Museums, Learning Centers and Education for Sustainable Development

Practices and Possibilities in the Oslo Area

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At their best, museums are places of the muse – where individuals experience timeless human themes: compassion, wonder, challenge, fear, achievement, love, death, sacrifice, and creativity.

(Worts, 2008)

Museums are nothing but producers of the present, precisely because they are an effective mechanism. Therefore, museums must be encouraged to realize that they are not the result of history standing before eternity […] This entails an obligation to consider what present reality museums want to engage in producing […]. Collecting objects, specimens and art, recording them, conserving them, researching them and displaying them does not mean the same thing over time.

(Friis Møller, 2013, p. 226)

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Abbreviations

DESD	Decade for Education for Sustainable Development
ESD	Education for Sustainable Development
HHH	Head, Hands and Heart
IIS	International Implementation Scheme for Education for Sustainable Development
MDG	Millennium Development Goals
SD	Sustainable Development
TSL	Transformative Sustainability Learning
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization

1 Introduction

Almost 30 years ago, the Brundtland commission introduced a term that would become a key idea of the 21st century – *sustainable development*. Sustainable development envisions a society in environmental, social and economic balance or, as expressed by the Brundtland commission *Our Common Future*, it is a "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (UN, 1987). It is widely accepted that knowledge, attitudes, skills and practices are important factors towards a more sustainable future, towards ecological health and human wellbeing (Orr, 1992; Sipos, Battisti, & Grimm, 2008).

During the past few decades a multitude of nature, development and sustainability education programs have been launched as a response to sustainability challenges. Hicks makes the criticism that such programs often handle sustainable development and education related to it as purely cognitive matter (Hicks, 2002, p. 108). Approaches such as the ecological footprint – an index to calculate the impact of consumption patterns – offer a way of understanding the actual state of the world, but do little to provide people with values and tools to cope with local or global sustainability challenges in an active way. It is therefore necessary to expand such kind of education, sustainability education, from a cognitive venture to a concept that includes values and skills. Currently, the UN Decade of Education for Sustainable Development, which has arisen from Agenda 21, aims to do exactly that: to promote knowledge, attitudes and skills for a more sustainable world. This decade and its intentions constitute the framework of this study.

Awareness of the effects of Western lifestyles and the obstacles they present for sustainable development has increased in Norway, but research indicates that Norwegians are generally little concerned about and committed to sustainability matters such as climate and climate change (Nordgaard, 2011, p. 1; Schreiner, Henriksen, & Kirkeby Hansen, 2005, p. 21; Stoknes, 2013).

In Norway, sustainability education, including the UN`s Decade for Education for Sustainable Development, has largely focused on formal education, especially schools. The same accounts for research on the topic. Studies by Raabs (2010) and

Laumann (2007) suggest that despite this exclusive focus on schools, sustainability education is not yet holistically integrated in the Norwegian school system. Within the last years, however, various actors have sought to promote and improve sustainability education in schooling. These include traveling speakers on climate and climate change; a national online school newspaper on the environment; teacher training courses and conferences on Education for Sustainable Development; funding programs which promote the collaboration of schools and external actors on sustainable development matters; and awards and certification for environmental commitment at schools. These projects show an increasing awareness of the role formal education plays for sustainable development in Norway.

Education is not exclusively confined to schools and students. Falk and Dierking (in Ballantyne & Packer, 2005, p. 281) estimate that people spend only a mere 3% of their life at school. They continue to acquire knowledge when graduating from school, when mingling with friends, surfing on the internet, when reading books, going to the zoo or to museums (Ballantyne & Packer, 2005, p. 281f.). This has major implications for sustainability education and raises questions about Norway`s exclusive focus on school education. This study looks at two institutions outside the formal education system, on museums and learning centers,[1] some of the most central institutions within informal education – that is education which is not organized with respect to goals, time or instruction (cf. OECD).

Data from 2011 shows that within the last five years, the number of visitors to Norwegian museums / learning centers has steadily increased. In 2012 alone, over 10.6 million visitors were recorded – more than twice Norway´s population the same year (Norwegian Arts Council, 2012, p.10). Furthermore, most Norwegian museums / learning centers have a strong focus on their youngest visitors. Over two thirds offer education specially directed at children or are planning to do so. Additionally, more than a third of Norwegian museums / learning centers provide online education tailored for schools (Norwegian Arts Council, 2012, p. 5). Most welcome school classes and have integrated school divisions. Museums / learning centers in Norway are thus not only major promoters of informal learning; they strive to become an

[1] The literature does not always differentiate thoroughly between those two institutions. The main difference lies in collection building which is central for museums, but not necessarily for learning centers.

integral part of school education, creating a bridge between formal (structured and organized) and informal (non-structured and not organized) learning. In short, the strong position museums / learning centers have in informal and formal education indicate that these can become central institutions for sustainability education. Indeed, a catalogue by Trautmann (2007) on 34 permanent and temporary exhibitions related to climate change suggests that sustainable development is a topic of interest at museums / learning centers.

There are, however, more critical views on the role and potential of museums / learning centers in sustainability education. Worts (e.g. 2004, 2006a; 2011) and Sutter (2008) point to a range of challenges. In particular, they are skeptical about the strong focus many museums have on collection building and the past. This focus stands in contrast to sustainable development's inherent concern with humans and the environment, and with the present and future (cf. Sutter, 2008, p. 198).[2]

Research on the role of museums / learning centers in sustainability education is a relatively new field and by large bound to English-speaking contexts. This study seeks to expand this focus. It focuses on four Oslo museums / learning centers, their exhibitions and school programs: the Norwegian Museum of Science and Technology (Norsk Teknisk Museum), the Nobel Peace Center (Nobels Fredssenter), the Natural History Museum (Naturhistorisk Museum) and the Norwegian Folk Museum (Norsk Folkemuseum).

The study will answer three main questions:

a) Potential: What can Oslo museums / learning centers, their exhibitions and school programs bring to sustainability education and more specifically to Education for Sustainable Development as defined by the UN Decade of Education for Sustainable Development?

b) Challenges: Which limitations do Oslo museums / learning centers, their exhibitions and school programs face with respect to Education for Sustainable Development?

[2] Concerning learning centers, there is preliminary little research on their role in sustainability education.

c) Solutions and Incentives: How can exhibitions and school programs at museums / learning centers in Oslo overcome those challenges they face with respect to Education for Sustainable Development? Which incentives might trigger a stronger integration of Education for Sustainable Development at Oslo museums / learning centers?

By exploring these questions, I wish to give attention to an under-studied field of research.

Before I move on, I wish to clarify and comment on the terminology employed in this thesis. First, for reasons of simplicity I will use the form *museums / learning centers* when referring to both museums and learning centers.

Secondly, the term *actor* is frequently used in the thesis – for instance with regard to Education for Sustainable Development. *Actor(s)* here are understood as individuals, groups, organizations or institutions from the private and official sector which in the broadest sense foster, impact or work with Education for Sustainable Development and matters related to it.

Lastly, in this thesis I refer to *formal*, *informal* and *non-formal* learning several times. Formal learning is defined as structured and organized learning linked to certain competence goals with the aim of acquiring an official qualification. This includes for example kindergarten education, school education or workplace training. Informal learning describes non-structured learning, independent from learning goals and official qualifications which happens through everyday experiences, e.g. at home, at work or during leisure activities, including museum visits.[3] Non-formal learning signifies learning that is structured and organized, often with respect to certain goals, but which does not necessarily provide an official qualification. This includes work seminars or hobby classes (cf. OECD). These definitions are not mutually exclusive, but they allow us to differentiate between different forms of learning.

[3] See infed and OECD for a more comprehensive discussion of the terms *formal*, *non-formal* and *informal* education. Dudzinska-Presmitzki & Grenier (2008, p. 10) notice that museums as informal learning institutions frequently are linked to non-formal learning as well.

Including this short introduction, the thesis comprises eight chapters. Chapter two will provide an exposition of the UN Decade of Education for Sustainable Development, and its conception and implementation on a global level as well as in Norway. Chapter three will give a brief introduction to museums / learning centers and their main features. Chapter four will outline the methodology of this study including a short characterization of the selected Oslo museums / learning centers. Chapter five will present exhibitions and school programs from the four museums / learning centers that are relevant for Education for Sustainable Development and will discuss their suitability for the initiative. Chapter six will address factors that impact exhibition design and the development of school programs at the museums / learning centers of this study. Chapter seven will summarize the potential of museums / learning centers in Education for Sustainable Development, the challenges they face in providing such kind of education and how these challenges may be overcome. The final chapter, eight, will sum up the major conclusions and provide a brief outlook on the future roles of museums / learning centers in Oslo.

The process of writing this thesis has been supported by many people. First of all, I would like to thank Tanja Winther, my supervisor, for her valuable input and constructive critique when designing the project and for inspiring me to explore the research material from different perspectives during the writing and revision process of this thesis. Many thanks also go to the Norwegian Museum of Science and Technology, to the Nobel Peace Center, the Natural History Museum and the Norwegian Folk Museum who opened their doors for this project and its fieldwork and who have provided me with all the information I needed. I am especially thankful to Håvard Heggelund, Toril Rokseth, Cecilie Webb, Siv Garles Sjåland, Anne Marie Svebak Grimstad, and those five teachers that made time in their tight schedules for the interviews this project is based on. Thanks also to Martin Lee Müller for literature suggestions, to Kristoffer Ring for patient technical assistance and Virginia Clark for proof reading. Finally, I would like to thank Anders Martinsen for his unbroken support during the writing and revision process, inspiring comments, power talks and not least proof reading during the final stage of the thesis.

2 Education for Sustainable Development

This chapter will give a short introduction to Education for Sustainable Development (ESD) as a concept within sustainability education. I will start with an overview of UNESCO`s Decade of Education for Sustainable Development (DESD) and will subsequently discuss how the Decade has been implemented. In this context I will draw on UNESCO`S International Implementation Scheme for Education for Sustainable Development, the ESD strategy of the UNECE countries[4] and Norway`s ESD strategy. Lastly, I will look at current practices ESD practices in Norway`s school system.

2.1 Sustainability Education – Clarifying Terms

Sustainable development (SD) is probably the most prominent concept of the 21st century. Introduced by the Brundtland commission in 1987, it is grounded in three major pillars: the economy, the environment and society.

Since its implementation, the concept has attracted criticism and has been accused of shortcomings and paradoxes. McNeill (2000, p. 4) notices for example that environmental sustainability and development are often perceived as two opposites that cannot easily be combined in one approach. Likewise, Selby (2006, p. 355) contends that environmental questions have not been given any urgency, as prevailing development paradigms have remained unchallenged, paradigms which threaten the well-being of the natural world. Paradoxically, it seems, while environmental sustainability is a central aspect of SD there is little will to compromise or revise present development paradigms to reach that objective. In this respect, sustainable development recedes into the distance (Olvitt, 2013, p. 117).

Despite these conceptual challenges, SD offers a fruitful approach. As the director of UNESCO, Koichiro Matsuura puts it, SD is a way to "think in terms of forever" (Matsuura, in UNESCO, 2005a, p. 15). One of its key principle is to reflect on the consequences and impacts of today`s actions and in doing so, to consider alternatives to them. There are many ways and branches that can contribute to this economically,

[4] Due to limited local resources the UNECE was asked to develop the ESD strategy for Europe, Northern America (the US and Canada) as well as Central and Western Asia (Kazakhstan, Kirgizstan, Tajikistan, Uzbekistan and Israel).

environmentally and socially sustainable future. Some – education, for example – are crucial. (UNESCO, 2005a, p. 3; 2005b, p. 6).

A rich terminology exists which describes learning connected to development, the environment and sustainability. Terms such as *Earth Education*, *Development Education*, *Environmental Education*, *Education for the Environment*, *Education for Sustainability*, *Education for a Sustainable Future* or *Education for Sustainable Development* derive from different periods, different global initiatives and trends (Shallcross & Wals, 2006, p. 3). I will group such forms of learning that aim at imagining and creating a sustainable society under the heading of *sustainability education*.

The DESD, which will last until 2015, is the most recent of these initiatives. The decade was declared by the United Nations General Assembly in 2002 and is being led by UNESCO. Traditionally, sustainability education has taken the form of nature and environmental education; this is mostly understood as education *for*, *in* and *about* the (natural) environment (Shallcross & Wals, 2006, p. 4). ESD, grounded in the principles of sustainable development, seeks to expand this focus and highlights much stronger social sustainability elements such as development, justice and equality (UNESCO, 2005a, p. 3, 2005b, p. 30,).

UNESCO linked DESD to eleven focus areas: biodiversity; climate change education; disaster risk reduction; cultural diversity; poverty reduction; gender equality; health promotion; sustainable lifestyles; peace and human security; water; and sustainable urbanization (UNESCO). Most of these originate from the Earth Summit in Rio de Janeiro and are linked to the three pillars of sustainable development (UNESCO, 2005b, p. 7). In addition, the decade is designed to support the Millennium Development Goals and is further linked to the UN`s Education for All initiative and the UN Literacy Decade. As such, it also supports lifelong learning (UNESCO, 2003, p. 3; 2005b, p. 8).

2.2 UN Decade for Sustainable Development

2.2.1 Conception and Implementation

Sustainability education has traditionally been seen as a matter of knowledge. Increasing literacy levels and comprehension of SD alone, however, are poor indicators for a society`s transition towards sustainability (e.g. Jorgensen, 2003, p. 388; Orr, 1991; Sipos et al., 2008, p. 70; Sterling, 2008, p. 18). ESD offers a more holistic educational approach in that it addresses, for example, knowledge, values, attitudes, skills, practices and action (UNESCO, 2005a, p. 15; 2005b, p. 6f.; 2009a, p. 4). It thereby extends cognitive learning approaches by an affective and practical dimension which are closely interrelated. Let us look closer at that.

To implement DESD globally, UNESCO has developed a guide for the individual regions and states, the International Implementation Scheme for Education for Sustainable Development (IIS). The IIS defines ESD, explains its roots and describes how it is organized on the international, national, governmental and regional level.

Value systems, critical reflection on them and their transformation are crucial aspects of this scheme. The IIS presents ESD as a tool to foster vision building for sustainable development (UNESCO, 2005b, p. 6). Envisioning a sustainable society requires a set of pro-sustainable values on which those visions are based. Although ESD is not intended to pre-define appropriate values or behavior, it should serve as a mediator for more universal values as respect, justice, tolerance or equity (UNESCO, 2005b, p. 8). This emphasis on values and value transformation provides ESD with a significant ethical dimension.

Values and the visions resulting from them have practical implications, affecting attitudes and thereby, decisions and practices (cf. UNESCO, 2005a; UNESCO, 2006, p. 22f.). Likewise, the IIS emphasizes skills development, practices, behavior and action awareness as more practical objectives of ESD: [5]

> To make progress towards more sustainable societies requires a population that is aware of the goals of sustainability and has the knowledge and the skills to contribute towards those goals.
>
> (UNESCO, 2005b, p. 29)

[5] Accentuation by the author.

> The overall goal of the DESD is to integrate the principles, values, and practices of sustainable development into all aspects of education and learning. This educational effort will encourage changes in behaviour that will create a more sustainable future in terms of environmental integrity, economic viability, and a just society for present and future generations.
>
> (UNESCO, 2005b, p. 16)

> Most importantly, awareness should result in an understanding that the actions of an individual or a group can affect the lives of others and the social, economic, and environmental situations locally and abroad.
>
> (UNESCO, 2005b, p. 17)

The scheme understands skills as general participative and contributive abilities related to SD; these include, for example, critical thinking, information collection skills, but also pro-sustainable practices or action itself. Action awareness, according to the IIS, consists of an understanding of actions and behavior and their consequences with respect to SD.

The extension of cognitive sustainability learning by affective and action-related elements has raised criticism in academia. It has fueled debates over how far-reaching transformation in sustainability education and ESD in particular should be. Sustainability education programs have been accused of being too ideologically laden, in that they predefine desirable behavior such as energy and water saving or recycling (cf. Courtenay-Hall & Rogers, 2002; Jensen & Schnack, 1997; Mogensen & Schnack, 2010; Stevenson, 2007). Critics such as Jensen, Schnack and Mogensen claim that moralizing and pre-defining behavior corrupts the ESD principle of raising critical, independent social thinkers. They argue that the capability to take action as such, or "action competence" as they call it, should be the prior competence goal, and that this should be separated from moral standards (Jensen & Schnack, 1997; Mogensen & Schnack, 2010).[6] Likewise, UNESCO noticed that some countries ground ESD in principles such as social learning, democracy and participation, with their main goal being to raise actively participating citizens. They thus favor a participative approach based on skills development and action awareness, that may pave the way for behavioral change. Other countries, UNESCO notes, pursue a more ideological approach stressing pre-defined behavioral change and practices (2009b, p. 24).

[6] Such moral concerns, it seems are prevalent in the Nordic countries where neutrality has been a principle in politics and political education (cf. RORG, 2010).

Those two approaches may not be as contradictory as they first appear. All curricula and all educational statements are value-laden per se and shaped by ontological and epistemological assumptions (Sipos et al., 2008, p. 70; Lawton, in Sterling, 2010, p. 18). Therefore, critical thinking is always influenced by the ontological frames set by education and socialization. Furthermore, priming this generation for the likely challenges it will face and providing it with certain practices does not necessarily downgrade skills development (e.g. critical thinking skills) and action awareness. Practices and behavior are by nature free from (everyday) reflection and can be a valuable supplement to critical thinking skills (cf. Curry, 2012, p. 168).[7] Rather than contradicting one another, I suggest, instrumentalist and participatory approaches can be used alongside one another to realize the goals of ESD.

Over the course of the Decade, UNESCO seeks to implement ESD broadly, with the help of multiple actors and already existing structures. As supporting partners for the decade, the IIS lists governmental and private agents, NGOs or civic organizations (UNESCO, 2005b, p. 10) and names examples such as schools (governmental / subnational level) as well as ministries of education and development (governmental / national level). In this context, the IIS also points out the role of formal, informal and non-formal learning (UNESCO, 2005b, p. 30f.). Informal learning institutions such as museums / learning centers are not included in the list of examples; this indicates that a lower priority is placed on such institutions. However, by including different forms of education, the IIS seeks to make ESD a concept that is relevant to different types of education and people of all ages (UNESCO, 2005b, p. 29).

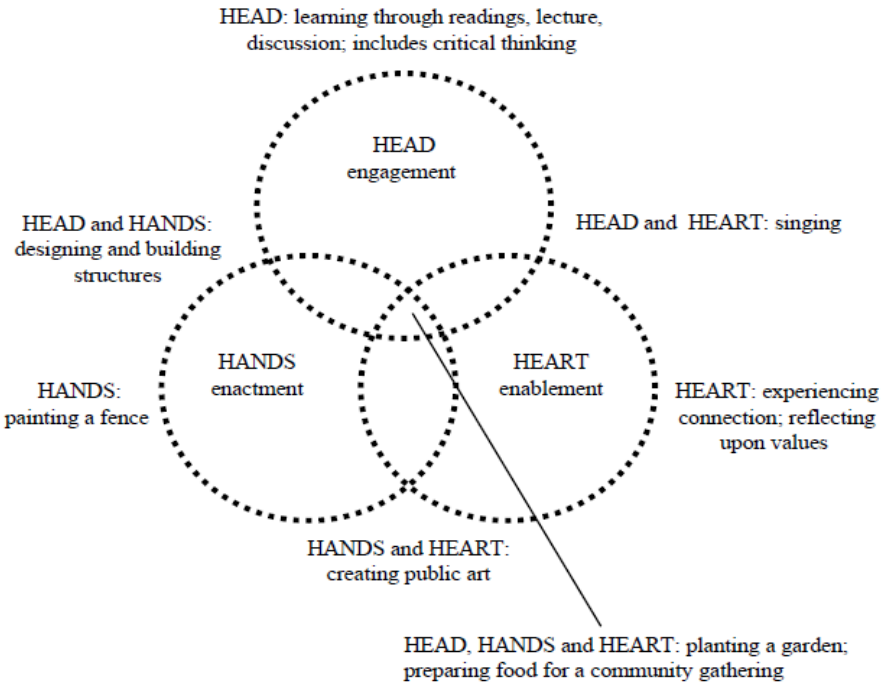
2.2.2 Transformative Sustainability Learning

The term Transformative Sustainability Learning (TSL) was introduced some years ago by Sipos et al. (2008) as an umbrella for different educational approaches that involve Head (engagement), Hands (enactment) and Heart (enablement), such as environmental education, critical emancipatory pedagogy, participatory action

[7] Even if aspired, it is not even guaranteed that transformation will actually happen and to what degree (Berner, Lobo, & Silva, 2013, p. 19; Sterling, 2010, p. 28).

research, pedagogy for eco-justice and community, problem-based learning or traditional eco-knowledge (Sipos, 2005, pp. 2,8; Sipos et al., 2008, pp. 73-75).

Transformative sustainability learning is grounded in Mezirow`s transformative learning theory (Berner et al., 2013, p. 7). Mezirow understands transformational learning as a redefining of prevalent reference frames (2013, p. 7; J. Mezirow, 2000, p. 7f., cf. Berner et al.). Transformative learning supports critical (self-) reflection, in which knowledge and meaning are not easily accepted, but challenged and ideally reconstructed. Mezirow`s approach focuses primarily – though not exclusively – on the cognitive dimension and on analytical skills, with the ultimate goal of educating independent social thinkers (Grabove, 1997, p. 90f.; J. Mezirow, 1997, p. 7). Other researchers such as Sipos et al. suggest that transformative learning should also encompass behavioral transformation, and it is to this tradition that TSL belongs.



(from Sipos et al., 2008, p. 75)

In TSL, the learner`s reference frames constituted by knowledge, attitudes and behavior, should be questioned and reframed with regard to socio-environmental concerns (Sipos, 2005, p. 15; Sipos et al., 2008, p. 70). Emotions and values are assigned a vital part in this process, as the promote cognitive learning and initiate action (Grabove, 1997, p. 90; Sipos, 2005, pp. 18-19; Sipos et al., 2008, pp. 19-29). There are strong parallels between Sipos and al.`s TSL concept and ESD, especially

concerning the focus on cognition, affection and action and the setting of pro-sustainable goals (Sipos et al., 2008, p. 71; cf. Svanström, Lozanzo-Garcia, & Rowe, 2008, p. 343; cf. UNESCO, 2005b, p. 9).

