intangible tools. While as a toolkit,

*Emotional Nature* becomes a physical mean for educators to be creative on exploring relations between emotions and nature with the range of tools, especially the biomaterials that its contents. The physical toolkit was also designed with the intention of reassurance educators to implement an experience that addresses emotions.

The *Emotional Nature* Experience inspires educators - and stakeholders in general - to further explore multidisciplinary nature-based learning activities and the concepts of biomaterials and emotions. It contributes to the existing educational gap of learning experiences that relates to emotions and nature. *Emotional Nature* also nurtures children's empathy towards their own and other beings' emotions and nature.

In addition, based on the co-creation sessions with different populations, like parents and postgraduate students, the hands-on learning experience has also proved to be effective for other age groups.



*7. Bibliography*





# EXPRESSIVENESS

FEEL FREE TO  
EXPRESS YOURSELF,  
NOTHING IS REALLY SERIOUS



# RESPECT

TREMENDOUS RESPECT  
TO OTHERS INDIVIDUALITY  
RELATIONS

CHEMARTS  
SUMMER SCHOOL 2013

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## Images and figures

### Images

[1-3, 5, 21, 24] Rueda Mejía, S. L. (2019) Emotional Nature: a learning experience to explore how materials relate to emotions. Emotional Nature toolkit. [Gift of the photographer - Daniel Bruzual]. Helsinki, Lauttasaari district.

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### Figures

[1,2, 4-17] Rueda Mejía, S. L. (2019) Emotional Nature: a learning experience to explore how materials relate to emotions. [Illustrations].

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## Appendices

- Appendix 1: Confidentiality agreement.

I, \_\_\_\_\_, acknowledge and agree that all materials discussed in the workshop is confidential and all the research materials, including but not limited to written statements, photos, video clips, collected by the researchers/facilitators during the workshop can be used in master's thesis research projects at Aalto University. All data collected will be confidential and anonymous, and won't be used for any other purpose than what is mentioned in the workshop without permission.

We would greatly appreciate your support and feedback to make our project better!

Do you give us permission to contact you for follow-up research?	YES	NO
Would you like to receive more info on the project in the future?	YES	NO
If yes, please provide your email:		

Print Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Researcher(s): \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

- Appendix 2: Educators questionnaires for the beginning and end of the workshop.

NAME \_\_\_\_\_ SCHOOL \_\_\_\_\_

On average, how many minutes do you spend in nature per week?

In the following you will read three different words. Please write down the first two words that come to your mind when you read each of them.

Biomaterials? \_\_\_\_\_

Promoting values? \_\_\_\_\_

Meditation? \_\_\_\_\_

On average, how often in a school year do you:

Use biomaterials?

never/ once a week/ once a month/ once each semester/ once a year

Practice meditation?

never/ once a week/ once a month/ once each semester/ once a year

Facilitate/Participate an activity with the aim to promote values (e.g. uniqueness, freedom to express, respect & collaboration)?

never/ once a week/ once a month/ once each semester/ once a year

To what extent do you agree that the experience helps to:

**Increase creativity**

Strongly agree/ agree / neutral / disagree / strongly disagree

**Regulate and transform emotions**

Strongly agree/ agree / neutral / disagree / strongly disagree

**Increase empathy towards nature**

Strongly agree/ agree / neutral / disagree / strongly disagree

**Increase empathy towards other beings' emotions**

Strongly agree/ agree / neutral / disagree / strongly disagree

In two words, what do you think about the following tools used during the workshop:

Biomaterials? \_\_\_\_\_

Value cards? \_\_\_\_\_

Meditation? \_\_\_\_\_

Now after the workshop, please estimate how often you think you will be using:

**biomaterials?**

never/ once a week/ once a month/ once each semester/ once a year

**Value cards?**

never/ once a week/ once a month/ once each semester/ once a year

**meditation?**

never/ once a week/ once a month/ once each semester/ once a year

To what extent do you agree that biomaterials help to materialize and grasp emotion(s):

Strongly agree/ agree / neutral / disagree / strongly disagree

To what extent do you agree that meditation helps to feel and visualise emotion(s):

Strongly agree/ agree / neutral / disagree / strongly disagree

After participating in the workshop, please rate the following items as part of the workshop experience. Please, give a number from 0 (not relevant) to 10 (highly relevant):

- Biomaterials  Dialogue with the emotion
- Values cards  The Storytelling
- Meditation  The experience in general

Please explain in a few words what were the pros of the experience and the opportunities to improve it?

Further comments

Kiitos!

- Appendix 3: Recipe cards of the materials used in *Emotional Nature* Experience.

### Wood-based Materials

colour: transparent/white



**Recipe to make paper pulp:**  
Cut a few recycled sheets of paper into pieces and put those pieces with water. The water should cover the paper. Wait 24h and then mix them in a mixer until it becomes pulp.


**cellulose**  
CMC (CARBOXY METHYL CELLULOSE)




**Paper Pulp**

### Oats

colour: white/ clear brown



**Recipe to make glass with oats:**  
Mix 1 glass of water with 1 quarter of oatmeal grains glass in a pot and cooked until it gets a sticky consistency (~10-30 min).




**Oat plant**

**Oat grains**

### Coffee

colour: dark brown




**Plant: Coffee tree (small tree)**

**Beans & ground coffee**


**Recipe to make Coffee ink:**  
Mix in a container 1-2 spoons of ground coffee powder with 2 to 4 spoons of hot water. Wait for some minutes to get darker colour.

### Curcuma

colour: yellow



**Plant: Curcuma longa - Turmeric Herb**




**Curcuma root and powder**


**Recipe to make curcuma ink:**  
Mix in a container 1 spoon of curcuma powder with 2 to 4 spoons of hot water.

### Strawberry

colour: bright red



**Strawberry plant and flower**




**Strawberry fruit**


**Recipe to make Paprika ink:**  
put a few berries (2 to 4) in a container, add 2 to 4 spoons of hot water and smash them to pieces.

### Paprika

colour: dark red



**Bell pepper or sweet pepper plant**




**Paprika powder**


**Recipe to make Paprika ink:**  
Mix in a container 1 spoon of paprika powder with 2 to 4 spoons of hot water.

### Blueberry

colour: purple



**Plant: Blueberry bush**




**Blueberry fruit**


**Recipe to make blueberry ink:**  
put a few berries (3 to 5) in a container, add 2-4 spoons of hot water and smash them to pieces.

### Green peas

colour: green



**Plant: Pea crop**



**Green pea seeds**

**Recipe to make green peas ink:**  
put a few peas (10 to 15) in a container, add 2-4 spoons of hot water and smash them to pieces. For better results you can put them in a mixer and create a type of peas smoothie.