In Sipos` dissertation, Sipos and Grimm (2005, p. 27ff.) suggest different aspects that belong to Head, Hands and Heart[8] – or cognitive, practical and affective education to use synonyms for their categories.[9] Such classifications do not come without problems, as Sipos and Grimm themselves (Sipos, 2005, p. 25) notice. In a learning experience, cognitive, affective and practical learning are deeply intertwined and to separate them from one another is an almost impossible academic exercise. Further, Sipos and Grimm do not always thoroughly differentiate between learning experience and learning effect in the sub-criteria of the three learning dimensions.[10] Additionally, the accuracy of the sub-criteria is quite varied. Despite these weaknesses, however, which primarily concern matters of definition, TSL is an intuitively consistent concept and runs like a golden thread though the works of e.g. Steiner, Montessori, Bloom, Dewey and Orr (cf. Sipos, 2005, pp. 21, 25; Orr, 1992, p. 92).

2.2.3 Culture, Human-Nature Relations and the Interplay of Visions and Actions

Robottom (2012, p. 162) concludes that although ESD constitutes a rhetorical change in sustainability education, it has provided few practical results**.** Likewise, Sterling (2008, pp. 64-66) has claimed that ESD has not brought about new patterns in education, let alone changed lifestyles or fostered sustainable societies. The causes named in the literature are diverse, ranging from overly vague key concepts, unfamiliar terms and lack of competence in the education sector to missing discussions of underlying ideologies, values and perspectives (Illeris, 2012, p. 79; Jickling & Wals, 2008, p. 4; UNESCO, 2009b, pp. 7, 22). To illustrate the potential, limits of and controversies around ESD, I will in what follows take up three central points: first, a restricted understanding of culture; second the framing of human-nature

[8] Grimm was co-author for the second chapter. The complete list can be found in the appendix.

[9] Sipos and colleagues` HHH concept puts ranges 'Hands- second place before affective learning. I will employ the order *cognitive*, *affective* and *practical* learning as the application of action-related competences to a certain degree depends on cognitive and affective elements.

[10] The sub-criteria for the three learning dimensions are presented as competence goals, but include e.g. learning experiences as "cognitive engagement" and "fun".

relations and third – less controversial, but highly central – the interrelation of vision, motivation and action. These points will be critical for the analysis of the study.

Culture

In the last years there has been increasing academic attention towards culture and cultural heritage, and the role of these in sustainability. Culture is no longer seen as an impediment to development and environmental sustainability. Quite on the Contrary, culture has been identified as playing an important role in economic growth, human development, peace and other spheres of sustainability. It has therefore recently been acknowledged as fourth pillar of SD (UNESCO, 2013, cf. Sutter, 2008, p. 189; Witoszek, 2012; Worts, 2004, p. 46). The IIS mentions culture several times, especially with regard to the cultural appropriateness of ESD programs (UNESCO 2005b, p. 20, 28). In that it seeks to reconsider and adjust attitudes, beliefs and practices in a critical way, ESD has a major effect on culture itself.

Furthermore, both SD and ESD explicitly reintroduce the past and the future into modern lifestyles, two dimensions intimately related to culture. In pre-modern times, life was significantly determined by natural forces and shaped by cultural memory which, through its realization in traditions and tales, created identity and generated a continuity of past, present and future.

With the invention of modern technologies such as the steam engine and electricity, natural limits were overcome more easily. Modernity fostered values such as democracy, human rights and equality. The central theme of modernity, however, is novelty and radical change; modernity promotes an ever-lasting renewal and thereby a focus on the here and now (Mathews, 2002, p.227).[11] This disrupts the continuity of past, present and future and dissolves cultural memory – a major source of knowledge on sustainable lifestyles (cf. Curry, 2012, p. 174f.). Instead, modernity fosters a machinery of production and waste which ultimately causes challenges for future generations.

SD and ESD actively reintroduce a time dimension into this modern worldview. In SD and ESD modern concepts as human rights and equality apply both to present and to

[11] This idea is already present in the semantic roots of the adjective ‘modern,’ which means "now existing" and "of pertaining to present or recent times" (Online Etymology Dictionary, 2013).

future generations (cf. UNESCO, 2005b, p. 8), and this should guide the choice of present actions. SD and ESD thus turn cultural memory as a concept upside down and highlight the future in addition the present. Rather than basing lifestyles on tradition, this encourages us to consider actions on the basis of their consequences. Besides this focus on the future, the IIS emphasizes the role of the past and of indigenous, traditional and local knowledge:

> Quality education […] is informed by the past (e.g. indigenous and traditional knowledge), is relevant to the present, and prepares individuals for the future;
>
> (UNESCO, 2005b, p. 27)

> Processes of public participation for integrating indigenous, traditional, and local knowledge and culture into ESD programmes.
>
> (UNESCO, 2005b, p. 20)

This is an important step and acknowledges the relevance of traditional lifestyles for sustainability. However, it provokes the question of why certain elements of cultural history, namely indigenous and traditional knowledge, are highlighted at the expense of others. The same can be observed in the strategy of the UNECE countries, of Europe, North America as well as Central and Western Asia (UNECE, 2005, p. 4). Interestingly, already the report by the Brundtland Commission *Our Common Future* mentions cultural heritage as being threatened but does not go deeper into its actual value for SD. In the light of UNESCO`s heritage conservation policy and acknowledgement of the role of culture in sustainability in the 1990s however, the subordinated role of cultural history in ESD is rather astonishing.

The present is not separate from history; rather it is a product of it (Egan, inEgan, Gray, Kaufman, & Montrie, 2004). Cultural history as a whole informs us about how present society has been and is being formed, giving us insights into the origin and relevance of basic values on which a society is based on (e.g.Worts, 2006a; Worts, 2011, p. 120). Understanding the past allows for a deeper understanding of values, lifestyles and practices. If culture is an aspect of SD and ESD, then cultural history as inseparable part of culture is a crucial element of the concept.

To sum up, SD and ESD offer a fruitful approach which helps to overcome modernity`s disregard for time especially with respect to the interrelatedness of the

present and the future. Nevertheless, both concepts could benefit from a stronger and more general integration of cultural heritage.

Human-Nature relations

SD, as I touched on shortly, has been facing criticism for not challenging current development paradigms enough, and thereby inhibiting genuine environmental sustainability.

Sterling (2008, p. 64) claims that Western education, including sustainability education initiatives, has mainly been a promoter of Cartesian rationalism. Current educational paradigms, he argues, foster objectivity, certainty, universality, and predictability, and regard humans as superior to and separate from the rest of nature. Nature, in this approach, supports the greater good of human development and becomes a calculable and controllable instrument for that development.

Thinkers such as Abram (2010, p. 87), Næss (cf. 2005a, p. 515) and Leopold (1990, p. 415) question the idea that humans are truly separable from other forms of nature. Rather they see humans as a part of the bigger natural community and regard human-nature interaction as essential part of human life and identity (cf. Næss, 2005b, p. 7, cf. Callicott, 1987, p.193-2002, Leopold, 1990, p. 421). Rational perspectives on SD and ESD such as provided by management approaches may prevent for example over-exploitation, but they do not acknowledge the actual causes of environmental distress which are rooted in socio-cultural values, practices and traditions (Lélé, 1991, p. 610). These affect human-nature relations.

The IIS remains fairly formal and general with regard to human-nature relations:

> Understanding and addressing these global issues of sustainability that affect individual nations and communities are at the heart of ESD. These issues come from the three spheres of sustainable development – environment, society and economy. Environmental issues like water and waste affect every nation, as do social issues like employment, human rights, gender equity, peace and human security. Every country also has to address economic issues such as poverty reduction and corporate responsibility and accountability.
>
> (UNESCO, 2005b, p. 7)

Interestingly though, the IIS names two examples only for the environmental dimension of SD – water and waste – but five elements of social sustainability.

However, these may be small details and should not be over-interpreted. The UNECE strategy is more explicit with this regard:

> Our vision for the future is of a region that embraces common values of solidarity, equality and mutual respect between people, countries and generations. It is a region characterized by sustainable development, including economic vitality, justice, social cohesion, environmental protection and the sustainable management of natural resources, so as to meet the needs of the present generation without compromising the ability of future generations to meet their needs.
>
> (UNECE, 2005, p. 1)

Here, environmental concerns are listed last, after economic and social elements of sustainability. Human-human relations are depicted in a comparatively detailed way as being based on "equity, solidarity and interdependence". This does not necessarily apply to human-nature relations, which are listed separately. Further, human relations with nature are presented as a one-way-street; human contact with nature is reduced to supervision and control – or as paraphrased here, "management". ESD, as it comes forth in the UNECE strategy, sets up an ideal that mainly concerns human-human relationships and in that way it presents human life as the center of concern (cf. Curry, 2012, p. 230).

Human-nature relations are an illustrative example of the role culture and cultural views play in ESD. Management approaches, based on calculation and control, do little for redefining human-nature relations, nor do they promote an awareness of the environment and a consequent cautiousness when interacting with it. If ESD in its very essence is about action and practices than these actions will have to be based on ontologies that include the environment in human life, in order to genuinely safeguard a socially and environmentally sustainable future.

Visions and Action

I mentioned above that SD and ESD are essentially about considering action on the basis of its consequences for future generations. Until recently, this approach has yielded few results. Researchers within sustainability education assume that this is partly due to an overemphasis on human failure in SD matters and on the shattered future which may result from that failure. Such narratives have caused stagnation, denial and depression which themselves build an unfavorable basis for pro-

sustainability commitment (cf. Moser & Dilling, 2007; Nordgaard, 2011; Rickinson & Lindholm, 2010, p. 20; Sutter, 2008, p. 193). One of the problems here is that such approaches fail to let people imagine their own future (Berner et al., 2013, p. 5; cf. Hicks, 2002; O`Sullivan, 2002; Sterling, 2010). There is academic consensus that hope and vision building are imperative for individual empowerment and hence commitment to a sustainable future. Ojala (2012) found that high schools students who integrated pro-environmental routines such as recycling into their everyday life after graduation, had much brighter hopes for the future. Likewise, in their comprehensive article on climate education, Schreiner et al. (2005, pp. 17f., 22) point to studies which indicate that visions and the opportunity to actively contribute to envisioned futures are central to individual motivation for climate action (Schreiner et al., 2005, pp. 22, 39). Where those opportunities of personal influence are missing, they claim, resignation, desperation and a focus on the here and now can evolve as a consequence. Similarly, Illich (1999, p. 17) differentiates between technological visions for sustainable development which foster individual passivity on the one side, and social visions that may lead to individual empowerment on the other. In line with Schreiner et al. and Illich, Hicks and Bord (2001, p. 416) regard the acknowledgement of personal responsibility as a central factor for commitment. To trigger this acknowledgement, they suggest, people have to be made aware of the nuisances around them, and they must be confronted by those nuisances (Hicks & Bord, 2001, p. 424).

Accordingly, there are three main factors that trigger personal commitment for a sustainable future and form a precondition for pro-sustainable action: first, a wake-up call addressing the need for change towards a more sustainable world; second, visions of alternative futures; and third, an opportunity to personally impact and contribute to that future. Again all three factors relate to cognition (knowledge on the state of the world), affection (imagination of the future) and action (possibility to act). Such refined didactic aspects also are implicit in the IIS (cf. UNESCO, 2005b, p. 17).

Looking at ESD more closely reveals certain elements which are important to ESD with regard to cognitive, affective and practical sustainability learning. These include, first, culture and cultural history, which only appear in fragments in UNESCO`s strategy. Second, as important as cognitive, affective and practical competences are

the ontological premises ESD is based on. This raises questions about the one-sided framing of human-nature relations in the UNECE strategy. And third, the actual success of ESD does not only depend on cognitive, affective and practical learning, but also requires an arena where people can make a difference. The next sub-chapter will examine these aspects in terms of Norwegian ESD strategy.

2.3 Norway`s Strategy for Education for Sustainable Development

2.3.1 Conception and Implementation

The framework the IIS sets for ESD is rather broad, and demands that each nation find its own model grounded in local conditions and challenges (UNESCO, 2003, p. 2; 2005a, p. 57; 2005b, p. 7f.). The Norwegian strategy for ESD is an adaptation of the Baltic-Nordic strategy, which again is linked to the overall strategy of the UNECE.

In 2012, the Norwegian UNESCO committee acknowledged that sustainability education in Norway, like in most other countries, had not yet overcome the stage of environmental education and struggled to include matters of development (Norwegian Ministry of Education, 2012; Laumann, 2007, p. 37). There are two causes for that. First, Norway`s strategy treated ESD as a matter of the natural sciences (cf. Norwegian Directorate for Education and Training, 2006h, p. 2). An second, Norway`s adaptation of SD highlights nature at the expense of development. The SD definition is quoted in Norway`s ESD strategy:

> Sustainable development requires that we see our actions in a generational perspective and are careful when we make choices that leave a lasting impression and influence on our descendants' freedom of choice and opportunity to cover their own needs, or even to survive. A fundamental principle is therefore that we must respect natural limits and base policy on the precautionary principle
>
> (Norwegian Ministry of Education, 2012, p. 7)

Clearly, SD in Norway emphasizes a generational perspective and the need to safeguard the opportunities of future generations. Needs of current generations and matters of development are not addressed any further. In particular, the last sentence puts the whole statements into the context of natural limits.

In 2012, Norway revised its strategy and in doing so expanded the focus of ESD. ESD should no longer be seen as an exclusive concern of the natural sciences; it should also become part of the social sciences and thereby widen its academic spectrum (Norwegian Ministry of Education, 2012, p. 2).

The revised strategy is fairly abstract, but seems at first glance to follow the implications of the IIS and the UNECE strategy. As objectives for ESD, it lists the mediation of "values and principles" that are in line with SD[12] as well as critical-thinking and problem-solving skills. The Norwegian strategy thereby addresses both cognitive, affective and practical elements of sustainability education (Norwegian Ministry of Education, 2012, p. 5). Further, it favors an approach that is based on values and participative competences rather than instrumental education.

The last section of the strategy suggests eleven topics that are regarded as especially relevant for ESD: climate; energy; consumption; resources and distribution; conflicts of interest; participation and democracy; biological diversity; nature areas; water resources; health; waste and recycling; as well as outdoors and nature experience.

Some things are worth mentioning here. Norway`s ESD strategy is an attempt to step away from human-centered development and education. This is particularly significant in the section on biodiversity, which acknowledges the interaction of humans and nature and an understanding of it as a basic criterion for SD. The section further emphasizes "economic, health, aesthetic significance" of biodiversity. In addition, the section on outdoors and nature names cognitive and affective benefits of human-nature interaction.

The strategies of other nations even take it a step further, going beyond a terminology of human-nature interaction acknowledging the interdependence of the human and natural environment such as the strategy of Colombia:

> In line with the systemic character of the environment, environmental education should be considered as a process that allows the individual to understand the interdependence between himself/herself and the environment, based on the critical and reflective knowledge of his/her bio-physical, social, political, economic and cultural reality, so that the appropriation of this concrete reality generates in the student and his/her community attitudes that value and respect the environment."
>
> (quoted in UNESCO, 2009b, p. 27)

[12] The strategy frequently drops catch words as *democracy*, *participation*, *justice* and *rights*, although not in the section on objectives.

Suggestion of Relevant Areas for ESD in Norway`s ESD strategy:

Climate
Global climate change is one of the most important environmental challenges we are facing today. Climate change can have a serious adverse impact on the living conditions for people, plants and animals. Education should provide insight into the mechanisms leading to anthropogenic climate change which we observe today and what might happen if greenhouse gas emissions do not change.

Energy
The increasing use of energy leads to global challenges related to the environment, conflict, energy security and energy prices that particularly affect the poor parts of the world. A more diverse and environmentally friendly energy system with greater use of renewable energy sources, energy efficiency and savings and flexible energy supply is a precondition for sustainable development.

Consumption, Resources and Distribution
Shortages of key natural resources and unequal global distribution of resources contributes to poverty and is a serious threat to sustainable development. Education must help to increase awareness about our consumption and show that the Earth's natural resources must be managed in a wise and solidary way. This shall provide insight into how this can be implemented within the physical, social and economic framework that is there today.

Conflicts of Interest
To ensure that the basic needs of all people on Earth are satisfied is an important goal. This places great demands on the sustainable use of nature and just distribution of goods. Conflicts of interest often arise when different concerns are weighed against each other. Interests of conservation and use can often stand in strong contrast. Learning to deal with conflicts of interest is a part of education for sustainable development.

Participation and Democracy
Responsibility and participation are fundamental in a sustainable development perspective. An essential prerequisite for participation and democracy is that societal barriers to equal participation are reduced. The school plays an important role to ensure that citizens in a democracy have the necessary democratic willingness and know their rights and obligations.

Biodiversity
Increased hunting of resources and a growing world population leads to pressure on the world's biodiversity. Loss of biodiversity is a serious threat to a sustainable future. Insight into the interaction of nature and the interaction between humans and nature is a prerequisite for being able to take a conscious choice for preserving biodiversity on Earth. Education should reflect economic, health, aesthetic and ethical significance of biodiversity.

Natural Areas
Loss of land is a threat to biodiversity. When natural areas are decreased or depleted, important natural resources can be lost, both as important habitats for plants and animals, as well as for land for food production and for recreation for humans. Conflicts of interest will often exist in the matter of development. Education should ensure that knowledge is the basis for the choices made.

Water Resources
Water is crucial, essential for life on Earth, and access to clean water is a human right. Still, clean water for many is a scarce resource. Access to clean water is a major challenge in the pursuit of sustainable development. The cultural, ecological and economic importance of water should be emphasized in education.

Health
Good public health is essential for sustainable social development. Material and cultural conditions have a major impact on lifestyle and health. Locally, the structure of the community affects people's opportunities to be physically active and the experience of security and belonging. Globally, there are other, bigger health challenges. Knowledge of global health challenges should be highlighted as part of sustainable development.[6]

Waste and Recycling
A bigger population and increased consumption creates more waste. The increasing amount of waste is a challenge for the sustainable society. Education must raise awareness of how waste can be reduced, how waste can be recycled and how waste containing hazardous substances shall be handled.

Outdoors and Nature Experience
Nature experiences and outdoor activities provide a basis for the individual's commitment to sustainable development. Outdoor activities can be central and beneficial to education, partly because children`s experiences in nature provide inspiration and knowledge to take responsibility for sustainable development.

(Norwegian Ministry of Education, 2012, p. 17f.)

While humans in Norway`s strategy are presented as primary agents who gain from interaction with nature – academically, physically, economically or aesthetically – Colombia puts nature on an equal footing with humans and emphasizes their interdependence.

Thus, in its ESD strategy, Norway backs away from Cartesian ideas of human superiority, but does not go all the way towards a genuine participative approach to humans in nature, and this weakens the basis of the ESD project as such.

Another element quickly catches the eye when analyzing the focus areas of the strategy, one which has been looming slightly in the above discussion and concerns the absence of culture and cultural history. Norway follows the implications by the UNECE strategy and omits cultural heritage – which had been included in the previous version – as a focus topic. (cf. Norwegian Directorate for Education and Training, 2006h, p. 7).

In the strategy document, culture is hardly mentioned at all. This suggests an underlying assumption that culture, including cultural diversity, cultural heritage and indigenous knowledge, is seen as a minor aspect of ESD. It is true that some focus areas include a cultural dimension in their description, such as consumption, resources and distribution; participation and democracy; and more explicitly water, but all are seen from a present-future perspective, which thrusts aside history and the origins of current cultural phenomena. Similar observation can be made with regard to visions and vision building. While the strategy presents ESD as a vision for the education sector, the educational role of vision and vision building for SD is not mentioned any further.

Despite a stronger connection with the social sciences and the integration of social science topics (such as health, social participation or conflicts of interest) it seems that socio-cultural elements are still neglected in Norway`s ESD strategy. This impression is further strengthened by the foreword of the strategy which, like its previous version, sees scientific knowledge as a major root of literacy:

> To contribute to the work for sustainable development, we need participants with good academic basis including science and social studies. Education for sustainable development is based on scientific knowledge and puts knowledge into meaningful social science contexts.
>
> (Norwegian Ministry of Education, 2012, p. 2)

If ESD is seen as a matter of the sciences, then central aspects of SD vanish, i.e. cultural factors such as values, lifestyles and practices, which may affect environmental sustainability, but also questions of development including social needs.

It is further significant that the Norwegian strategy for ESD, unlike the IIS and the UNECE strategy, focuses exclusively on formal learning and on young learners at kindergartens and schools. The UNESCO and the UNECE strategy explicitly link lifelong learning and ESD, and this includes also non-formal and informal learning (UNECE, 2005, p. 5; UNESCO, 2005b, pp. 6, 29f.). The same is true for Norway`s neighbor countries Denmark and Germany. They list both non-formal and informal learning in their strategies, target people of all ages and name amongst other things museums as potential supportive agents (Danish Ministry of the Environment 2008, pp. 3, 8, 11; German Commission for UNESCO, 2011, pp. 10, 20).

Also the supportive players within ESD that are listed in Norway`s strategy are directed at schools and students (Norwegian Ministry of Education, 2012, p. 13f.). Indeed, in Norway there are plenty of actors that promote ESD and other forms of sustainability education at schools; not all of them are mentioned in the Norwegian ESD strategy. On the national level, there are several initiatives, including funding programs, which promote the collaboration of schools and external organizations, and touch on ESD matters, e.g. the Cultural Rucksack, the Natural Rucksack and the Lektor2 program. The Cultural Rucksack aims at increasing the status of culture and art at schools. Over half of the children and adolescence who participate in pedagogical programs by museums do so via the Cultural Rucksack (Norwegian Arts Council, 2012, p. 11).[13] The Natural Rucksack distributes funding to school projects that are related to science education or education for sustainable development.[14] The lektor2 program funds the integration of the working world in natural science teaching, including sustainability education.[15] Further, there are initiatives such as Energy Schools (Energiskolene), which offers a framework for energy related education

[13] The Cultural Rucksack is not mentioned as supportive player in Norway`s ESD strategy, but allows for learning related to the field. I will come back that in chapter six. See http://www.kultursekken.no/
[14] See http://www.natursekken.no/
[15] See http://www.lektor2.no/

projects between schools and the working world; Entrepreneur camps (Gründercamp) that promote amongst other things energy-related projects between schools and companies / organizations; Environmental Journalists (Miljøjournalistene), an online school newspaper on the environment; and Ambassadors for the Environment (Miljøambassadørene), guest speakers on climate change. Other incentives include awarding and certification of environmental commitment at schools such as Green Flag.[16]

Table of Important Promoters of ESD or Sustainability Education in Norway

Initiative	**Agenda**	**Type of Promotion**
Cultural Rucksack	Promotes culture, art and cultural history through projects with external actors	Funding of external actors
Natural Rucksack	Promotes sustainability and natural science education projects, especially partnerships between schools and external actors	Funding of schools and external actors
Lektor2 program	Promotes natural science education through partnerships with actors from the working world	Funding during the period of establishment
Energy schools, Entrepreneur school and others[17]	Promotes collaboration projects with the working world with a focus on energy and SD	Information and counseling
Ambassador for the Environment	Guest speakers for secondary schools on climate and the environment	Free offer for schools
Green Flag	Certification for environmental commitment of schools	Counseling and certification
Climate award	Award for climate commitment at kindergartens, primary, and secondary school	Award including price money
Environmental Journalists	Promotes and publishes student articles and videos on the environment	Information, counseling and publication
Heiverden.no, Miljølære.no, Klimafilm.no and others	Websites with teaching material on development and the environment	Free information and material
Teacher training courses	Training possibilities within environmental education at e.g. Natural Science Center, Union of Education Norway or University of Life Sciences	Teacher training courses and programs

[16] See http://www.ue.no/Laerere-og-forelesere/Videregaaende-opplaering/Grundercamp, http://miljojournalistene.origo.no/, http://www.klimaloftet.no/generasjongronnforedrag, http://fee.no/?pageslug=hva-er-gront-flagg-4399

[17] See for similar projects http://www.naturfagsenteret.no/c1405600/seksjon.html?tid=1442351

Also, in collaboration with the Norwegian Society of the Conservation of Nature (Naturvernforbundet), the Union of Education Norway (Utdanningsforbundet) annually distributes an award for climate and environmental commitment at kindergartens, primary schools and secondary schools.[18] Moreover, there are several webpages with teaching suggestions on environmental and development topics, including cultural heritage (e.g. Miljølære.no, Klimafilm.no, Heiverden.no). As for the Oslo region, the Science Center at the University of Oslo (UiO), the Union of Education Norway and the University of Life Sciences (NMBU) offer training courses and conferences on ESD.[19] Interestingly, and this further strengthens the point made above, most of those actors in ESD and sustainability education belong to the natural sciences.

To conclude, Norway follows the IIS and the UNECE strategy by acknowledging ESD as a concept that includes cognitive, affective and practical sustainability learning. Further, Norway`s strategy acknowledges the interrelation of humans and nature, although it does not speak of interdependence. In other respects the strategy narrows down the broad superordinate approach of the IIS and the UNECE strategy significantly – more specifically, in the areas of both content and implementation. Culture and cultural history are poorly integrated into Norway`s strategy, and this accords with the strategy's strong emphasis on the natural sciences. Besides, the Norwegian initiative focuses exclusively on formal schooling and limits its target group to young learners. This provokes the question of whether other agents outside formal education, such as museums or learning centers, are able to contribute to ESD. This is what the study aims to discuss.

2.3.2 The Norwegian School curriculum and School Practices

In 2006, Norway`s government launched a new national curriculum – *The Knowledge Promotion* (Kunnskapsløftet) which addresses essential elements of ESD. The core curriculum includes a chapter on the environmentally conscious human, which emphasizes humans as part of nature, human dependence on other species as well as

[18] See http://www.utdanningsforbundet.no/Hovedmeny/Om-forbundet/Andre-artikler/Ny-klimapris/
[19] Likely, such courses are also offered outside of Oslo.

the importance of knowledge, insight and experience of nature (Norwegian Directorate for Education and Training, 2006a, p. 20f.). Here, the core curriculum goes beyond the implications of Norway`s ESD strategy. Moreover, elements of ESD are integrated in the curriculum of the individual subjects. In particular, *Social* and *Natural Sciences* which are compulsory in Norway for all students up to upper secondary school, include ESD aspects in their competence goals. Other compulsory subjects touch on ESD topics as well, such as *Food and Health*; *Religion, Philosophy and Ethics; English; Arts and Crafts; Geography* and, in a peripheral way *Norwegian* – albeit to a much smaller extent (cf. Norwegian Directorate for Education and Training, 2006c, 2006e, 2006f, 2008, 2013a, 2013c).

Most of the competence goals include cognitive skills such as understanding, discussing or analyzing matters related to sustainable development. In addition to that, the curriculum includes value education addressing ethics in several subjects at secondary school, for example in *Natural Sciences* and *Social Sciences* or elective courses such as *History and Philosophy*, *Biology*, *Technology* and *Research Science* or *Entrepreneurship and Enterprise Development* (cf. Norwegian Directorate for Education and Training, 2006b, 2006d, 2006g, 2007, 2013b). Only recently, behavioral routines – more specifically, recycling and waste separation – have been added (Norwegian Directorate for Education and Training, 2013b).[20] Still, cognitive competence goals dominate the curriculum, followed by affective aspects and minor practice- or action-related goals.

Perusing Norway`s national curriculum indicates that it differs in certain areas from Norway`s ESD strategy. Despite the lack of attention given to indigenous people and culture in the national strategy; these are well-represented topics in the curriculum – especially Sami tradition – in subjects like *Social Sciences*, *History*, *Norwegian*, *Food and Health* and *Arts and Crafts* although they are rarely explicitly addressed in terms of cultural education per se, but often as matter for democratic participation (Norwegian Directorate for Education and Training, 2006f, 2009, 2013c, 2013d).

Besides, history and the way events and history of ideas have shaped today's society are assigned a vital part in the curriculum, especially in *Social Sciences* and *History*

[20] Practicing recycling and waste separation is a competence goal in *Natural Sciences* for all students up to grade four.

(Norwegian Directorate for Education and Training, 2009, 2013d). The future, on the contrary, including vision and vision building, is barely addressed.

To conclude, there are certain differences between Norway`s national curriculum and the national strategy for ESD. Where the strategy sees human gains in human-nature relations, the curriculum gives more information about interdependence. It also includes elements of cultural heritage and cultural history. It seems, in fact, that in these instances the national strategy lags behind the curriculum (cf. UNESCO, 2009b, p. 12).

Since its launch, however, the curriculum has been met with broad skepticism among advocates of sustainability education, who criticize the curriculum for being too open, insufficiently relevant and insignificant with regard to SD (e.g. Laumann, 2007, p. 51; Raabs, 2010, p. 92f.; Schreiner, 2007). Within the past few years though, it has been revised several times. Competence goals have been added or reformulated to make them apply more to the core curriculum. In the course of these revisions, matters of ESD have been added or specified. In the *Natural Sciences* for example, the term 'sustainable development' has been integrated systematically in the sub-areas *Diversity in Nature* and *Technology and Design* (cf. Norwegian Ministry of Education, 2013, see Mork, 2013 for more examples). Moreover, in 2013/2014 six new elective subjects have been introduced to the already existing eight courses that are offered at the end of primary school in grade 8, 9 and 10. In total, six of these fourteen courses – students are to choose one for every school year – overlap directly with ESD:[21] *democracy in practice*; *commitment for others*; *living cultural heritage*; *nature, environment and outdoors*; *international collaboration;* and *physical activity and health* (Norwegian Directorate for Education and Training, 2012). Thus, in contrast to Norway`s strategy, the curriculum also takes up topics which lie outside environmental concerns and the sphere of the natural sciences.

Terms such as *sustainable development* and *sustainable* appear several times in the curriculum – the latter two frequently as the result of revisions as I indicated above (cf. examples by Mork, 2013). This must be deemed as an important success, but there are

[21] When introduced, these elective subjects were not linked to ESD, but marketed as a tool to motivate students with more practical education (Norwegian Ministry of Education, 2011). At this point in time it is not clear how many schools will have the resources to actually run all or parts of these courses and how attractive they are to students compared to courses such as *transport* or *tourism* (Svarstad, 2013).

two problems arising from this which are interrelated. First, *sustainability* and *sustainable development* are, in line with Norway`s strategy for SD, often interpreted as matters of climate, energy and the environment, and this does not coincide with the global understanding of the term.[22] It would require clearer, more precise language in the curriculum to broaden the comprehension of the term *sustainable development* and to specify the respective competence goals linked to it.

The second problem related to the increasing appearance of the term *sustainable development* in Norway`s school curriculum concerns the status of the topic. It seems, ESD has become an add-on rather than a principle. Competence goals within ESD substitute for or extend pre-existing competence goals. This can be challenging when ESD competes with other educational standards set by national and international tests as PISA. Teachers already perceive an overload when it comes to examinations and evaluations (Raabs, 2010, p. 92f.). This may in the end affect the quality of how competences – e.g. those within ESD – are narrowed down, prioritized and taken up in class.[23]

In summary, the Norwegian school curriculum takes into account essential elements of ESD and to go beyond the implications of the national strategy – especially concerning the acknowledgement of human-nature relations and the inclusion of cultural history. Although ESD is a concept which emphasizes the present and the future, the curriculum, does not include visions, vision building or active involvement in a sustainable future. In addition, I indicated above that there are practical challenges to realizing ESD in busy everyday school life. In 2009, the UNESCO mid-term report concluded that the school systems of Europe and North-America were ill-prepared to provide the kind of holistic and interdisciplinary learning that ESD demands. In this document, it also became obvious that most countries suffer a general lack of competence in ESD, which complicates its establishment (UNESCO,

[22] See chapter 6.

[23] This stands in direct contrast to a survey among Norwegian headmasters from 2011 which suggests that sustainability education is important for most Norwegian schools, that teachers have acquired relevant skills in the area and that ESD is well integrated in the local curriculum. However, most headmasters had not heard of or did not have any opinion about DESD (Spørsmål til Skole Norge 2012: page 46).

2009b, p. 22). This, research indicates, also applies to Norway, where teachers lack specific training and face time pressure due to demanding curriculums.

2.4 Chapter Summary – A Broad Concept and its Narrow Interpretation in Norway

ESD is a concept that addresses cognition (knowledge and critical thinking skills), affection (values and vision building) and action (skills, practices and actions). The IIS and the UNECE strategy present ESD as a concept that comprises development and the environment in equal parts, although it is less critical to underlying development premises. The Norwegian strategy is comparatively little concerned about development problems and emphasizes the strong role of the natural sciences on the expanse of socio-cultural aspects.

Although culture has been included as a fourth leg of sustainable development, the concept is rather weak in ESD in general. It can be found in the IIS and the UNECE strategy, mostly with regard to indigenous or related to the cultural appropriateness of ESD programs. Cultural history as such, however, is not recognized as element of ESD. Besides, those cultural implications of the IIS and the UNECE strategy vanish almost completely in the Norwegian adaption. Likewise, vision and vision building which are essential elements of the IIS, are not mentioned any further in the Norwegian strategy.

Another problematic aspect concerns the presentation of human-nature relations. Norway, in its strategy, distances itself from the management approach of the UNECE strategy and emphasizes human-nature interrelation, and the potential benefits this might entail for humans. However, Norway does not acknowledge any interdependence, as other countries do.

The flaws of the Norwegian strategy are largely compensated for by the national school curriculum. The Norwegian school curriculum includes both cognitive, affective and to a marginal extent also action-related aspects of ESD. It includes topics on development and the environment and goes beyond natural science-related approaches. In addition, cultural history and heritage are much more prominent including its role for present society. Further, the core curriculum recognizes human-

nature interdependence. Only vision and vision building are not integral part of the curriculum.

There are, further, indicators which suggest that due to an extensive curriculum and multiple expectations, ESD is not always prioritized in everyday teaching. Besides, the curriculum would benefit from a concretization of the term *sustainable development* to make it more tangible and highlight the development side of the concept.

Finally, it must be mentioned that the IIS and the UNECE strategy present ESD as a broad initiative targeting all age groups and different forms of learning. The Norwegian strategy narrows this approach down, focusing exclusively on formal education and students. While this may help to focus on one area of implementation specifically, such a selective implementation assigns all responsibility for SD to the coming generation, and gives up on this generation.

3 Museums and Learning Centers

In current research on ESD in Norway, one issue which has received little attention is the exclusive focus on kindergarten and school education, which stands in opposition to current lifelong learning initiatives and excludes actors with a certain potential for ESD such as museums / learning centers.

Traditionally, museums / learning centers are institutions which promote knowledge or competence acquisition without pre-defined goals. Museums / learning centers are open for the wider public, and many have developed school programs to make their exhibitions more relevant for formal education. In Norway, initiatives such as the Cultural Rucksack or the Natural Rucksack promote cooperation between museums / learning centers and schools. Museums / learning centers are thus not necessarily an integral part of formal learning, but they are undoubtedly a common supplement to it.

In the literature, museums and learning centers are often seen as the same, but they come with different assets. While museums are mainly characterized by their collections, learning centers often do not possess any (historical) objects.

Museums collect and display different kinds of objects, typically related to a place, a period and / or a certain topic. Many conduct research and act as mediators between academic subjects and the wider public. Research is still ongoing into the actual impact of museums and the ways people learn from them.

In museums, the learning experience is actively shaped by visitors and their interaction with objects, installations and each other (cf. Garcia, 2012; Leinhardt & Crowley, 2002, p. 4f.; Sterling, 2010). Research indicates that museums can help to explore attitudes and perspectives, they can foster a feeling of belonging and integration in a community, and they can support the exploration and articulation of "sensitive and difficult issues" (Selwood, 2009, p. 5). Further, they may promote knowledge, certain values, attitudes and beliefs, all of which are primary aspects of ESD (Sutter, 2008, p. 188f.). Although this is a good basis to start from, and although many museums address sustainability questions, not all do and few actively aim to transform behavior (Jordan, 2011).

One of the major assets of museums is their link to the past. Paarderkooper claims that "[H]istory museums act as shelters for memories" giving access to life in the past (Jordan, 2011, p. 9; Paardekooper, 2011, p. 8). This, I suggest, is an inherent

characteristic of the majority of museums as many display historical objects, at least to a certain extent. These objects create a strong basis for the discussion of values, and practices and how these have affected present society (Jordan, 2011, p. 9). In other words, even if museums do not address sustainability issues directly, they may be particularly interesting as mirrors and bearers of culture.

Learning centers, like museums, are places where visitors are invited to investigate certain topics, but they often allow for more physical involvement than museums. Usually, they are not bound to historical objects and collection building in the same way as museums, and therefore they are less closely linked to cultural history. Like museums, learning centers may touch on topics related to SD, but not all do so.

This brings us to another point, namely the purpose of museums / learning centers and their exhibitions. Weil contends that "ensuring that the public is better off after an institution`s action than it was before, are the hallmarks of an effective museum in the Knowledgeable Age […]." This highlights the fact that museums – and this is certainly true for learning center as well – are in the service of the public, rather than of their objects. If museums are made for people, then they will have to address topics relevant to people`s lives. SD is one of those topics, or should be at least, and is thereby directly relevant for the curriculum of museums / learning centers. Indeed, Ballantyne and Packer find that the agenda of museums in the UK frequently coincide with sustainability education programs (Ballantyne & Packer, 2005, p. 282). Also the German Commission for UNESCO notices that there are plenty of informal education institutions that are linked to ESD related matters – especially when it comes to nature and technology (German Commission for UNESCO, 2003, pp. 13, 16).

With regard to ESD, one field within museology is especially interesting, ecomuseology. It is a relatively new area within new museology which originated in the 1970s in France. While there is no single concept for ecomuseums, there are certain features that characterize most of them. Ecomuseums typically consist of several spaces that are significant to the community (Davis, 2011, p. 84). They thereby address and create a consciousness for a place, for objects tied to it and memories. Usually ecomuseums include nature and nature history alongside human artifacts and traditions (Davis, 2011, pp. 4, 79, 272,276). The Lihu Ecomuseum in Huaili in China, for instance, documents the traditional lifestyle of the White-

trousered Yao which has hardly been impacted by modern technologies and has kept intact its natural environment (Su, in Davids, 2011, p. 242)

Further, ecomuseums actively involve the local community in exhibitions and their design process. They thereby provide an opening for the active exploration and discussion of different types of knowledge, values and attitudes. Some, such as the Ha Long Bay Ecomuseum in Vietnam have actively played a part as a cradle for sustainable community development. Ha Long Bay is facing environmental pollution and cultural degradation due to rising tourism, coal mining, shipping and mineral extraction (Davis, 2011, p. 235). Through interpretation projects that included the whole community, the museum examined, among other things, the role of women and children in the community, and traditional fishing techniques. In that it promoted both community education and development (Davis, 2011, p. 236).

It seems that the work of museums / learning centers can be of great relevance to ESD. These are more theoretical conclusions based on literature research and examples from outside of Norway. The study will explore four specific museums / learning centers in the Oslo region and will discuss ESD at museums / learning centers in the Norwegian context.

4 Methodology

4.1 Research Design

The research project seeks ESD at museums / learning centers on the basis of real life examples. It comprises four qualitative studies of museums / learning centers in the Oslo area and maps their potential for ESD, looking especially at their exhibitions and school programs. Through this study, I aim to provide a deeper understanding of the work of museums / learning centers in general.

Initially, I sent out a survey and did online research in order to get an overview of Oslo museums / learning centers and to select those best suited for the study. I then looked at relevant ESD exhibitions belonging to the museums / learning centers which I selected, and I also examined one school program for every museum / learning center. Additionally, I conducted interviews with five employees of the museums / learning centers and with five teachers who had participated in relevant programs with their classes.

4.2 Fieldwork and Samples

Oslo is an interesting place for studying ESD. First of all, there is little previous research on ESD beyond the field of environmental and outdoor education in Norway. Second, as pointed out in chapter 2, Norway has chosen a rather narrow approach to ESD which emphasizes formal education. And third, theory and practice in ESD do not necessarily coincide in Norway.

As Norway`s capital, Oslo is home to 25% of Norway`s total population and seven of Norway`s top ten most visited museums / learning centers (cf. Arts Council Norway, 2012, p. 33ff.; Nobel Peace Center, 2013), three of them are included in this study.

To get an overview of the activities of each institution, I sent out a short survey to 37 museums / learning centers in Oslo. The museums / learning centers were chosen from the website *Oslo Surf*, an online guide for events and activities.[24] The survey included a short definition of ESD and a list of ESD topics taken from UNESCO and the Norwegian strategy for ESD. The museums / learning centers were asked to

[24] See http://www.oslosurf.com/Guider/Museer/

indicate whether ESD was of relevance for their business and to check those topics which come up in the institution`s exhibitions, programs or activities. Further, they were to indicate their general efforts in the field of SD and any possibilities for conducting research at the institution.[25] Twelve museums / learning centers replied. Among these, I picked those four museums / learning centers which had put on several exhibitions connected to the focus areas in Norway`s ESD strategy, which indicated that they were open for research and which had high visitor numbers and would thus reach out to the broad public. I also tried to maintain a certain breadth concerning the focus area and type of museum / learning center. For that reason I conducted online research in order to get a more detailed picture of the activities of the various institutions as well as their visitor numbers. Finally, the following four museums / learning centers were chosen for the study:

a) Norwegian Museum of Science and Technology (Norsk Teknisk Museum)

   The Norwegian Museum of Science and Technology has put on several exhibitions touching on matters related to ESD, such as energy; democracy and participation; health; and water. The museum includes a science center in the basement and had over 250 000 visitors in 2011, making it one of the most popular museums in Oslo (Norwegian Museum of Science and Technology). The fieldwork was conducted during the first two weeks in September.

b) Nobel Peace Center (Nobels Fredssenter)

   The Nobel Peace Center offers changing exhibitions dedicated to the work of Peace Prize laureates. Within the last years, the Peace Prize did not only go to bodies and individuals concerned with development and peacekeeping. It more frequently honored efforts and achievements related to the environment (e.g. 2007: Intergovernmental Panel on Climate Change (IPCC) and Albert Arnold Gore Jr., 2004: Wangari Muta Maathai). The exhibitions and activities at the Nobel Peace Center address topics such as climate; consumption, resources and distribution; conflicts of interest; and as participation and democracy. The center counted

[25] The topics were taken from Norway`s current and former strategy as well as from UNESCO`s IIS. The survey was purely meant to get an overview over the museum field in the city and will not be considered in the actual study. See the appendix for the survey sample.

200 000 visitors in 2012 (Nobel Peace Center, 2013). The fieldwork was conducted during the last two weeks in September.

c) Natural History Museum (Naturhistorisk Museum)

The Natural History Museum has as its main focus the natural environment and biodiversity. It touches on the ESD fields biodiversity; natural areas; and outdoors and nature experience. With over 630 000 visitors, it was the most popular museum in Oslo in 2012 (Tidemann, 2013). In the coming years, the museum plans to renovate parts of its buildings, to renew the geological exhibitions and to establish a science center. The fieldwork was conducted during the first two weeks in October.

d) Norwegian Folk Museum (Norsk Fokemuseum)

The Norwegian Folk Museum is an open air museum with exhibitions on the Norwegian way of life since 1500. Its current exhibitions and activities are dedicated to cultural heritage education. Besides, the museum's exhibitions touch on the ESD topics energy; democracy and participation; and natural areas. In 2011 the Norwegian Folk Museum counted over 333 000 visitors (Norwegian Arts Council, 2012). The fieldwork was conducted during the last two weeks in October.

Additionally, I sought to establish contact with the Ministry of Education, the Ministry of the Environment and the Ministry of Culture, so that I might get deeper insight into the implementation process of ESD and the potential of the Cultural Backpack. Those requests were either declined, or left unanswered, and for that reason these aspects will not be considered any further in the study.

4.3 Data Collection

The procedure for collecting data was similar for all four samples and was scheduled to take place for 2 weeks for each museum / learning center in autumn 2013. First, with the help of each institution`s website I sketched out a catalogue on the current school programs. Subsequently, I documented current exhibitions relevant to ESD; the key criterion for ESD-relevance here was the exhibition`s topic and its relevance for the suggested focus areas in Norway`s ESD strategy. I took pictures of objects,

installations and texts and made notes on the audio-visual media. I would also look superficially at the rest of the exhibitions to get a general impression of the museum`s / learning center`s work.

The museums / learning centers ran several school programs during the period of my fieldwork. I participated in at least two of them for every institution, those that seemed most related to ESD. I would then pick one program for every museum / learning center that seemed to be most relevant. Again, the main criterion here was the program`s topic. In addition, I aimed to have a certain variation among the chosen programs with respect to target group and topic. As energy and climate are one of the most pressing issues in the media and are also represented in the school curriculum, I initially wanted one of the tours picked to touch on that field. However, none of the museums offered a relevant program. The Norwegian Museum of Science and Technology was planning a new program on energy and climate, but it was not available before spring 2014.

I finally decided to examine a program on the Industrial Revolution (13^{th} grade, Norwegian Museum of Science and Technology), one on food and waste (4^{th} grade, Nobel Peace Center), one on biodiversity and red-/black-listed species (12^{th}/13^{th} grade, Natural History Museum) and one on democracy and voting rights (8^{th} grade, Norwegian Folk Museum).

For every program, I followed a random class and took notes on the program`s structure, on conversational and explanatory sequences as well as on tasks and interactional elements (e.g. student-guide interaction, student-student interaction, student-exhibition interaction). As for the Natural History Museum, I did not participate in the program presented in this study. Those programs which were offered during the field work and which I was able to join were not directly relevant for ESD. Therefore I drew on a program that had been run in summer 2013.

I further conducted four interviews with the employees of the respective museums / learning centers who had become my contacts for the study and who would be most able to answer questions concerning the agenda of the museum, school collaboration and sustainability education. At the Norwegian Museum of Science and Technology and the Nobel Peace Center I talked to the head of the school division, Håvard Heggelund (Norwegian Museum and Science and Technology) and Toril Rokseth

(Nobel Peace Center); at the Norwegian Folk Museum I interviewed an educational officer and an educational consultant (Siv Garles Sjåland and Anne Marie Svebak Grimstad); and at the Natural History Museum I talked to the leader of external affairs (Cecilie Webb).

I also conducted interviews with five teachers who had participated in the respective programs with their class. The museums / learning centers provided contact information for teachers who had participated in each school program. The contact was then established by mail. The interviews touched on the teacher`s impression of the tour, its relevance for the school curriculum, student responsiveness and the role of ESD and museums / learning centers in everyday school life. The teachers interviewed were not the same ones whom I had observed with their classes earlier, which was mainly a matter of organization. However, it came with the advantage that the classes I observed were not particularly primed by the teacher and that those teachers I interviewed did not know about their participation in the study at the point of their visit. For that reason I expected that the museum experience for both the classes I observed and the teachers I interviewed was little impacted by the study.

All teachers seemed to be genuinely committed to their teaching and generally positive about teaching projects and museum / learning center visits. Due to reasons of anonymity, I will use pseudonyms when referring to the teachers. A short description follows here:

a) Eva: teaches History and Norwegian at a secondary school in the center of Oslo. In the course of a "history day" (fagdag) at school, she participated with her graduation class in the conversational tour *The Industrial Revolution* at the Museum of Science and Technology. The class visit was followed by a walking tour along the river Akerselva where Eva and her students occasionally stopped to discuss Oslo`s period of industrialization. Eva had visited several museums and centers with previous classes; some of them also were related to art.

b) Cathrine: is a class teacher for a 5th grade at a primary school north of Oslo`s city center. She participated with her class in the conversational tour *From the Worktop to the Planet* at the Nobel Peace Center as part of her Social Science class. The trip was followed up by a teaching session on recycling led by two student teachers.

Cathrine seemed to have a strong focus on practical learning in general. In the school year 2013/2014 she organized a demonstration against the closure of a neighborhood library and held a mock election in class when Norway was voting for a new parliament.

c) Hanne and Liv: are teachers at a secondary school in the western outskirts of Oslo, in Bærum. Hanne teaches Biology and Natural Sciences; Liv teaches Biology and Technology and Research Sciences. They visited the Natural History Museum at the end of the school year 2012/2013 together with their 12th and 13th grade biology classes and participated in a conversational tour on black and red-listed species and the Oslo ridge. Both had previously participated in studies of the University of Oslo. This was not known at the time of the interview. Liv and Hanne also established a project on SD at their school with the help of the lektor2 program.

d) Lilian: works at a primary / lower secondary school (grades 1-10) in a well situated area in the east of Oslo. Together with her 8th grade Religion, Philosophy and Ethics class, she participated in *I want to decide too!* at the Norwegian Folk Museum. The trip was scheduled by the municipality as part of the Cultural Rucksack (Den kulturelle skolesekken).

All interviews were conducted after having participated in the program at the museum. As it was not possible to join a class at the Natural History Museum, I put additional questions on the program`s structure into the interviews with Webb and Hanne and Liv.

All interviews were semi-structured and open-ended; they were recorded and later transcribed. In this way, the information gained covered the same topics for every museum / learning center, but was also suited to the individual character of the institution and the classes who participated in the program. The interview-guide was provided beforehand which made it easier for the interviewee to prepare for and focus on the most important issues. A sample of the interview guides for the museum / learning center employees and the teachers is enclosed in the appendix.

Norwegian, which was the primary language during the fieldwork, is my second language, and this may have impacted the interviewees. A final draft has therefore

been sent to the interviewees to check that their statements were transcribed, translated and interpreted correctly.

4.4 Data Analysis

The collected data from the exhibitions, programs and interviews will be analyzed with respect to the potential of the museums / learning centers to contribute to ESD. Two aspects will be central in this respect.

First, I will look at the perspectives the exhibitions and school programs provide on SD topics and compare how these perspectives match with Norway`s ESD strategy.

Second, I will look at the exhibition`s and school programs` potential to provide for cognitive, affective and practical sustainability learning. In doing so, I will draw on Sipos et al.`s TSL concept. I will refrain from using Sipos and Grimm`s (2005, pp. 27-29) scheme as a check list due to the blending of learning experience and learning objective. I will, however, include central aspects listed in the scheme and employ them as a tool to structure the analysis.

In terms of the cognitive aspect – Head – I will focus on how museums approach SD issues. That will include the choice of topics, cognitive content and ontological premises – especially the presentation of human-nature relations – as well as the possibilities for active cognitive involvement through critical analysis, problem analysis and solution finding.

Concerning the affective dimension – Heart – I will examine values that are conveyed in the narratives or depictions of the different exhibitions and school programs. Critical aspects include the kind of values addressed and the ways in which the exhibitions or programs reflect on values and lifestyles. In addition, I will look at the visions which are presented and any concrete stimuli for vision building.

With regard to the action dimension – Hands – I will examine the potential of museums / learning centers to pass on skills, practices and create active commitment for a more sustainable future. This includes active learning and participation in authentic human and environmental contexts.

4.5 Bias and Reservations

The limited number of museums / learning centers and informants for this study does pose limits to the generalizability of the results and it also makes them vulnerable to over-interpretation - especially where the interviewee had difficulties remembering details correctly. The "material" findings, that is to say mainly the documentation of the exhibitions and online research, therefore form important pillars on which the conclusions are based.

The study is impacted by my background as a museum guide at the Norwegian Museum of Science and Technology at the time of the fieldwork. This gave me good insights into the work of this specific museum and critical ideas. All conclusions will be based only on the evidence which came forth in the study, and exclude any impressions formed beyond the study.

It is also necessary to mention that this study does not aim to form any conclusion about the effect of learning in museums / learning centers. As far as the exhibitions are concerned, it is rather difficult to predict what visitors actually "learn" or if they perceive certain narratives in the exhibitions as such. This is because the visitor herself selects objects and information of interest as he moves through the exhibition (DiBlasio & DiBlasio, 1983; Leinhardt & Crowley, 2002, p. 3). Further, and this is also true for school programs, the way knowledge is acquired is much more complex than the input-output model. The type of information and the way in which it is interpreted, grouped and remembered is highly individual and depends on a multitude of personal and contextual factors (Falk, 2009, pp. 9f.,34,51; Falk & Dierking, 1997, p. 212; O´Loughlin, 1992). This analysis therefore has no ambition to form conclusions about the actual learning effect. Even so, it is likely that programs adopting an approach similar to TSL do promote ESD and other types of sustainability learning.

This study is not meant as an assessment of the individual museums / learning centers. Certain features that are highlighted for one institution may also apply to others. The goal here is to employ exhibitions and school programs as a tool to explore certain characteristics of museums / learning centers and consider them in the light of ESD, looking both at strengths and challenges.

5 Findings and Discussion I – The Four Museums and Learning Centers

In this chapter, I will present and discuss the exhibitions and programs of four Oslo museums / learning centers and map their status quo with respect to ESD.

I will treat every museum / learning center separately. I will start with a short description of the museums` / learning centers` work. Subsequently, I will present its ESD-related exhibitions and one selected ESD-related school program. All of the exhibitions and school programs in this study refer to at least one of the eleven focus topics of the Norwegian ESD strategy, on climate; energy; consumption; resources and distribution; conflicts of interest; participation and democracy; biological diversity; nature areas; water resources; health; waste and recycling; or outdoors and nature experience.

I will discuss the exhibitions and school programs from two perspectives: a) the degree to which they match with the description of ESD topics in the Norwegian strategy and b) their potential to provide for cognitive, affective and practical sustainability learning . This includes the ontological premises on which this learning is based, especially with regard to human-nature relations. The analysis will serve as a basis for a more pointed discussion of strengths and weaknesses of museums / learning centers with regard to ESD in chapter seven.

5.1 National Museum of Science and Technology

The National Museum of Science and Technology is situated in the very north of Oslo close to the city`s forests and the river Akerselva. Alongside the river, there is a walking path leading all the way to the city center which makes it a popular place for recreation. The museum includes a science center, a medical museum and a telecommunication Museum. It is dedicated to topics such as industrialization, transport, health, communication and energy.

The National Museum of Science and Technology offers a wide range of guided school tours and activities for all grades. In connection with some school programs the museum works with Generic Learning Objectives (GLO), a framework for education programs at museums, libraries and archives. GLO include a) knowledge and insight,

b) skills, c) attitudes and values d) entertainment, inspiration and creativity, and e) action, behavior and progression. These objectives have strong parallels with transformative learning theory, with cognitive, affective and practical learning.

The museum also holds regular upgrade training courses for teachers, mainly in connection with its permanent or temporary exhibitions. Further, it sporadically runs competitions encouraging visitors to send contributions with links to specific exhibitions. The latest of these was related to an exhibition of nature photography by the Norwegian photographer Wilsen from the first half of the 20th century. In this competition, students were invited to send a photograph which they believe catches Norway in a picture and add a comment on the motive behind their choice.

On weekends and during holidays, the Norwegian Museum of Science and Technology offers guided tours and activities. During the autumn holidays 2013, for example, it ran a soap bubble show, offered guided tours and arranged a LEGO-festival. Futhermore, the museum has been co-designing a digital walking route along Akerselva on industrial history can be downloaded as an app.[26]

5.1.1 Exhibitions: From Energy to Health

The Norwegian Museum of Science and Technology comprises 23 permanent exhibitions and installations, seven of which seem to be relevant for ESD:[27]

a) *Energy Fair* – hands-on installations that address alternative energy production
b) *Electricity at Home* – an exhibition on the electrification of Norwegian households
c) *Energy (science center)* – hands-on installations that illustrate principles of energy production and consumption
d) *Energy (museum)* – an exhibition on energy production starting with the steam engine
e) *Oil and Gas* – an exhibition on how Norway evolved as an oil nation
f) *Industry along Akerselva* – illustrates the industrialization along the Oslo river Akerselva and its consequences for the environment and urban citizens
g) *Healthy Soul in a Healthy Body* – gives insights into the development of medical research, clinical medicine and psychiatry within the last 150 years

[26] See Industrimuseum: http://www.industrimuseum.no/akerselvadigitalt
[27] The museum also has an exhibition on plastics which marginally touches on health effects. The exhibition has not been included in the study as its main focus lies on the spectrum of plastic products.

In addition to the permanent exhibitions, the Norwegian Museum of Science and Technology hosts temporary exhibitions regularly. Among those that were shown during the fieldwork, one addressed ESD-topics:[28]

e) *It Did not Help us to Get Voting Rights* – presents a maternity home campaign by Katti Anker Møller

At first glance, the exhibitions of the museum touch on many aspects that are connected to ESD as energy; democracy and participation; or health, but also water and waste are topics which are addressed by the exhibitions. The exhibitions of the museum are mostly dominated by text walls and historical objects. The science center on the other hand is mostly made up of hands-on installations.

Energy exhibitions

In the basement of the museum, the exhibitions *Energy* (science center), *Energy Fair*, *Energy* (museum) and *Electricity at Home* merge into one another.

The *Energy* exhibition of the science center consists of different installations that invite the visitor to explore forms of energy and physical laws.

picture 1: solar panel mill, picture 2: mini-model house, picture 3: digital energy game

It includes among other things a solar panel mill driven by mirrors, a mini-model of a fully equipped modern house which shall be provided with sufficient wind and solar energy, and *Energy Balance*, a digital game where one can build energy plants (e.g. coal power stations, nuclear power plants or dams) while considering community demands, limited financial resources and environmental pressures.

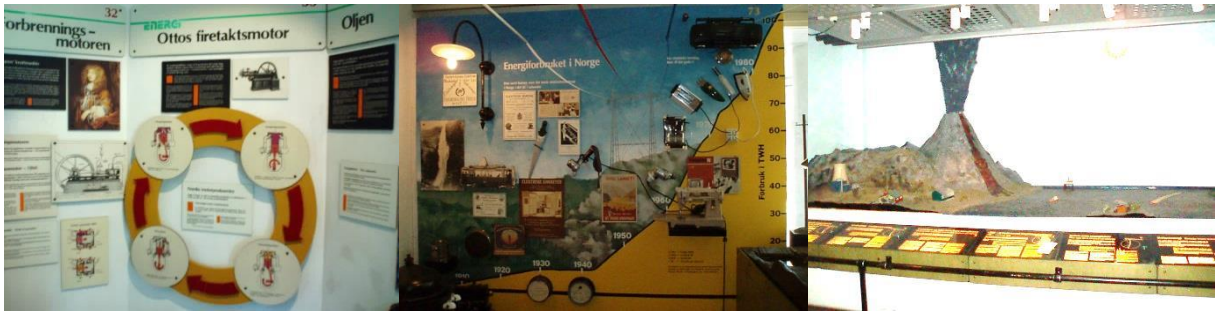
[28] During the time of the fieldwork, there has also been a science center exhibition on science in the Islamic Empire, *Sultans of Science*. The exhibition touches on medicine and water-driven machines, but its overall focus does not relate to ESD topics. This is why the exhibition has not been included in the study.

Immediately next door is the *Energy Fair*. Here seven installations illustrate different aspects of energy production in a playful way: bioenergy / photosynthesis, heat pump, solar energy, wind energy, hydropower, wave power and nuclear power.

pictures 1-3: installations in the Energy Fair: pinball machine, can knockdown, high striker, picture 4: information label for the wind power installation; picture 3 retrieved from Norwegian Museum of Science and Technology

Photosynthesis, for example, is illustrated by a pinball machine, solar energy by a variation of can knockdown, and nuclear energy by a variation of high striker. Each of the installations is accompanied by a short informative label. The *Energy Fair* also includes an opinion barometer on human impact on the environment which addresses among other things the expansion of renewable energy plants in Norway and the immediacy of climate threats.

Moving on from this section, the visitor comes to the *Energy* exhibition (museum) which is much more text-centered and exhibits a number of historical objects. It includes a three meter long 3D-model that explains and visualizes different kinds of energy production, including their environmental impact. For every production type there is a button that makes relevant areas in the model light up.



picture 1: 3-D-model, picture 2: explanation of combustion engine, picture 3: chart on increasing energy consumption in Norway

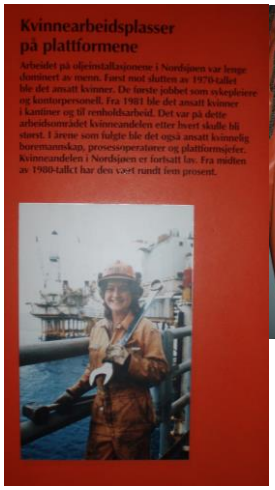
The exhibition`s main focus, is on the development and functioning of essential energy-related technologies such as the steam engine, internal combustion engines and turbines. Moreover, it looks at the rising demand for electricity – depicted by a huge chart – and the importance of hydropower for Norway. In other parts, the exhibition considers the social consequences of technological developments, for example advanced transportation, and the poor living conditions for people in the growing cities at the beginning of the Industrial Revolution.

The *Energy* exhibition of the museum merges into the *Electricity at Home* exhibition, which illustrates how electricity has infiltrated almost every corner of private life. It exhibits electrical household devices from different periods and kitchens from the 1920s to the 1990s.

picture 1: kitchen from 1960, picture 2: electrical devices; pictures retrieved from Norwegian Museum of Science and Technology

The exhibition additionally includes an informative video from the 1950s which teaches the proper handling of light and light bulbs.

Neighboring the *Energy* exhibition of the science center, there is the oil exhibition, sponsored by Statoil Offshore, which covers parts of the museum`s ground floor and the basement. It shows several models, such as a floating rig, original objects like oil booms and includes two installations: a pitch-dark security labyrinth and an escape chute. Big information labels and walls lined with numerous pictures narrate the evolution of Norway as an oil nation; they give detailed descriptions of working processes and working conditions and the decrease of accidents in number and severity due to the gradual automation and mechanization if tasks. Furthermore, included in the exhibition is a sections on Norway`s economic growth due to oil revenues and on the environmental challenges of oil operations.




picture 1/2: information walls, picture 3: floating rig; picture 3 retrieved from Norwegian Museum of Science and Technology

Benefits like the blossoming of oil cities and subsidies for Norwegian farming are depicted in detail whereas environmental concerns are mentioned only in a general way. Pollution is presented merely as a juridical (authorized oil emissions into the sea), economic (costs of oil spills) and technological (more environmentally friendly and reliable machines) matter. The exhibition concludes that oil and gas are the essential energy sources of the future. It leads directly to the Energy exhibition of the science center and the Energy Fair which for their part present alternative energy sources.

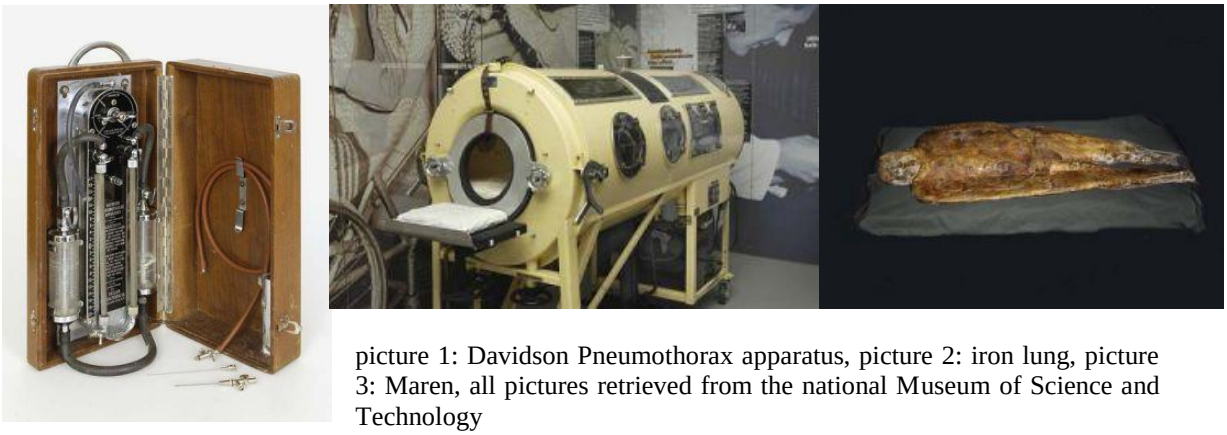
After the field-work, the exhibition was taken down and substituted with a new one. Current advertisement for the exhibition indicates no big changes to the central motives of the exhibition.

The energy exhibitions touch on the ESD topics energy and conflicts of interest (protection of the environment vs. exploitation of natural resources).

Medical Museum

Healthy Soul in a Healthy Body on the museum`s ground floor narrates how poor living conditions in Norwegian cities led to diseases such as cholera becoming widespread in the 19th century. Like the *Oil* exhibition, *Healthy Soul in a Healthy Body* is dominated by huge walls of information and pictures. In addition, the exhibition includes objects such as a CT scanner, an ultrasound machine and a historical pneumothorax apparatus. It further includes videos on tuberculosis patients in Russia and on a former children`s sanatorium in Oslo; and it puts on display Maren, a girl mummy from the 19th century. The exhibition also features a smaller section

with five videos on the history and the current situation of mental health matters in Norway.[29]



picture 1: Davidson Pneumothorax apparatus, picture 2: iron lung, picture 3: Maren, all pictures retrieved from the national Museum of Science and Technology

Healthy Soul in a Healthy Body presents the discovery of bacteria and viruses, diseases caused by them, possibilities for scanning the human body and the treatment of both mental and physical diseases. The main focus of this exhibition is on cholera, tuberculosis and polio. For each of these diseases, the exhibition provides information on contagion (through viruses or bacteria), treatment technologies (e.g. bloodletting, iron lung) and social factors (e.g. bad hygiene, tight living space, and sanatorium stay). Besides, the exhibition presents modern technologies, e.g. a CT-scanner and an ultrasound machine. Pictures indicate their importance for brain scans and prematernal medical care respectively.

Healthy Soul in a Healthy Body merges directly into *Get Well!*, an exhibition about life and work at Norwegian hospitals in the 20th century. Rather than following a linear narrative, the exhibition presents a variety of different perspectives on life in a hospital.

Large text walls divide the exhibition into seven topics: *Hope*, *Surgery*, *Medicine*, *Diagnosis*, *Children`s ward*, *Voices from the hospital* and *Around the sick-bed*. *Get Well!* displays mainly hospital-related objects from the 20th century (e.g. an ambulance from the 1920s, specimens and hospital equipment) which are accompanied by short information labels.

[29] The video screens were out of order at the time of the fieldwork which is why no detailed information can be given on the content of the videos.

picture 1: specimen, picture 2: wall on *Voices from the hospital*, picture 3: ambulance from early 20th century; picture 3 retrieved from Norwegian Museum of Science and Technology.

It further includes reports by patients and hospital staff, newspaper articles, a computer game on diseases and their symptoms, a UV scanner to test washing efficacy and a black-and-white video about a girl being in a hospital.

It Did not Help us to Get Voting presents various original objects from a traveling exhibition from 1916/17 designed by Katti Anker Møller.

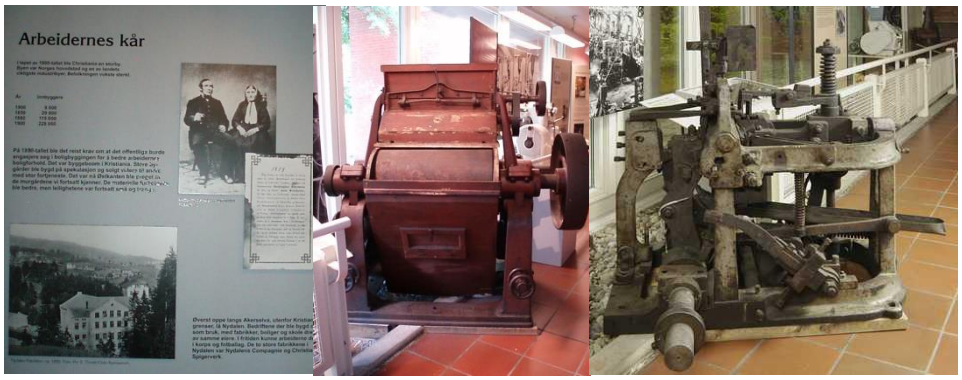
picture1: organic model of the uterus and specimens, picture 2: picture of a maternity home, picture 3: cradle and children clothes

These include children's clothes, toys, physical models, specimens, photos and statistics on child mortality. Labels explain the background of the exhibited objects and the exhibition`s purpose, thereby giving insight into Anker Møller`s political attitudes and ambitions.

The medical exhibitions touch on one of the eleven focus topics of ESD in Norway, namely health.

Industry along Akerselva

Industry along Akerselva is situated along a window front on the museum`s ground floor and addresses the process of industrialization along the river Akerselva. The exhibition consists mainly of information walls which include informative text, pictures and statistics. They are supplemented by historical objects, e.g. factory machines, maps and a model of the historical area around the river Akerselva.



(picture1: information wall on working conditions, picture 2: picture 3: nail machine; picture retrived from Digitalt Museum)

Industry along Akerselva serves as an umbrella exhibition for many topics. It takes its starting point in the first half of the 19th century presenting the blossoming of fabric, paper, iron and pharmaceutical factories along the river. It highlights the poor living conditions of many workers, the spread of diseases, child labor as well as the establishment of labor unions and the growth of workers' rights. The exhibition further acknowledges the environmental impacts of the industrial boom, namely the pollution of the river due to sewage and industry waste. It draws lines up to the second half of the 20th century, where it looks at the destiny of the factories and the partial recovery of the river due to better sewage systems. *Industry along Akerselva* thus addresses ESD topics such as participation and democracy; biodiversity; water; health; and waste and recycling.

5.1.2 The Industrial Revolution – A School Program on Technological, Social, Environmental and Economic Effects of the Industrial Revolution

The program *The Industrial Revolution* is a 45 minute-long conversational tour for grades 8-13. The tour is based on the museum`s objects and draws on the exhibitions *Industry Along Akerselva*, *Energy* (museum) and *Healthy Soul in a Healthy Body*. It also includes a replica of an early 20th century mechanical workshop which belongs to

an exhibition on the workshop industry. The program starts in the basement of the museum in the *Energy* exhibition. Here the museum pedagogue talks about the historical importance of the steam engine, its invention in England and its export to Norway in the early 19th century. In this context she refers to the role of coal as essential material for firing and the importance of iron for building machines. The group then moves to the exhibition *Industry along Akerselva* where the guide continues with the Industrial Revolution in England and England`s fear of industrial espionage. She explains the transition from the primary sector which had settled around the Akerselva in the Middle Ages, industries like wood and tobacco, towards the secondary sector using the example of Nydalen kompani (weaving mill), Myrens verksted (machinery producer) and Christiania Spikerverk (nail producer). She points to the increasing pollution of the Akerselva due to industrial waste, outlines the expansion of the factories and their decline in the 20th century, and also explains the mechanism of different machines in the exhibition.

Subsequently, she focuses more on the social aspects of the Industrial Revolution, for example, the low wages given to women. The group then moves to a mechanical workshop where the museum pedagogue talks about difficult working conditions in the factories (e.g. the noise and comparative darkness), accidents (e.g. scalping and loss of fingers) and the establishment of a labor union and labor party which enforced regulated work days.

The tour ends with Maren, a girl mummy, who died of cholera. The disease, the pedagogue explains, spread easily during 19th century due to high population density, insufficient hygiene and deficient sewage systems. All along she incudes the students in her explanations asking about and drawing on their pre-existing knowledge.

Eva, a teacher from an upper secondary school in Oslo regularly uses museums, galleries and art centers as an arena for teaching. She started a school history day at the museum and participated with her 13th grade history class in the program. After the tour, she and her class would walk with her students along the river back to school. On the way, the class looked for traces of the Industrial Revolution (e.g. buildings). Eva was very positive about the program *The Industrial Revolution.* In particular, she appreciated the density of information and the elaborations on the working conditions. During the tour the students were rather passive, but became more active as they

walked back to school. Eva explained that they had a shortage of time, and that a more interactive tour would have taken too much time. In the classes following the visit, Eva worked primarily on democracy and democratic movements in relation to the Industrial Revolution. She was convinced that the students gained something from the museum visit. When asked, she explained that students referred to the visit "for example [to] the girl who was scalped by the machine" and "Maja [Maren] who was buried after the cholera epidemics." She referred to the museum visit in class, to certain facts that had been mentioned or to objects. She found that the museum objects facilitated the understanding for the students and that the artefacts in the exhibitions could specify and illustrate some of the points she had talked about in class.

5.1.3 Discussions: Education for Sustainable Development and the Norwegian Museum of Science and Technology

The exhibitions of the Norwegian Museum of Science and Technology address the ESD topics energy (energy exhibitions), democracy and participation (*Industry along Akerselva*), health (medical exhibitions) and on the periphery water and waste (*Industry along Akerselva*). The museum thereby offers a wide palette of topics that are potentially relevant for ESD. However, a closer look at the understanding of these topics in Norway`s ESD strategy reveals certain problems.

Norway`s ESD strategy describes energy as a contemporary technological matter and names renewable energy as an important factor in the field. The science centers` *Energy* exhibition and the *Energy Fair* refer to exactly these aspects. They focus on the technological aspects of renewable energies, such as production mechanisms and the challenges which come along with them. The energy exhibitions of the museum, on the other hand, depict the history from the invention of the steam engine to the electrification of the modern home. These rather retrospective details are, according to the strategy, of less relevance.

Health, in Norway`s ESD strategy, is mainly about current global challenges, while the medical exhibitions are, like the energy exhibitions of the museum, retrospective in character. *Healthy Soul in a Healthy Body*, focuses primarily on the 19th and 20th century. It puts on display some modern medical technologies, but compared to the

historical section on cholera, tuberculosis and polio, it does not give much space to contemporary health challenges.[30] Likewise, *It Did not Help us to Get Voting Rights* is an exclusively historical exhibition on the first part of the 20th century. *Get Well!* for its part provides insights into hospital life mainly from the 20th century. Thus, in the exhibitions, global challenges are not taken into account, which can partially be due to the fact that contemporary social dimensions are largely omitted.

Similar observations can be made for *Industry along Akerselva*. Like most of the other exhibitions of the museum, *Industry along Akerselva* takes its starting point in the Industrial Revolution and follows events until the middle of the 20th century when the industrial boom of the late 1800s and early 1900s had subsided. The exhibition is mainly bound to the past and does address current social or industrial conditions primarily as a result of historical developments.

The program *The Industrial Revolution* strengthens this impression. Here most links to current working realities have been omitted. The main emphasis of the tour is clearly on the factories, their growth, technologies of the time, working conditions and the beginnings of industrial democracy.

Although the exhibition *Industry along Akerselva* and the school program *The Industrial Revolution* touch on many ESD topics – participation and democracy (workers` movement), water resources (water power and drinking water), health (cholera) and waste and recycling (pollution of the river)[31] – the way those topics are presented in the exhibition, does for the most part not overlap with their understanding in Norway`s strategy. The strategy presents participation and democracy as a matter of individual empowerment, commitment and an individual awareness of rights. This exceeds cognitive capabilities and addresses affective and practical competences. The strategy further relates health to current global health challenges and links the field waste and recycling to hazardous waste, waste reduction and recycling. None of these aspects in the strategy is provided by the exhibition or the school program. The main reason for that, it seems, lies in the historical approach of the exhibition.

[30] The temporary exhibition *A Small Part of Health Norway*, which already had been taken down was more attuned to contemporary health related matters, namely medical access for illegal immigrants.

[31] In its periphery, the exhibition *Industry along Akerselva* also touches on biodiversity where it addresses the disappearance of animal life in the river. Biodiversity, according to the strategy, has economic, health, aesthetic and ethical implications. These aspects however, are given comparably little space in the exhibition and are not mentioned in the school program.

An exception here is the field water which, the strategy informs, shall be highlighted concerning cultural, ecological and economic importance. Partially, the program and the exhibition refer to such aspects. They touch on the ecological meaning of clean water for animal life and human health and present rivers as a crucial part of the wood industry before the Industrial Revolution. However, also these aspects are mostly embedded in a historical context.

Although the energy and medical exhibitions as well as *Industry along Akerselva* may look at different topics, they show similar patterns. They all are based on historical objects in their socio-cultural contexts. From this historical basis the exhibitions present scientific and social developments, accompanying challenges and their possible solutions continuing up to the end of the 20th or the beginning of the 21st century. They all present modern success stories and by that certain achievements with regard to SD, for instance industrial democracy. Similarly, the exhibitions do not seem to have any intention to address current SD challenges or provide more practical competences.

Another focus topic of Norway`s ESD strategy, which is taken up in the exhibitions of the Norwegian Museum of Science and Technology, in particular the exhibition *Oil*, is conflicts of interest. In this field, the strategy aims to provide students with the ability to deal with contradictory purposes, e.g. those of environmental protection and the extraction of resources. *Oil* provides a one-sided perspective on the matter, claiming that proper technology alone can resolve this conflict. Besides, the strategy talks about active cognitive skills that go beyond an understanding of such conflicts, and move towards developing the capacity to deal with them. This kind of empowerment is not provided by the exhibition.

It is significant that the examined exhibitions of the Norwegian Museum of Science and Technology present anthropocentric perspectives. They celebrate technologies as breakthrough for human welfare. Nature and the human-nature relationships, on the other hand, are rarely mentioned. In *Industry along Akerselva* and its related school program there are signs of the actual interplay and interdependence between the river and the society living around and befitting from it. Even so, this aspect is given little attention compared to the detailed outline of the factories and living conditions.

Generally, nature is presented as a matter that either drives technologies (e.g. coal, oil or water) or is managed or extracted by them (e.g. oil platforms). This perspective is particularly dominant in the energy exhibitions where nature becomes a convenient object for the greater human good. It is true that technologies are indispensable parts of a more sustainable future. Yet, they cannot make-up for a frontier approach and must not promote it by reducing nature to an entity subordinated to human superiority (cf. Vetlesen 2008, p.90ff.).

Another challenge for the museum with regard to ESD is the largely transmissive character of the exhibitions, and the school program I examined, which demands little in the way of critical and analytic thinking from visitors and students. One exception to this are the exhibitions in the science center which are more interactive, inviting the visitor to explore certain technologies or, in the case of the computer game *Energy Balance,* to reflect on the advantages and disadvantages that come with different energy production technologies. Besides, the student competitions I named at the beginning can lead to active exploration and reflection in real life and can be especially fruitful when linked to ESD issues. Interestingly, Eva emphasized the potential of the objects in the exhibitions that specified and exemplified the theoretical content and thereby made it more accessible.
To conclude, concerning cognitive learning, the Norwegian Museum of Science and Technology provides many exhibitions that could be relevant for ESD, but would need certain modifications in terms of time focus, the framing of human-nature relations and cognitive involvement beyond individual competitions.

The examined exhibitions address values such as democracy and social participation as well as physical and mental health, which by themselves coincide with the suggested focus areas in Norway`s ESD strategy. Further, the exhibitions` strong connection to Norway – and Oslo specifically – form a sound basis for identification and hence emotional engagement on the part of the visitor. Again, a stronger emphasis on the present could foster more specific and critical reflection on personal attitudes and social values.

Further, the museum does not provide specific opportunities for practical sustainability learning. Neither the examined exhibitions nor the related school

program seem to support the development of practical skills (e.g. problem solution skills with respect to conflicts of interest), pro-sustainable practices or engagement in real-world contexts.

To sum up, the Norwegian Museum of Science and Technology has a certain potential for ESD. To become more relevant to the initiative, the museum must redefine the temporal focus of the examined exhibitions and the school program. It could promote the visitor`s cognitive involvement more strongly and challenge her attitudes, skills and practices. And finally, in addition to celebrating technology, the museum could work out technology's social and environmental challenges. This would require a reconsideration of human-nature relations.

5.2 Nobel Peace Center

The Nobel Peace Center is situated in the city center close to the harbor. The center constitutes a melting pot for culture and politics and puts on display exhibitions related to topics such as peace, war and conflict resolution. Linked to the exhibitions, the center runs different school programs for all grades.

It offers a range of activities for its youngest visitors during school break. In autumn holiday of 2013, the center invited children to build a mini-greenhouse, to learn about food preparation, mushrooms and syrup and to explore the function of bin lorries. Sporadically, the center starts Instagram campaigns and encourages visitors to take pictures related to its exhibitions, for example when the center hosted an exhibition on Gandhi and asked its visitors to take pictures of what makes them happy.

Aside from the exhibitions, the center regularly participates in local festivals and hosts independent events. In 2013, the Nobel Peace Center participated in a food festival, a multicultural festival and a gay festival at the harbor. Furthermore, it arranged events on women`s voting rights and on the function of music as a weapon.

5.2.1 Exhibitions: From Health to Resources, Consumption and Distribution

All exhibitions of the center, except for one installation on Alfred Nobel`s life and two on Nobel Price laureates, are temporary. During the period of the fieldwork three

exhibitions were shown. One of these, *What the World Eats*, has links to ESD and relates to matters such as health, waste and resources, consumption and distribution.

The exhibition *What the World Eats* covers almost the entire exhibition hall on the museum`s ground floor. A large part consists of huge photographs arranged around two meter high hay blocks. They show 33 families in or around their homes and the food they consume in the course of one week. Additional information under the pictures gives insight into the family's food habits and informs the visitor about general food consumption patterns in the country the family lives in. Visible differences between the families portrayed include for example the home itself, the number, age and fitness of family members as well as the kind and amount of food they consume (e.g. meat, fast food, sweets, fruits or vegetables).

picture 1: hay blocks, picture 2: section on green food consumption, picture 3: children`s section and recipes of former laureates

Along the edge of the exhibition one finds recipes by Peace Price laureates; information on straw as leftover from rice production and sustainable construction material; a video on the food consumption in a Norwegian family; and advice for sustainable food consumption. The latter includes tips as: *eat up*, *eat seasonal produce*, *eat environmentally friendly meat*, *eat fish*, *eat wild* or *eat home-grown*. Moreover, there is a corner where children can smell different spices and feel the shape of fruits and vegetables in closed boxes.

5.2.2 From the Worktop to the Planet – A School Program on Food, Health and Waste

From the Worktop to the Planet is a 45 minute-long mainly conversational program linked to the exhibition *What the World Eats*, which comes in four different designs:

a) grades 1 to 4: focuses on where food comes from
b) grades 5 to 7: focuses on global food consumption and waste
c) grades 8 to 10 : focuses on global food consumption, waste and its connection to SD
d) grades 11-13: focuses on the paradox between increasing knowledge on SD and missing action

In what follows, I will focus on program b) in which I had the opportunity to participate. The tour starts at the entrance of the exhibition area where the museum educator asks the students about the connection between food and peace, and hints at unfair food distribution. The class then enters the exhibition and looks at the Nobel Prize Medal. Here, the museum educator explains that some Peace Prize laureates have worked with food and that food is something all people have in common. Subsequently, the students move deeper into the exhibition, sit down and discuss their own food habits and those of their grandparents. Referring to the examples given by the students, the museum guide concludes that food consumption has changed. She outlines how potatoes came to Norway as a result of Columbus` voyage, and points to two exhibition photos of Chinese families that illustrate the ongoing changes in the food sector. The first one shows a rural family whose weekly food consumption consists partly of self-grown food and is supplemented by grocery products; the other one shows an urban family who consume mostly packaged food produced by international brands, bought in a hypermarket.

Afterwards, the students are asked to explore the families portrayed in the exhibition in groups and to present their findings for the class. During the subsequent presentations in the museum`s teaching room, the museum pedagogue adds more information – for example that overweight and insufficient exercise lead to severe cardiologic challenges – or asks more questions about the health effects of certain diets. She concludes briefly that current food consumption in the West is not very environmentally friendly, dropping keywords such as distance shipping, packaging, pollution and energy use for storage. In this context, she emphasizes that a high amount of food is thrown every year – about 50 kilos per Norwegian – and asks the students what can be done about this. The students of the class I observed came up with solutions such as planning grocery shopping beforehand, avoiding buy-three-pay-for-two-offers or checking food to see if the best-by date is exceeded before throwing it away. Exemplifying that last point, the museum pedagogue ends the

program by demonstrating how to check the freshness of eggs with the help of a glass with water.

Cathrine, a class leader for a 5th grade at a primary school in Oslo, participated in the program with her students. She seemed to have a strong focus on practical learning. Earlier that school year, she had prepared a demonstration against the closure of a neighborhood library and a mock election. Cathrine noticed the special design of the exhibition. She found that the hay blocks created a kind of "magic" forest, where the visitors could go inside and imagine a world in itself

Two student teachers followed the museum visit up with a teaching session on recycling and waste separation. However, the students in the class were already aware of the separation system; according to Cathrine it had been practiced successfully for over a year.

In the classes following the museum visit, Cathrine and her students would refer to the exhibition several times. Cathrine said that her students were particularly concerned about diabetes which was quite common in one of the families that had been presented in the program.

5.2.3 Discussion: Education for Sustainable Development and the Nobel Peace Center

The exhibition *What the World Eats* and the related school program *From the Worktop to the Planet* touch on the ESD topics health; waste; and resources, consumption and distribution. *What the World Eats* portrays contemporary global lifestyles. The photographs and the information beneath them do not seem to convey an explicit message. Rather, it is down to the visitor to make sense of the pictures. A range of associations are possible here: reflections on lifestyles, traditions, globalization, consumption, distribution, packaging, health, housing and family structure.

The most concrete section is probably the one on straw which indirectly relates to waste. The section challenges the concept of waste presenting straw, a "left over" from rice production as convenient building material. Due to its openness and the absence of a clear message, however, it is impossible to compare the exhibition to the ESD topics in Norway`s strategy.

The program *From the Worktop to the Planet* builds a context around the photographs and thereby facilitates a more analytic approach to them. This context is twofold. First, by drawing on Columbus and the changing food habits across family generations, the museum educator embeds globalized food consumption in a historical context and links historical developments to present lifestyles. Second, the museum educator consistently includes the experiences of the students in order to exemplify specific points (such as changing food habits) and to explore solutions for waste reduction. Thereby she connects global issues with local realities. *From Worktop to the Planet* questions prevalent socio-cultural patterns and allows for an investigation of different futures (reduced waste) on a personal level.

The school program addresses global health challenges like cardiac disease resulting from obesity and limited exercise. It further refers to food waste and encourages the students to explore possibilities of waste reduction. Both current global health challenges, waste reduction and an awareness of consumption patterns are mentioned explicitly in Norway`s ESD strategy for the fields, health; waste and recycling; and consumption, resources and distribution. This makes the program`s theoretical content especially relevant for ESD.

It is significant that the Nobel Peace Center, unlike the Norwegian Museum of Science and Technology, chooses a contemporary socio-cultural perspective. One reason might be that the center owns only one historical object, the Nobel Prize Medal which forms the link between all exhibitions of the center. This may give the conservators of the center a certain freedom to include contemporary perspectives in the exhibitions.

What the Worlds Eats and *From the Worktop to the Planet* have a strong potential for cognitive sustainability learning. In particular, the school program goes beyond pure knowledge transfer and appeals to active and reflective thinking. Additionally, according to Cathrine, the effective design of the exhibition creates a certain authenticity which may make geographically distant topics more accessible.

Further, just like the competitions at the Museum of Science and Technology, the Instagram campaigns run by the center may inspire visitors to reflect on the exhibitions and their topic in relation to their own lives.

The exhibition *What the World Eats* does not provide a clear message which makes it difficult to link it to certain values. The sections on straw and green food consumption address the cautious use of environmental resources, and this may be the most obvious value in the exhibition. Healthy lifestyles also play a role, especially in the school program *From the Worktop to the Planet*. Interestingly, the program does not spend much time on criticism, for example on current patterns of food production and consumption, but moves directly to possible solutions. In this, it offers a positive, empowering approach. The Nobel Peace Center avoids an overly negative narrative, which, as mentioned in chapter two, has led to stagnation and resignation rather than motivation and action. Rokseth, head of the school division at the Nobel Peace Center, explains that the exhibition *What the World Eats* and the activities around attempts to break prevalent patterns of blame and shame.

It is difficult to draw more general conclusions in terms of the center`s potential for practical and action-related sustainability learning. The exhibition`s section on green food consumption gives some advice for everyday routines. In the school program the students discuss possibilities for waste reduction at home and are presented with a technique to check the quality of eggs. It is hard to assess whether these theoretical ideas will be carried out in practice, and how this might happen. One of the challenges may be that the exhibitions and programs provide no physical connection to the children`s lives where these practices can be established. Interestingly though, the visit was followed up practically with a teaching session on pro-sustainable practices, which focused on recycling. Although the students had already established recycling routines, this might indicate that programs run by museum / learning centers can be a starting point for more practical exploration and sustainability learning.

To conclude, *What the World Eats* and *From the Worktop* to the Planet have significant potential to support ESD, especially with regards to cognitive and affective learning. In the school program, the students are actively involved in exploring their own family background and those of others, and to reflect upon strategies to reduce waste. It is possible that the exhibition inspires similar thoughts and conversations. There are limitations when it comes to practical sustainability learning at the center. Within the walls of the center, real life interaction and practices can only be addressed

theoretically. However, the topics the school program and the exhibition touch on are closely related to everyday life, which allows for practical learning related to the topic after the visit.

5.3 Natural History Museum

The Natural History Museum is situated in the midst of the 15 hectare Botanical Garden close to Oslo`s city center. It encompasses two separate exhibition buildings and two greenhouses which put on geological, zoological and botanical collections. The museum has a strong focus on biodiversity matters and on the Oslo region. For the coming years, it is planning a comprehensive renovation of its geological exhibitions and the establishment of a science center.

The Natural History Museum contributes to formal education in a number of ways. Like all other institutions in this study, it offers a variety of school programs linked to its permanent and temporary exhibitions. It has designed several online tour suggestions which can be conducted independently at either the museum or other places in Oslo.[32] One of them, *Exploring Hovedøya*, is rather comprehensive and provides ideas for outdoor education and geological, botanical, zoological and historico-cultural exploration on one of Oslo`s islands. The programs of the Botanical Garden draw on Inquire Botany Learning. Similar to the GLO of the Norwegian Museum of Science and Technology, Inquire Botany Learning encompasses cognitive, practical and affective learning objectives.

Moreover, the museum holds teacher training sessions within the natural sciences once a year and gives introductions to pedagogic work in the Botanical Garden.

During weekdays and weekends, the Natural History Museum is a place for lectures and theme days. In autumn 2013, it arranged, among other things, talks on Neanderthals, bees and dark matter and energy. It also organized a potato day, marked the international day of biodiversity and arranged events on dinosaurs and herbariums.

[32] See http://www.nhm.uio.no/skoletilbud/undervisningsopplegg/

5.3.1 Exhibitions: From Biodiversity to Natural Areas

The museum shows eight permanent exhibitions. Two of these address ESD topics: [33]

a) *Norwegian and Foreign Animals* – presents specimen in their natural surroundings
b) *Botanical Garden* – hosts 8500 plant species[34]

Besides, the Natural History Museum regularly hosts temporary exhibitions and installations. During the time of the fieldwork two of those were related to ESD issues:

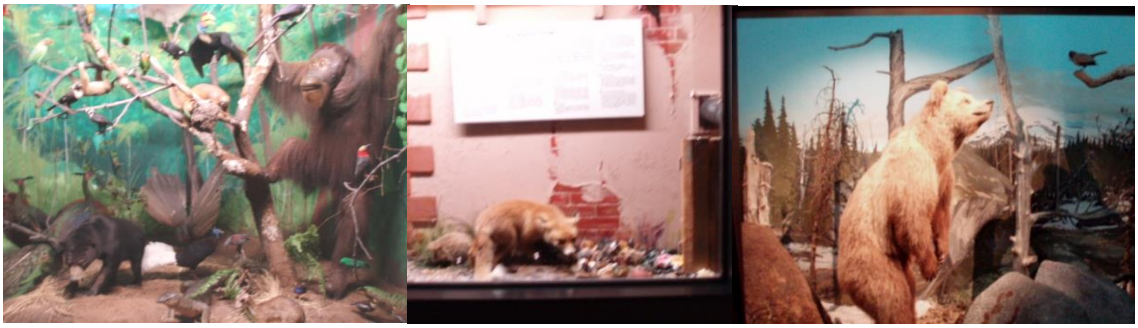
c) *Headhunter – an Exhibition on Trophies, Hunt and Power* – presents different sides of hunting such as trophies, economic opportunities and threatened animal populations
d) *Reverdin' s Blue* – installation made by an art group that highlights the decreasing habitat for Norway`s most threatened butterfly

These exhibitions touch on the ESD topics biodiversity and natural areas. Mostly, they put on display specimens or plant collections.

Norwegian and Foreign Animals

The exhibition *Norwegian and Foreign Animals* is divided into three sub-sections: a) the *Norwegian Room* on the first floor shows animals from the seas to the mountains, b) the *Svalbard-Room* on the ground floor exhibits arctic animals and c) the *Animal-Geographic* Room on the museum`s second floor displays animals from seven different biogeographic regions.

The three sections are quite similar. All consist of show cases which present zoological specimens and the environment the animals live in.



picture 1: show case Animal-Geographic Room/ Oriental region, picture 2: show case Norwegian Room/ urban animals, picture 3: show case Norwegian Room

[33] During the time of the fieldwork there was also a systematic section which was being taken down. It is therefore not part of the study.
[34] On the museum`s webpage, the Botanical Garden is not listed as an exhibition in its own. Yet, its character is similar to those of the exhibitions. The Botanical Garden is also integrated in the museum`s school program. This is why it will be included in the study.

Small labels inform about the species` name and habitat. Only for some species, is there extensive information, for example for bats, whose navigation technique is described in more detail. Traces of human life are rare in the exhibitions and only evident in a few show cases in the Norwegian room, where houses, fields, and – in one case – people are visible in the background. The zoological exhibitions focus clearly on the broad scale of animal life and biodiversity.

The Botanical Garden

The Botanical Garden includes an arboretum, a scent garden, a mountain garden, an ornamental garden with old regional plants, a garden with plants from the Oslo area, a bed with red- and black-listed species, a systematic garden, a herb garden as well as two greenhouses exhibiting exotic plants from the Mediterranean and the Tropes/Subtropics.


picture 1: the Oslo ridge, picture 2: red- and black-listed bed; pictures retrieved from Natural History Museum

All plants are labeled with the species` name. Therefore the Botanical Garden is strongly linked to the wider field of biodiversity.

Headhunter

The exhibition *Headhunter* came into being when the museum received a private trophy collection. *Headhunter* addresses three sides of trophy hunting: a) hunting as leisure activity, b) poaching and nature deprivation and c) hunting as income for game reserves and the consequent potential for nature preservation. Besides trophy heads and big mammals, the exhibition shows several hunting artifacts such as weapons, hunting equipment, lodgings and clothes both from Norway and more exotic regions.

picture 1: Headhunter: lion and trophies in the background, picture 2: Headhunter: safari tent with information on the big five; picture 3: Reverdin`s Blue installation; picture 3 retrieved from Natural History Museum

In addition, *Headhunter* includes a digital moose hunting game. The game illustrates how the consequent shooting of the strongest and biggest individuals will weaken a population in the long run. It also includes a photo installation where visitors can take pictures of themselves as a trophy. *Headhunter* is informative in character, but does not present a linear narrative or convey an explicit message. It touches on the ESD topics biodiversity and conflict of interest.

Reverdin`s Blue

The *Reverdin`s Blue* installation in the Botanical Garden is an art project by the group F36. The installation consists of big blue, wing-shaped boards that loom out of the meadow symbolizing the butterflies. Close to them, there is a table which gives information about the ongoing destruction of the endangered butterfly`s habitat and the lack of protection for it. The installation is thus linked to three ESD topics: biodiversity, natural areas and conflict of interest.

5.3.2 Red- and Black-listed Beds / Oslo Ridge – A School Program on Biodiversity and Threatened Species

Red- and Black-listed Beds-/-Oslo Ridge is not part of the Natural History Museum`s regular school program. Hanne and Liv, two science teachers from an upper secondary school close to Oslo, asked for a tour on these two beds in summer 2013 for their 12th and 13th grade biology students. They found that red- and black-listed species were a relevant topic for the biology curriculum and that the Oslo-ridge

offered – beside its prettiness – an important local focus. The Natural History Museums designed the tour on the basis of other programs.

The program starts in the Botanical Garden at the bed with red-listed (threatened) and black-listed (threatening) plants. The museum pedagogue introduces the topic and asks the students to sort out plants on pictures in small groups. There is no final answer to how the plants presented are to be categorized which leads to more comprehensive discussions on red- and black-listed species. Subsequently, the museum pedagogue points to the Reverdin`s Blue installation and the butterflies' habitat loss due to human activity. The group then looks at the plants of the Oslo Ridge before moving to the greenhouses where the pedagogue elaborates on different seeds and how they can be preserved. In this context, the guide introduces the museum`s cooling rooms as storage for seeds and refers to the Art Databank (Artsdatabanken) – a national hub for gathering knowledge on biodiversity.

Hanne and Liv scheduled the museum visit as one of the last activities of the school year. It was followed up by a quiz conducted in the school area where the students were asked to find black-listed species. They brought Syringe, Rugosa Rose and Canada Goldenrod, and Hanne was convinced that this indicated that the students might have had "some thoughts around the topic". The following autumn the biology students eliminated Canada Goldenrods from the school area. Moreover, they thought about bringing up the topic in their neighborhood. Hanne said:

> They burned it and yes they thought it was important and they think that way about their own local garden ... ooh ... I've seen it at the neighbor`s. Now I must go and talk to the neighbor. Like that.

The students who participated in the program would also inform the newly enrolled biology students about black-listed species and the Art Databank. Both the quiz and the cleaning of the school area, Hanne and Liv confirmed, were directly inspired by the museum visit.

5.3.3 Discussion: Education for Sustainable Development and the Natural History Museum

The zoological and botanical exhibitions are related to the ESD topics biodiversity and natural areas. Additionally, the museum`s online teaching suggestions for nature exploration (e.g. *Exploring Hovedøya)* and the school program include aspects of outdoor education. While the name of the museum indicates a certain interest in the history of nature, the examined exhibitions showed specimens and plants that currently can be found around the world.[35]

As far as biodiversity, natural areas and outdoors and nature experience are concerned, the programs and exhibitions of the Natural History Museum directly match the implications of Norway`s ESD strategy. The strategy emphasizes the role of economic, health, aesthetic and ethical aspects of biodiversity. Indeed, especially the zoological exhibitions allow for an aesthetic approach to biodiversity thanks to the scenic presentation of the specimens which is not distracted by extensive labels. *Headhunter* additionally addresses hunting from an environmental, social and economic perspective. By presenting hunting as a crucial revenue resource for game reserves and thereby financial opportunity to protect the environment, it challenges standard prejudices. Moreover, the exhibition has ethical implications where it cautions against extensive hunting. Also the Reverdin`s Blue installation on the endangered habitat of the butterfly comes with ethical implications related to human development on the expense of biodiversity.

With regard to natural areas, the strategy addresses conflicting interests in the exploitation of such areas; they may be protected for the sake of biodiversity or used to promote human development.[36] The *Reverdin`s Blue* installation problematizes the destruction of natural areas and gives insight into the problems human development might cause for animal and plant habitats.

The section on outdoors and nature experience in Norway`s ESD strategy highlights the increasing appreciation of nature, and the academic skills which may result from exploration of nature. The programs *Red- and Black-Listed Species / Oslo Ridge* and

[35] Only the geological exhibitions with e.g. a section on fossils have a more historical focus. The exhibitions are not included in the study due to their missing link to the Norwegian ESD strategy.
[36] Here is a certain overlap with the strategy`s fields biodiversity and conflict of interest.

the tour suggestion *Exploring Hovedøya* allow for such an acquisition of outdoor knowledge relevant for SD and may additionally trigger appreciation of nature.

At the Natural History Museum the permanent geological, zoological and botanical collections are separated from one another. Such a categorization gives an inaccurate picture of the role of species or geological phenomena in ecosystems. This is about more than questions of nature representation and authenticity; it is essentially about meaning making. In eco-centric approaches as presented by Næss or Leopold, intrinsic natural value does not derive from simply being in the world. Eventually, every natural phenomenon is related to ecosystems and interactions within them. Thus, from an eco-centric perspective, the meaning of a species is constituted by its relations and interactions within ecosystems. The zoological and botanical exhibitions take into account such eco-systemic ideas by grouping their specimen and plants by regions. The categorization of plants into threatening and threatened species, for example provide a contemporary view on their role in the specific ecosystems in Norway.

The overarching categorization of nature into geology, zoology and botany on the basis of taxonomies, on the other hand, makes a comprehensive understanding of a species` ecological context, and hence its ecological meaning and value, difficult. Besides, the scarce information labels in the zoological and botanical permanent exhibitions reduce the possibility for meaning making. Undoubtedly, taxonomies provide important insights into the breadth of nature. Even so, eco-systemic information beyond the individual features that are included in the show cases of the Natural History Museum could be a valuable supplement.[37]

As an exception, the temporary installation *Reverdin`s Blue* departs from the museum`s fragmentation and illustrates the interweaving of botany, geology and zoology. It includes the ground and landscape structure (geology) favored by wild licorice (botany) and the plant`s significance for the butterfly (zoology).

[37]An eco-systemic approach would also raise the status of geology which often stands in the shadow of biodiversity – not least in Norway`s ESD strategy. Focus on biodiversity excludes geological phenomena such as rocks or minerals which play a fundamental role in eco-systems. The new Nature Diversity Act (*Naturmangfoldloven*) from 2009 protects biodiversity, geological diversity and ecological processes (Ministry of Education and Research, 2009) and emphasizes thereby the mutual importance of geology and biology as well as the interactive character of ecosystems (cf. Erikstad, 2010).

Another point that is closely related to the fragmentation of nature at the museum, concerns the absence of human life at almost all sites of the museum`s exhibitions and collections. Where humans appear or are mentioned they are presented as intruders / exploiters (*Headhunter*, *Reverdin`s Blue*) or preservers / protectors (*Headhunter*). In each case humans are not seen as an integral part of nature.

Protectionist approaches present human activity per se as posing a threat to nature (Neumann, 1998, p. 87f.; Weiner, 2005, p. 406). They idealize wilderness and the pristine landscape as the "original" state of nature. As a result, they promote virtues that are hard to realize and in themselves counterproductive for SD.

In an exploitive approach humans are not necessarily presented as physically separate from nature. Yet, they become the prime agents who live not just alongside nature, but at the expense of it (Coates, 1998, p. 34f.). The challenge, indeed, lies in bringing humans into natural history museums as a part of nature and to translate philosophical ideas by Abram, Næss and Leopold into tangible concepts and to highlight human-nature relationships as essential for and beneficial to SD.

Concerning cognitive sustainability learning, there is a certain gap between the permanent exhibitions and the school programs of the Natural History Museum. The permanent exhibitions do little to invite critical reflection, analysis or comprehension of SD matters due to scarce labeling and a fragmented view on nature. This is reinforced by the division of geology, zoology and botany, and illustrations of human-nature relations that emphasize either the separateness of humans and nature, or the exploitation of nature by humans. These are elements the Natural History Museum could reconsider if it wants to embrace ESD in its exhibitions. The temporary exhibitions and installations give a more comprehensive presentation of eco-systems, and insights into ecological processes.

The school program *Red- and Black-Listed Species / Oslo Ridge* provides a framework for the exhibitions which encourages activity and critical thinking on the part of the students. Hanne and Liv reported on the high cognitive involvement of their students – something they could not remember experiencing in any other museum program in which they had participated.

Indeed, the program includes many aspects of active learning, critical analysis (discussing pictures), system thinking (ecological processes) and problem-based

learning (red- and black-listed species) related to an up-to-date topic. Further, by including the Reverdin`s Blue installation, the program also addressed aspects of geology and botany.

The exhibitions of the Natural History Museum highlight the aesthetic value of the natural world – the latter was an important criterion for Hanne and Liv for looking at the Oslo Ridge in the first place.

The exhibitions, especially the permanent exhibitions, do little to inspire vision-building mainly due to scarce labeling and limited information on the displayed specimen. They thus do not directly address any need for change or development in favor for SD. In contrast, the school program touches on a rather normative topic, endangered species, illustrating it with more information than was otherwise present in the Botanical Garden. The program emphasizes efforts to protect and conserve endangered species, a vision that seemingly inspired the students to take more action.

Neither the exhibitions nor the school program allow for practical sustainability learning in situ. However, similar to the program of the Nobel Peace Center, the practical learning unit took place after the museum visit. Hanne and Liv reported that the museum visit directly inspired the outdoor quiz, the clearing action at the beginning of the new school year and the information session for new biology students. Further, the students were thinking about bringing up the topic in their neighborhood. What is evident here is that the school program, like program of the Nobel Peace Center *From the Worktop to the Planet*, is related to contemporary ecological processes and to the students` realities. It thereby allows for more action-related work after the visit.[38] In this particular case of Hanne and Liv`s class, the program *Black- and Red-listed Species / Oslo Ridge* seems to have formed a bridge between applied learning and vision building (during the museum visit), real life exploration (quiz) and action (student information, intention to talk to the neighbor).

To sum up, the majority of the zoological and botanical exhibitions (the permanent exhibitions in particular) permit cognitive sustainability learning only to a limited extent and provide an aesthetic approach to the specimen – this may promote affective

[38] Again, as for the Nobel Peace Center, it must be mentioned that Hanne and Liv seemed quite open to museum visits and practical learning in general, which might have affected the outcome of the museum visit.

sustainability learning. The school program *Black- and Red-listed Species / Oslo Ridge,* on the contrary, includes relevant aspects of both cognitive and affective sustainability learning and allows for a practical follow up of the topic.

5.4 Norwegian Folk Museum

The Norwegian Folk Museum is an open-air museum on a museum peninsula outside Oslo`s city centre. It is Norway`s largest museum of cultural history and exhibits Norwegian homes from the middle ages until today. Some buildings contain permanent or temporary exhibitions looking at changing Norwegian lifestyles and culture. In addition to the exhibitions, the museum includes a farm, Bygdø Royal Manor (*Bygdø Kongsgård*), which is run organically. The farm raises cows, sheep, ponies, chickens and pigs and is used to communicate aspects of farming to the broad public including kindergartens and schools. The Norwegian Folk Museum offers a variety of guided school tours connected to the exhibitions for all school levels.

On the weekends and during holidays, actors illustrate and explain activities such as food or fire making and run workshops – often linked to the current season. During autumn break 2013 for example the museum focused on potatoes and potato holidays offering workshops on potato printing and food preparation with potatoes. In addition, the Norwegian Folk Museum occasionally arranges theme days or seasonal events. In autumn / winter 2013 the museum hosted a knitting Sunday, a scary night walking tour and a Christmas market.

5.4.1 Exhibitions: From Social Participation to Health

The Norwegian Folk Museum encompasses 19 permanent exhibitions, some of which are open only in the summer season. Among those that are open year-round, four are related to ESD matters:

a) *Technology of the Home* - illustrates how electricity, water systems and technology changed homes and lifestyles

b) *The Constitution`s Guardian* – presents the first room of Norway`s parliament (Stortinget), one of its chambers (Lagtinget) and informs about the development of Norway as democracy

c) *A Tobacco History* – addresses the development of Norway`s tobacco industry up to the present day and how knowledge about tobacco changed tobacco politics, people`s attitudes and tobacco consumption.

d) *Sami Culture* – presents Sami lifestyle and culture in the past and today

Just like the other three museums / learning centers in this study, the Norwegian Folk Museum hosts temporary exhibitions frequently. At the time of the fieldwork one of these has been relevant for ESD:

e) *Devoted Women* – presents information on women`s increased participation in society and changes in women`s everyday life

In these exhibitions questions of democracy and participation are most prominent, but the ESD topics health and energy are also covered. Regarding their design, the exhibitions are mainly dominated by show cases and informative labels.

Technology of the Home

The exhibition *Technology of the Home* is situated in the basement of a historical apartment building and narrates how electricity, running water and household appliances (e.g. electric stove, washing-machine, fridge, shower, TV) entered private homes. The exhibition takes its starting point in the late 19th century and continues to the second half of the 20th century.

picture 1: shower and information wall; picture 2: bathroom from post-war period, picture 3: electric stove and fridge; picture 1 and 2 retrieved from Norwegian Folk Museum

Technology of the Home consists mainly of historical technologies – from wastewater pipes to fridges. Information walls give more detailed insight into the changes brought about by the introduction of modern technologies. As an introduction on energy, there is a short note on the environmental effects of energy production. Otherwise, the

exhibition emphasizes several times how quick modern technologies changed everyday life and improved hygiene and home comfort. The exhibition is mainly linked to the ESD topic energy.

The Constitution's Guardian

*The Constitution`s Guardian* is a small historical exhibition on the first floor of the museum`s visitor center which shows the first parliament hall (Stortinget) as well as documents and objects connected to the parliament's first years (e.g. Wergeland`s glasses, a portrait of Wergeland, an inkstand from the parliament`s hall).

picture 1: parliament hall, picture 2: glasses from Henrik Wergeland, portray of Wergeland, picture 3: mugs with portrait of Christian Krogh, pipe head and inkstand, picture 1 retrieved from Norwegian Folk Museum

The objects are supplemented by posters. They provide information about historical events (e.g. the design process of the constitution) and important personalities of that period (e.g. Henrik Wergeland, Christian Krogh, Carl Johan) and outline the development of democracy. The exhibition presents a linear narrative of evolving democracy in Norway and is thereby closely connected to the ESD area democracy and social participation.

A Tobacco History

A Tobacco History is a historical exhibition situated in a fruit and tobacco shop. It depicts the status of tobacco in Norway from its introduction at the end of the 17th century to the Tobacco Act and its multiple expansions in the 21st century. The exhibition covers three small rooms and consists mainly of information tables, pictures and historical objects related to the topic.



picture 1: packaging hall of the Norwegian-English Tobacco enterprise around 1930, picture 2: cigar form, Norwegian tobacco
and cutting machine, picture 3: advertisement poster for cigarettes; picture 3 retrieved from Norwegian Folk Museum

The first room portrays the rise of the tobacco industry in the 18th century, including aspects such as production processes and child labor; the second room addresses different sides of tobacco consumption and advertisement; and the third room takes up increasingly skeptical attitudes on tobacco consumption and more restrictive laws due to health effects such as lung cancer. *A Tobacco History* touches primarily on the ESD topic health, but also participation and democracy where it addresses working conditions and child labor.

Sami Culture

Sami Culture is situated in the museum`s largest exhibition building and provides information about Sami cultural history, changing Sami lifestyles and the increasing participation of the Sami in Norwegian society. The exhibition is dominated by objects, pictures and shorter information labels that give insight into the object`s meaning and different spheres of Sami culture.

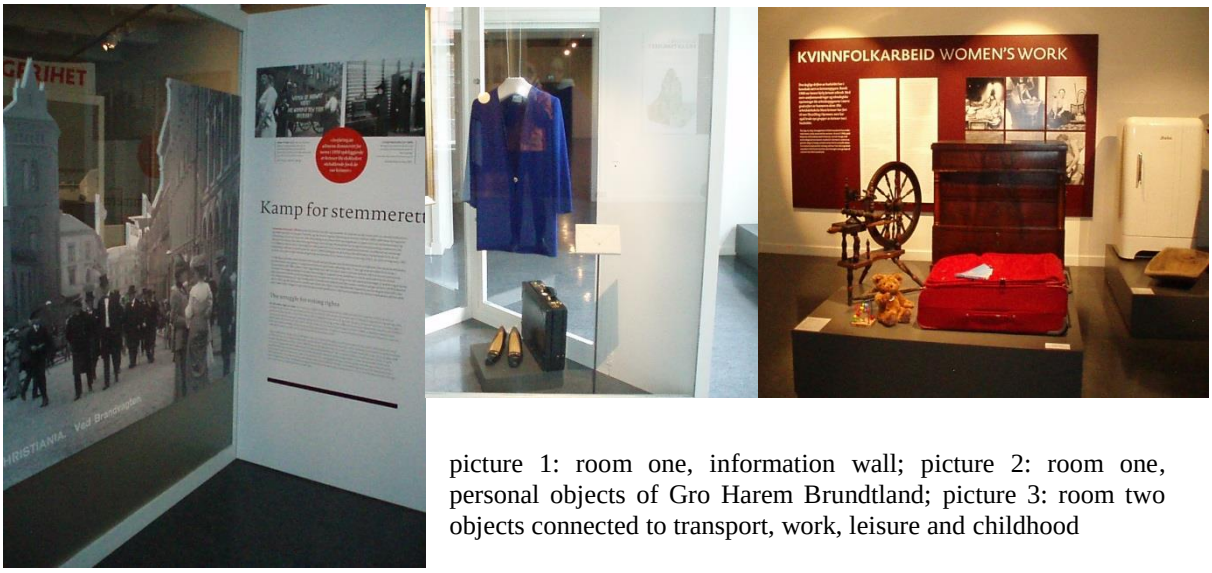



picture1: traditional Sami clothes, picture 2: fishing net, picture 3: modern Sami living room, picture 4: young Sami today

It is divided into two rooms. The first and largest room presents characteristics of traditional Sami lifestyle (e.g. language and myths, hunting, farming and costumes) while the second room portrays modern life (e.g. increasingly urban lifestyles and political participation).Beside the diverse information on Sami lifestyles, the exhibition gives insights into the oppression of Sami culture and Sami-Norwegian conflicts (e.g. school education in Norwegian, expansion of the Alta-watercourse) as well as the Sami`s increasing cultural protection and social inclusion from the middle of the 20th century (e.g. the recognition of Sami as an official language, the Sami Parliament of Norway). *Sami Culture* thereby touches on the ESD topics of participation and democracy.

Devoted Women

Devoted Women was shown during the time of the fieldwork as one of the many exhibitions in the museum`s biggest exhibition building. It was designed in celebration of the 100th anniversary of women suffrage in Norway. Spread over two rooms, the exhibition portrays women`s participation in society and the accompanying challenges from the 19th century until today.



picture 1: room one, information wall; picture 2: room one, personal objects of Gro Harem Brundtland; picture 3: room two objects connected to transport, work, leisure and childhood

The first room at the entrance of the exhibition is dominated by large text walls arranged around show cases which contain selected historical objects related to the topic (e.g. a switchboard and birth control pills). This part of the exhibition gives information about the fight for increasing participation of women in society and

portrays different female personalities as pioneers of their time (e.g. Camilla Collett and Gro Harlem Brundtland).The second exhibition looks at women`s everyday life (e.g. transportation, music, job, animals, love) and how it has changed since the late 19th century. Again in this section huge information walls provide rich information, illustrated by a variety of original objects (e.g. a spinning wheel and a fridge). The exhibition repeatedly links historical facts to present society; for example, it is mentioned that women still work in industries with lower pay today, that women tend to work part-time and that foreigners are underrepresented on the municipal level. Generally, *Devoted Women* is linked to the ESD topic participation and democracy.

5.4.2 I Want to Decide too! – A School Program on Democracy and Social Participation

In October 2013 the municipalities assigned several Oslo schools to participate in *I Want to Decide too!* via the Cultural Rucksack. *I Want to Decide too!* is a 90 minutes school program designed for 8th graders. The program is divided into two parts. The first part is a conversational tour through the exhibition *Devoted Women* which is followed up by, part two, a workshop on democracy and democratic principles.

The tour starts in the first room of *Devoted Women* with festive music. Here, the guide enters into a conversation with the students on the anniversary of women's suffrage, as well as the duties and rights of Norwegian adolescents (e.g. voting rights and age of consent). She points to Camilla Collet and Gro Harlem Brundtland, briefly outlines their importance for the feminist movement and indicates that a lot has happened since Camilla Collet`s writings. Subsequently, she brings up freedom of speech as a central democratic principle and refers to the French Revolution as one of the inspirations for the development of democracy in Norway. Together with the students she concludes that demonstrations are an effective means of demanding more rights and invites the students to protest. The students line up and march to the next object – a switchboard – shouting "Better distribution, more voting rights". Here, the guide explains that universal suffrage was introduced in Norway in 1913, but that women still were disadvantaged in working life. Only certain jobs were suitable and the husband had control over the wages.

The guide then points to power of parliament in everyday matters and the introduction of birth control pills as an example. She returns to freedom of speech and concludes that even today freedom of speech is limited and it must not be misused for purposes of discrimination. In this context, the guide talks about Berit Ås who at the end of the 1970s published a book on power manipulation and the humiliation of women in the Norwegian Parliament.

The students enter the second room of the exhibition and are asked to line up around a square indicated by a cord on the ground. They are to position themselves according to agreement or disagreement with statements such as "politics is tiresome", "only those who are interested in politics and are committed to society, can be allowed to vote" and "there should be compulsory voting". After each statement the students explain why they agree or disagree. In the group I joined, the students would quickly engage in conversation, not only with the guide, but also with each other.

Towards the end of the first part, the guide talks about the difficult working conditions of many women who suffered from contact with phosphorus in the match-making industry, who worked long shifts and received low wages. Slowly, however, due to massive protest, she concludes, the situation improved. The entire tour is systematically led by the questions of the guide and driven along by discussions with and among the students.

For the second part, the students enter a separate room – a laboratory. Here they explore six stations on democracy in groups spending between three to five minutes on every station:

1. All members of the group – except for one – get their mouth taped and take their place in a row with chairs. The one who still is able to speak, pulls a slip from a box and reads it aloud, e.g. *We believe that football is stupid. There is too much football everywhere. We vote for fewer soccer teams both for children, youth and adults. Since you do not say anything, you certainly agree.* The students who have their mouth taped can either agree or disagree non-verbally.

2. A board on the wall shows pictures of different people from different periods. The students write sentences taken from different contemporary or historical sources in a paper speech balloon and attach it to one of the persons who could have said that. The students have to consider factors such as age, sex and historical period.

3. The students discuss school-topics choosing a certain mood and certain arguments, each of which is illustrated by objects (e.g. nails: aggressive – for or against shorter breaks, cotton: vague, for or against homework)

4. With the help of tweezers the students extract statements from test tubes ("I hate to queue", "I do not trust politicians") and discuss whether they qualify as good or bad reasons not to vote.
5. The students write "democracy" together using an oversized pencil with five handles.
6. The students pin a note on a tree listing things which are important to them and, on the other side of the tree, listing what they think is important for Norway (e.g. peace, family, computer games).

After the time is up, the class discusses how they experienced the exercises. They then line up to participate in a secret poll on whether they intend to vote when they turn eighteen and leave the laboratory.

Clearly, some exercises are linked to the first part of the program; exercise one and two relate to social participation and freedom of speech; exercise three illustrates different voices in the public discourse; and exercise four and six affect personal attitudes on democracy, elections and the future. Yet, those links are implicit and not presented to the students.

Lilian, a teacher at a combined primary and lower secondary school on Oslo, participated with her Religion, Philosophy and Ethics class in the program. She knew little about the program beforehand apart from the actual topic and had neither taken up democracy or voting rights as topics in class.

While her students were just listening in the first part of the program, Lilian explained, they became more active in the workshop. After the program, the students explored the rest of the museum in groups. Back in class, Lilian stated, that the visit made it easier to discuss democracy and Greek philosophers, as the whole class shared the same experience.

5.4.3 Discussion: Education for Sustainable Development and the Norwegian Folk Museum

Compared to the great number of exhibitions at the Norwegian Folk Museum, ESD topics seem to play a minor role. Most central are questions of democracy and social participation (*The Constitution's Guardian, Sami Culture, Devoted Women).* Moreover, the exhibitions address the ESD topics health (*A Tobacco History*) and energy (*Technology of the Home*).

The exhibitions examined refer to specific historical aspects of Norwegian life and sketch out their development up until recent times. Like the exhibitions of the Norwegian Museum of Science and Technology they offer an explanatory background, a kind of storytelling, through which the development of today`s Norwegian society can be understood. *Technology of the Home* narrates the conquest of modernity in private homes, and in that it has striking parallels with the energy exhibitions of the Norwegian Museum of Science and Technology. *The Constitution`s Guardian* depicts the origin and manifestation of democracy in Norway.[39] *A Tobacco History* reports on the gradual banishment of cigarettes from public life. *Sami Culture* gives information about the increasing inclusion of the Sami in Norwegian society. And *Devoted Women* illustrates women`s increasing social participation. Significantly, each of these exhibitions reflects a success story and depicts the increasing democratization in Norway and improved public health. When discussing the findings for the Norwegian Museum of Science and Technology, I indicated that this may be problematic as such narratives leave modern society unchallenged. The most promising exhibition in this respect might be *Devoted Women. The exhibition* draws parallels with the political marginalization of foreigners and the comparatively low income of women in Norway today while celebrating SD achievements increased gender equality and social participation.

This affects the exhibitions relevance for the focus topics in the Norwegian ESD strategy. While the topics of the examined exhibitions do overlap with ESD topics as such, they do not match with the way they are understood in the Norwegian strategy. Participation and democracy as described in the strategy comprise democratic willingness and the comprehension of individual rights. The strategy thus focuses on individual awareness and commitment. The exhibitions *The Constitution's Guardian*, *Sami Culture* and *Devoted Women* create an awareness of democracy as basic value of Norwegian society, but do not actively include this specific empowerment. Health as an ESD topic, as mentioned earlier, is mainly linked to knowledge of global challenges. Again, the exhibition on tobacco creates an awareness of the health effects of tobacco, but presents the challenges related to it as concerns belonging to the past.

[39] *Here* the narrative stops in the early 19th century, is an exception here. However, like most other exhibitions that were examined at the museum, it supports a narrative of gradual progression towards a modern society.

Energy in Norway`s ESD strategy, which I mentioned earlier in connection with the Norwegian Museum of Science and Technology, is related to current challenges in energy consumption, e.g. renewable energy, energy efficiency and energy saving. Such aspects are not integral to the exhibition *Technology of the Home* due to its retrospective character and its focus on the social sciences.

The school program *I Want to Decide too!* embraces to a much greater extent participation and democracy as a matter of empowerment, and links women`s struggle for social and political participation directly to the reality of the students. Initially, in the first part, the students discuss the rights of adolescents and refer to aspects such as age of consent and voting rights – something which is directly related to the students` life. At the end of part one, they also explore their own attitudes to democracy when they line up around the rectangle. In addition, the workshop recreates conditions that women were struggling with and helps the student to develop a better comprehension of women`s struggle. Similarly, they explore and discuss their personal opinions and their willingness to participate actively in a democratic society.
In this way the school program creates a dynamic relationship between the past and the present. Likewise, Eva reported on a similar program at the House of Artists (Kunstnernes Hus), an art center in the heart of Oslo, where she and her class looked at the exhibition *Everything for Norway* by Victor Lind which looked at the deportation of Jews in Oslo in World War II. Eva said:

> What makes it interesting is that it thwarts our official view about Norway during the war. That we were exemplary and were the victims. But […] the deportation of the Jews shows that Norwegians were slightly more active than we like to think in relation to the Jews. And what was really good was that it was an experience; or more experience-based [...] learning.
>
> I was there twice with two classes. The one time, I participated in a program and there we just drew on democratization which they problematized in relation to today`s situation. [...]. They had various ethical dilemmas. All thought immediately that they would have been those who helped the Jews to escape. But what did they [the students] think about asylum applicants today? They came up with very specific examples which the students were asked to take a position on. And the students, they were very active. And they experienced it as very contemporary although it was actually linked to a different period.

Obviously, Eva appreciated the reciprocity of past and present and the parallels drawn in this program which allowed for interpretation, understanding and reflection on past and present social phenomena.

It is interesting that, just like the Norwegian Museum of Science and Technology, the examined exhibitions of the Norwegian Folk Museum barely address nature, and promote anthropocentric values and topics, namely democracy, health and energy.[40] Norway`s history, however, is integrally linked to nature. Being a nation of farmers for centuries, Norway has evolved to become an oil nation in the last 50 years. Now and then Norway has been dependent on its natural richness, for example in terms of leisure activities as cabin vacations, skiing or hiking. The Sami exhibition relates slightly to this field, portraying the historical interconnectedness of Sami culture and nature. It presents certain changes as increasing settlement and urbanization, but could address past and present human-nature relations more explicitly.

Similar to the Natural History Museum and the Nobel Peace Center, the possibilities for cognitive sustainability learning at the Norwegian Folk Museum vary drastically between the exhibitions examined and the school program. The exhibitions are traditional in character; they are dominated by show cases and texts and focus primarily on knowledge transmission. The school program *I Want to Decide Too!* seems to be much more stimulating, demanding active involvement and exploration through experiments and discussion. Lilian was convinced that the museum visit facilitated discussions on abstract philosophical ideas later in class.

Both the examined exhibitions and the school program *I Want to Decide too!* seem to show a certain potential for affective sustainability learning. Values such as justice and equal participation – which are central to the Norwegian ESD strategy – are prominent in almost all exhibitions (*The Constitution`s Guardian*, *Sami Culture*, *Devoted Women*). They are also repeatedly addressed in the school program both through discussion and practice. Moreover, *A Tobacco History* emphasizes healthy lifestyles as modern virtue.

The exhibitions all report on social progress and achievements, whether it is reduced smoking, higher living standards or increased democratic participation. They present stories of social success, throwing a shadow over the past and lauding the present.

[40] These values or topics may not be anthropocentric as such – especially health and energy – but being linked to the human world exclusively in the exhibitions makes them appear as if they were.

This may in the end affect the scope of the exhibitions, in that they give little room for visions and vision building.

As with the other museums in this study, the practical learning potential of the examined exhibitions seems to be limited due to the high focus on knowledge transmission. The school program *I Want to Decide too!* on the contrary, emphasizes the comprehension and practical exploration of social and political participation. Predictions about future student behavior must be left to speculation. Interestingly, in contrast to the programs of the Natural History Museum and the Nobel Peace Center, Lilian decided to follow up *I Want to decide Too!* on a cognitive, conceptual level in class.

To sum up, as a cultural history museum the Norwegian Folk Museum is dedicated to matters of historic Norwegian lifestyles. In this context it is noteworthy that nature and human-nature relations play a marginal role in the exhibitions examined. The exhibitions as such touch on certain ESD topics, but do not match the way they are understood in Norway`s ESD strategy due to missing links to current sustainability challenges. The school program, however, addresses both cognitive, affective and practical sustainability learning and is more in line with the ESD strategy.

5.5 Chapter Summary – Relevant Topics and Problematic Perspectives

The findings of this chapter indicate that the status and presentation of ESD topics is highly varied between and within the respective museums / learning centers: the Norwegian Museum of Science and Technology addresses the ESD topics energy, democracy and participation, health, water as well as waste and recycling; the Nobel Peace Center touches on the fields health, waste and recycling as well as consumption, resources and distribution; the Natural History Museum focuses on biodiversity and natural areas and facilitates outdoor education; and the Norwegian Folk Museum addresses different sides of Norwegian cultural history such as democracy, participation, energy and health which generally are the most prevalent ESD topics in the exhibitions of this study. Interestingly, climate change as central topic within SD, is hardly referred to in the museums / learning centers examined.

The exhibitions of the Norwegian Museum of Science and Technology (apart from the science center) and the Norwegian Folk Museum favor retrospective views on the topics presented. The Nobel Peace Center, the Natural History Museum and the science center of the Norwegian Museum of Science and Technology, on the other hand, present rather contemporary perspectives.

Similar to the school curriculum, the museums / learning centers primarily seem to foster cognitive and affective sustainability learning. Active cognitive involvement is better facilitated in the temporary exhibitions and school programs, which in general appear to be more suitable for ESD in that they may weave modern topics into historical exhibitions (e.g. *I Want to Decide too!* / Norwegian Folk Museum). They are thereby partially independent from the intentions of the curators.

According to Eva and Cathrine objects are major assets of museums / learning centers. They visualize and specify; they exemplify, illustrate and have the power to create authentic settings which again increases possibilities of cognitive learning in general.[41]

In their exhibitions and programs, the museums / learning centers include values such as biodiversity, social participation, democracy as well as physical and mental health – these topics resemble the focus areas of ESD. The majority of the museum exhibitions though, do not encourage a critical reflection on current lifestyles and contemporary society; neither do they encourage visions of alternative ways of living. The absence of this perspective weakens their relevance for ESD. Often, especially at the Norwegian Museum of Science and Technology and the Norwegian Folk Museum, this is because of the retrospective focus of the exhibitions or the emphasis on modern success stories. The school programs are generally more innovative, linking historical events to the here and now reality of the students.

Practical sustainability learning seems to be much weaker in general, especially in the exhibitions. This might be due to the isolated position of museums / learning centers in society. They present models of the world outside rather than being part of it. In two cases though, the museum / learning center visit was followed up by a practical

[41] Lilian, Hanne and Liv would touch on similar topics during the interview when referring to museums / learning centers in general.

learning session on the initiative of the teachers. These were programs that touched on ESD topics related to the students` reality.

There is further an overall tendency in the museums / learning centers to promote a human-nature divide by presenting exhibitions that either focus on humans or the environment exclusively or that illustrate human domination of nature. This fosters a frontier approach and thereby an ethic that counteracts SD. Partly, I suggest that this may be due to the academic focus of the museums / learning centers. Technical museums, for example, may struggle to address human-nature relations from a non-technological view. Likewise Natural History Museums have traditionally excluded humans in their exhibitions and may need to reconsider the appropriateness of their approach.

6 Findings and Discussion II – Factors that Impact the Work of Museums and Learning Centers

The interviews I conducted provide a more nuanced understanding of the factors that impact the work of museums / learning centers and thereby also their potential for ESD. Such factors include the role of the school curriculum and of school collaboration projects as well as the interpretation of SD at museums / learning centers. These will be presented briefly below.

6.1 The National School Curriculum and Quantitative Performance Goals

One of the basic criteria which teachers use to assess the relevance of an exhibition or a school program, the interviews indicate, is the school curriculum. Heggelund explained that the program *The Industrial Revolution* is among the most popular of the Norwegian Museum of Science and Technology due to its high relevance for the secondary school curriculum. Further, all teachers agreed that although they personally supported school visits to well-made exhibitions in general, time-pressure forces them to make the visit relevant for the curriculum and the final exam:

> [The program] should be very specific and be grounded in the curriculum of the subject if the teacher is to think that the academic outcome is big enough to spend the time it takes to travel back and forth to Tøyen [area of the Natural History Museum] or elsewhere. And one spends quickly half a day at least. We have to take the students out of other subjects, perhaps. So highlighting academic content and its relation to the curriculum is certainly important if teachers are to use that kind of program.
>
> (Hanne)

> It should be in subjects where the teacher has many hours, so that one can benefit from it covering perhaps more learning goals. So it's partly to adapt it to the learning goals, to the exam. It should be relevant for the curriculum and exam. And you usually manage to make it relevant for the curriculum, but it really is more difficult with the exam. That's how it is, unfortunately.
>
> (Eva)

The interviewees from the school divisions at the Norwegian Museum of Science and Technology, the Nobel Peace Center and the Norwegian Folk Museum indicated that the institutions were expected to welcome a certain number of school classes per year or were facing other quantitative (e.g. financial) goals:

> [I]t is our instinct to offer programs that are as good as possible and we want as many in here as possible. And we need to be relevant for most teachers at as many levels as possible. The strategy is partly to focus on everything to become more relevant for even more teachers.
>
> (Heggelund, 2013)

> Well, we must at least have 800 school classes per year to meet the minimum requirement of the board.
>
> (Rokseth, 2013)

> We are a museum which has great revenue requirements. We are forced to get money there [for material in school programs].
>
> (Garles Sjåland, 2013)

This also affects the design of the programs. All museums / learning centers of this study reported that they adjusted their school programs to the school curriculum to make it worth the effort. As Rokseth explained when asked about the target groups of the Nobel Peace Center:

> We have worked a lot to make students from upper secondary school come. We had a little low here for a period, but we made an effort to lift the programs and we did a lot to make the teacher feel, it is a supplement to the teaching.

Although aspects of SD and ESD are to be found in the programs of the examined museums / learning centers, they seem to be of minor importance compared to the significance of the national school curriculum. When asked if they use the term 'sustainable development' in their school divisions, Rokseth and Heggelund said:

> The Nobel Peace Center strives to have an even stronger focus on it, on sustainable development in the exhibitions in the future. We do not have a particular focus on it.
>
> If it fits, we absolutely use the term 'sustainable development'. And it is as I said in secondary school where they [the students] have to understand and explain it.
>
> (Rokseth)

> To be perfectly honest, no. We haven`t done that. It is a term that we are probably going to be more aware of. You can say that when Climate X [exhibition on climate change] came, we felt like, "oh, finally there is an exhibition that takes the environment serious" Earlier we had an energy exhibition where there was [a part on] power saving; it was put away in a little corner that nobody saw. I would probably say that exhibitions which make it easier to focus on the topic have been rare. And so we are trying, where it fits. So even if power saving is not an issue in the museum's old energy exhibition, we are talking about power saving because it's important and because it's relevant for the curriculum. But we use other words than sustainability.
>
> (Heggelund)

However, Heggelund noticed that recent revisions of the school curriculum have strengthened the role of SD and ESD, and in the end this may also affect the program offerings of the National Museum of Science and Technology.

6.2 Funding Projects

To promote the status of non-school actors in education such as museums / learning centers, the government has launched several funding projects, e.g. the Cultural Rucksack, the Natural Rucksack or the Lektor2 program.

The Cultural Rucksack aims at increasing the status of culture and art at schools. Every year external actors can apply for funding to develop programs that are later offered or assigned to schools for free. The Cultural Rucksack changes the focus of its announcements annually and often links it up with national anniversaries. The programs that apply for funding have to be grounded in the school curriculum, either the core curriculum or the specific goals of the single subjects. None of the museum personnel could recall announcements that were directly related to sustainable development, but the Norwegian Museums of Science and Technology, the Nobel Peace Center and the Norwegian Folk Museum reported on current or earlier projects that were related to the field. The Norwegian Museum of Science and Technology has been working with a program on oil which looks at the environmental challenges connected to it; the Nobel Peace Center has been running a program on conflict resolution; and the Norwegian Folk Museum has offered amongst other things the school program *I Want to Decide too!* on democracy which is described in chapter four as well as the program *Out into Nature!*, an explorational tour of the museum`s surroundings and its cultural history.

Svebak Grimstad and Heggelund emphasized that they often suggest something special when they apply for funding from the Cultural Rucksack:

> We never take anything that we otherwise could have gotten. We do something more or we do something completely new. And in this case [the program *I Want to Decide too!*] we did something completely new. We used this anniversary exhibition *Devoted Women* for which we also offer regular guided tours for all types of groups for and then we made a separate and different program in this exhibition and refined it with democracy and the laboratory on democracy.
>
> (Svebak Grimstad)

> There are others who evaluate us: the teachers evaluate the program directly for the Cultural Rucksack without us seeing it. We get the feedback maybe after a month. We will have a meeting tomorrow with the Cultural Rucksack. I feel that my stress level is higher than normal because mediocre feedback is worse and I take it even more personally with regard to the Cultural Rucksack – because we shall reach farther, even farther than we normally do when designing a program for the Cultural Rucksack.
>
> (Heggelund)

Heggelund`s comment indicates that the follow up and evaluation by the Cultural Rucksack is a critical aspect for museums / learning centers in the funding program, and that it directs focus onto quality rather than quantity.

The Natural Rucksack distributes funding to school projects related to nature education or ESD, preferably with a local approach involving external actors. The program thereby supports projects that consider the individual needs and possibilities of specific schools, and engages the school staff in the development process of the project. Recently, the program also opened up to applications by school actors outside the formal teaching plan. Although the program is open to applications for development topics related to SD, most projects that received funding for the school year 2013/2014 focused on the environment (cf. The Natural Rucksack).

The lektor2 program funds the integration of the working world in natural science teaching. Liv and Hanne received financial support from the funding program to establish a project on sustainable development together with OREC, a provider of consultancy services within subsurface technical areas to the oil and gas industry. They used the funding to cover the extra working hours that went into the project.

In sum, all three funding initiatives provide support for projects related to ESD. As I indicated in chapter two, however, development perspectives seem to play a minor role for these programs, especially in the Natural Rucksack and the lektor2 program.
The Norwegian Museum of Science and Technology, the Norwegian History Museum and the Norwegian Folk Museum all reported about partner schools, but, like Hanne, saw tight schedules as one of the main challenges of the partnership.
It is here the Cultural Rucksack, the Natural Rucksack and the lektor2 program come in. They provide financial support and thereby time to conduct projects with other

agents; and they build a frame for mutual commitment to collaborate on topics that do not have to be linked to SD, but can be.[42]

6.3 Interpretation of Education for Sustainable Development for Museums and Learning Centers

When talking about sustainable development with the personnel from the four Oslo museums / learning centers, the interviewees had a tendency to interpret SD mainly as a matter of the environment:

> And the last criterion that has been included – by criteria I mean the categories that have been included for the Peace Prize candidates – is environmental commitment. In school programs, we always talk about it, but there we often talk about how sustainability can contribute to peace – it`s more those issues we are discussing. […]. We know that the next exhibition will be about democracy and social media, but there will be surely an exhibition on the environment soon.
>
> (Rokseth)

> Sustainable development is a term we do not use. You will have to give me a definition on the issue. I would think of topics which are about energy, but sustainability in terms of the Industrial Revolution, that sounds strange to me.
>
> (Heggelund)

This one-sided interpretation of the term, which results in the neglect of the development dimension constitutes one of the main challenges of SD and ESD. In the case of the Oslo museums / learning centers I examined, development topics such as health or social participation have been addressed in several exhibitions, but they were not necessarily considered as part of SD.

6.4 Chapter Summary – Quantitative Goals and Strong Ties to the School Sector

Up to the present day, sustainability education is an area of interest at the museums / learning centers examined, but not necessarily a prioritized one. The interviews indicate that the museums / learning centers in this study pursue certain quantitative

[42] Downey et al. for example (2007, p. 177f.) report about a long-term school project of the Guggenheim Museum that increased students` critical thinking skills significantly. To develop their program, the Guggenheim Museum actively collaborated with school staff (Downey et al., 2007, p. 179f.).

goals and these may compromise commitment for sustainability education. As an example, the four museums / learning centers in this study increasingly attune their programs to the school curriculum – the teachers` primary criterion when considering the suitability of a school program – to attract more school classes. The integration of ESD in these programs thus depends on its status in the curriculum.

Besides, there are certain funding programs such as the Cultural Rucksack, the Natural Rucksack and lektor2 which promote collaboration projects between schools and external agents. These projects do not have to include sustainability topics, but the frame of the programs does allow for that. This indicates that in relation to schools, the school curriculum and funding programs are key factors that impact the work of museums / learning centers – and the future of ESD topics as part of their programs.

Finally, it is noteworthy that the environmental dimension appears to be dominant in the museum`s / learning center`s interpretation of ESD. Increasing awareness of the multiple aspects of SD and ESD could help museums / learning centers to see their exhibitions from a fresh and innovative perspective.

7 Museums and Education for Sustainable Development: Potential, Challenges and Incentives

In chapter two I argued that ESD, especially in Norway, is a narrow concept that excludes important aspects of sustainability education. The Norwegian strategy aims to implement ESD exclusively in formal schooling; it focuses primarily on children and adolescents and omits culture and cultural history. Museums / learning centers promote individual elements of ESD, especially cognitive and to some extent affective sustainability learning, but they struggle with practical aspects. In what follows, I will draw on the findings from chapter five and six and discuss the potential of ESD at museums / learning centers. This includes aspects as objects and exhibition design, cultural history, human-nature relations, and the overall goals of the institutions. Finally, I will suggest three ways to promote ESD at museums / learning centers: a) through further revision of the national school curriculum and ESD, b) through increased cooperation and governmental incentive projects that target museums / learning centers, and c) through a reconsideration of performance standards.

7.1 Strengths and Weaknesses

7.7.1 Objects and Design – about Exemplification and Contextual Flexibility

According to the teachers, objects and effective exhibition design specify, exemplify, illustrate and create authentic settings.[43] Leinhardt and Crowley (2002, p. 4) support these views claiming that objects are major assets of museums as they allow for example-based-learning, and build a bridge between historical events and the visitor. In fact, in the exhibitions of this study objects or effective exhibition design refer to different historical events (e.g. *The Constitution`s Guardian* / Norwegian Folk Museum), but beyond that, they are employed to illustrate abstract and complex processes (e.g. *Energy Fair* / Norwegian Museum of Science and Technology) or local realities (e.g. *What the World Eats* / Nobel Peace Center). They facilitate an

[43] A study by Arbuthnott et al. (2014) suggests that the visiting of natural history museums can have the same effect on spontaneous pro-environmental goal setting as real nature experiences.

access to wider contexts in general that may otherwise be challenging to comprehend. This is especially relevant for ESD which addresses abstract and complex topics at times such as the processes behind climate change. Schreiner at al. (2005, pp. 26-32, 40), for example, discuss several Norwegian and international studies that indicate a lack of essential knowledge on climate change and factors related to it such as important climate gasses or the cause of rising sea levels. Similarly, Hanne and Liv reported that they always draw on projects and practical learning when they take up 'sustainable development' in class, because their students have little knowledge of the natural science aspects of SD and experience difficulties when being confronted with them.

Similar to the illustrative character of projects, objects and effective design may promote this kind of learning through their exemplifying character. They are therefore important aspects of museums / learning centers, which cannot be imitated the same way in everyday school life.

The meaning of objects as such is flexible and their educational function is mainly defined by the context, i.e. the exhibition they are situated in. Sutter (2008, p. 198) claims that there are plenty of objects that can be included in SD exhibitions. Indeed, all examined Oslo museums display such objects. Some of them have been named in chapter five, e.g. electrical household appliances or floating rigs (Norwegian Museum of Science and Technology), specimen of mammals or plants (Natural History Museum) or personal objects by Gro Harlem Brundtland (Norwegian Folk Museum).[44] This openness in terms of interpretation is not limited to historical objects, but includes contemporary objects as well. The photographs of the exhibition *What the World Eats* / Nobel Peace Center illustrate this rather well. They allow for different associations, ranging from environmental concerns, health and waste aspects to questions of development.

Hence, many objects of the museums / learning centers examined have an inherent potential for ESD as they can create an access to more advanced SD topics.

[44] This is also true of those exhibitions that are not included in the study due to low relevance for ESD. The Norwegian Museum of Science and Technology for example shows different exhibitions on transport.

7.1.2 Culture and Cultural History – Opportunities and Limitations

Worts makes the distinction between conscious and unconscious aspects of culture:

> …the total sum of all values, collective memory, history, beliefs, mythology, rituals, symbolic objects and built heritage which reflect the manner people relate to those aspects of life which a) they can know and control; as well as b) those they cannot fully understand or control, but to which they need to have a conscious relationship.
>
> (Worts, 2004, p. 45)

This distinction works exceptionally well for museums. Many of the exhibitions and programs in this study provide historico-cultural perspectives which illustrate and raise awareness of the ways in which Western values have or are currently affecting Norwegian society. These narratives build a sound foundation for the further exploration of values and lifestyles with respect to ESD.

Historical exhibitions may trigger such an exploration in several ways. First, historical events and conflicts can be related to similar events in the present. Eva reported in connection with a Victor Lind exhibition that the guide actively drew lines between the past and the present (World War II vs. 21st century) highlighting similar paradigms (persecution and discrimination) in relation to different social groups (Jews versus asylum seekers). This reciprocal relation of past and present encouraged the students to re-consider their conception of the core problem – persecution and discrimination. Likewise, *I want to Decide Too!* illustrates historical and contemporary aspects of social participation and freedom of speech. Such an approach could for example be employed in *The Industrial Revolution* and encourage students to discuss the necessity of a Revolution of Sustainability.

Secondly, insights into cultural history can serve as a tool to illustrate how certain developments have created new challenges. *From the Worktop to the Planet* / Nobel Peace Center, for example, looks at the ways in which current consumer habits are a consequence of long-term historical development. The program then challenges the appropriateness of these developments. This approach may not be completely consistent in the program since the historical part concerns the increased globalization of food consumption and the contemporary conflict presented addresses waste – food that is not consumed. However, it is an attempt to combine historical developments with current SD challenges. To stay with the example of *The Industrial Revolution*,

such an approach could foster a discussion on the social and technological frames which have arisen from the Technical Revolution as well as their appropriateness for a sustainable society and possible alternatives.

Either way, this conscious and dynamic exploration of past and present, values and narratives, captures the purpose of ESD. It triggers the discussion of contemporary SD challenges and allows thereby for vision building. Further, this dynamic relationship of past and present promotes reflection on values, lifestyles and conflicts. This opens for a reconsideration of individual practices and possibly the transformation of behavior.

The historical perspective that the museums in this study offer, is largely ignored in Norway`s ESD strategy and also to some extent by UNESCO. UNESCO emphasizes the value of traditional and indigenous knowledge, which as I pointed out in chapter two are often seen as important for more sustainable lifestyles. A less restricted and more holistic integration of cultural history in ESD would allow for highly beneficial cultural insights, and could strengthen the concept. It is here that museums show their biggest potential for ESD.

Depending on their foci, learning centers may not have the same historical orientation as museums. The exhibitions in the science center at the Museum of Science and Technology and the Nobel Peace Center present a contemporary view of energy and food consumption respectively. However, this does not mean that learning centers exclude historical perspectives altogether.[45] Rather, they are not bound to historical objects and have thereby more freedom in in their temporal approach.

Many of the exhibitions of the National Museum of Science and Technology (e.g. *Healthy Soul in a Healthy Body*, *Industry along Akerselva*) and to some extent the Norwegian Folk Museum (e.g. *The Constitution`s Guardian*) focus exclusively on the past and hardly provide links to the present. This may impede reflection on current social needs (cf. Fithian & Powell, 2009, p. 2f.; Sutter, 2008, p. 198). The same is true for the glorification of modern life in the 20th and 21st century and of how challenges of the past have been overcome (e.g. *Oil* / Norwegian Museum of Science and

[45] As noted earlier, the energy exhibitions at the science center of the Norwegian Museum of Science and Technology, are fruitfully supplemented by the museum exhibitions which provide a more historical perspective on the topic.

Technology and *Technology of the Home* / Norwegian Folk Museum). Such modern success narratives may be uplifting and informative, but exhibitions that focus exclusively on the benefits of modernity or recent achievements within SD, miss the opportunity to highlight current sustainability challenges and to empower the visitor by envisioning and committing to alternative futures.

Worts (1998, p. 7; 2004, p. 52; 2008, p. 6) regards the low attention to visions and vision building as a general problem for museums, which originates from their strong academic focus on objects and collections. In accordance with Worts, Sutter (2008, p. 198) makes the criticism that, although objects are valuable for sustainability education as ways into SD topics, an exclusive focus on collections and collection building goes along with an overemphasis on the past and the present, and that this impedes forward-looking perspectives. In line with Sutter and Worts, the findings of this study suggest that if museums provide their historical objects and exhibitions with contemporary perspectives, museums can be of primary importance for ESD.

The school programs indicate that such contemporary perspectives would take into account the local realities of the visitors. Studies from Norway (Brunstad, 2002), Great Britain (Henley Center, in Schreiner et al., 2005, p. 21), Sweden (Lindström & Johnsson, 2003, p. 62) and Australia (Hicks & Holden, 1995) suggest that individuals perceive their impact on the local community to be considerably higher than on global matters.[46] Similarly, people are more positive about their personal future, while they tend to be pessimistic about global developments. Schreiner et al. (2005, p. 21f.) see a link between perceived local impact and positive images of the future. Accordingly, the local context, i.e. the realities of museum and learning center visitors, constitutes one of the key elements for vision building and commitment. Both *What the World Eats* / Nobel Peace Center and *Red- and Black-Listed Species / Oslo Ridge* / Natural History Museum prove advantageous with this respect. They draw on topics that are directly connected to the students' lives, namely food consumption, waste and local plants.[47] By that, they open for action and the reconsideration of certain practices after the visit.

[46] All studies are also quoted in Schreiner et al. 2008.

[47] In fact, all museums / learning centers in this study have exhibitions that are related to Norway or have sections which are linked to Norway and Oslo. The Norwegian Museum of Science and Technology shows an exhibition on the industrialization along the Akerselva; the Natural History Museum has a section on

These aspects could get more attention beyond the school programs of museums / learning centers, since they encourage continued involvement and engagement beyond the actual visit.

7.1.3 Practical Sustainability Learning - A Matter of Walls

The Museums / learning centers of this study promote primarily cognitive and affective sustainability learning. Practical learning, which includes skills development, practices or action competences, plays a subordinated role. One reason for that may be the strong emphasis on history, which I have discussed in detail above. It directs the focus away from present problems, and thereby away from a commitment to find sustainable solutions for them. A second challenge arises from the physical limitations of museums / learning centers. Almost all exhibitions and school programs are situated within the boundaries of the museum`s / learning center`s property, and this separates the activities inside the museum / learning center from the visitor`s actual community. Museums thereby create a detached model of the actual world in their exhibitions. Practical learning, on the other hand, depends on a real-world context and happens at the interface with the wider community.

It is noteworthy that all museums in this study are running or have run individual projects which exceed the boundaries of their buildings. The Norwegian Museum of Science and Technology has co-developed an app providing information on the historical sites along Akerselva; the Natural History Museum has designed suggestions for discovering different aspects of one of Oslo`s islands (*Exploring Hovedøya*); and the Norwegian Folk Museum ran a school program on the history of the peninsula it is situated on. Through these initiatives, the museums encourage visitors including school classes to explore different aspects of their community. These are promising developments, but they do not resolve the general challenges with respect to practical sustainability learning.

Norwegian animals, the Nobel Peace Center has a video installation on food consumption in a Norwegian family; and the exhibitions of the Norwegian Folk Museum focus on Norway as a whole. These may be easier to link to the visitor`s reality.

7.1.4 Human-Nature Relations – on Dominance and Separation

In chapter five I pointed out that in addition to diachronic relations, synchronic relations are also important for meaning making. This is especially interesting when thinking about the way human-nature relations are presented.[48] The Norwegian Museum of Science and Technology (e.g. medical and energy exhibitions) presents nature as material which provides for modern life and which is cultivated and managed by humans. Conversely, the absence of human life in the zoological and botanical exhibitions of the Natural History Museum and the depiction of humanity as harmful to nature, signals general reservations about human-nature interaction. As I argued in chapter two, such illustrations of human-nature relations ignore the interdependence of humans and their natural environment. In their article on the Mediterranean, Farina et al. (2005, p. 169) emphasize that human settlements and actions create important niches for other species. They here point to several cases, for instance the dependence of the Great and Lesser Bustards in Alantejo on non-irrigated agriculture or the coastal fish ponds in the Mediterranean which are managed by humans and are related to the abundance and distribution of many water birds.

This implies that social and environmental development are two sides of the same coin. A human-in-nature approach would consider humans and nature together and how they affect one another over the course of time. This takes into account both the dangers and the benefits they offer one another. An overemphasis on either human-human and nature-nature relations or an rejection of human-nature relations ignore the interplay and interdependence of humans and nature, and this may affect the framing of current challenges to sustainability as well as their solutions. As an example, presenting human interaction with nature as harmful per se, oversees the potential certain human practices have for biodiversity. Consequently, it would be beneficial for museums / learning centers to employ a more holistic perspective on human-nature interaction.

7.1.5 Temporary Exhibitions and Innovation

The exhibitions of the study did not pay much attention to matters of climate. The museums` exhibition histories and the catalogues for upcoming exhibitions give a

[48] Since I only examined one exhibition at the Peace Price Center, I will not conclude more generally about its orientation here.

more multifaceted image of climate exhibitions at the museums / learning centers. All of them had hosted or were expecting to host exhibitions on the topic.[49] This supports another more general observation, namely that temporary exhibitions often are more innovative (e.g. *Headhunter* / Natural History Museum and *Devoted Women* / Norwegian Folk Museum). By contrast, the permanent exhibitions in this study have a somewhat retrospective character (e.g. *Energy* exhibition (museum) / Norwegian Museum of Science and Technology) or are broad in their approach (e.g. zoological exhibitions / Natural History Museum) and give little room for ESD perspectives.

At the moment, ESD therefore seems to be a side-aspect in the exhibition business of the examined museums / learning centers, an add-on which through temporary exhibitions links the work of these institutions to up-to-date topics. This presents both an opportunity and a challenge. Temporary exhibitions can be transferred to other museums. This allows smaller museums / learning centers with very specific agendas to invite ESD in addition to their permanent exhibitions. This may eventually increase the scope of the respective exhibition, but it comes with the risk that ESD generally is treated as an element separate from the main agenda of museums / learning centers and as such is not holistically integrated in exhibition curricula.

7.1.6 Quantitative Goal Settings and their Limitations

Finally, there are certain pragmatic factors that affect the integration of ESD at museums / learning centers.

All museums / learning centers in this study have certain quantitative targets, for example when it comes to revenue or visitor numbers. This affects the quality of school programs at museums / learning centers, which are tailored to the school curriculum and thereby to the demands of the teachers. While this brings great advantages concerning the collaboration between schools and museums / learning centers, such a prioritization of quantitative objectives may diminish the status of

[49] The Norwegian Museum of Science and Technology designed the exhibition *Climate X* which was open from 2007 until 2009 and won the "Leading Edge Award". From 2007 until 2008, the Nobel Peace center hosted the exhibition *Fever* on Al Gore and the Intergovernmental Panel for Climate Change. The Natural History Museum will be hosting a temporary exhibition, *Cold Ocean – Hot Questions*, in autumn 2014 on the importance of the ocean for Norwegian society which also will touch upon climate change in the Artic. And the Norwegian Folk Museum hosted the temporary exhibition *Climate Change and Indigenous People in the North* from 2009 to 2010.

other goals, for example those which are central to cognitive, affective and practical sustainability learning.

At the moment, the inclusion of ESD in school programs very much depends on its role in the curriculum.[50] I mentioned in chapter two that SD often is regarded as a matter of the environment, an impression that was confirmed in the interviews with the school personnel from the museums / learning centers. The school curriculum lists the term 'sustainable development' several times in the competence goals of the individual subjects. The one-sided interpretation of this term may impact the way museums / learning centers look at their exhibitions when designing programs related to them and may overlook their potential for development education. A more detailed specification of the term could help museums / learning centers to see the all four dimensions of the term, its implications for the environment, society, economy and culture.

Another problem concerns qualitative goal settings as such. If quantitative goals are also set for audiences outside the school sector, then museums / learning centers prioritize the attraction of visitors above impact on them. Worts (cf. Worts 2005, p. 45, 50f., Worts 2008,6f.) makes the criticism that the assessment of museums is too often based on quantitative factors such as gift shop sales, media coverage or corporate events pushing museums in the direction of entertainment institutions and tourist attractions. Prioritizing economic goals over social impact may pose a challenge for ESD at museums / learning centers in the long run.

7.2 Incentives and Solutions

Thanks to their objects, their design and their relevance for cultural history, museums / learning centers can contribute to ESD in several ways. In order to strengthen their contribution to society at large and schools in particular, certain adjustments would need to be made. I suggest that this includes, on the one hand, an adjustment of ESD itself and school policies, for instance by modifying the national school curriculum or

[50] Garcia (2012, p. 49) criticizes that such adaptions limit the potential of museums / learning centers and expectations that learning can be about more than acquire relevant academic skills. In fact, the informal learning character of museums / learning centers vanishes in the school programs. Tal and Morag (2006) as well as Griffin and Symington (1997) suggest the exploration of museums in groups similar to family visits.

strengthening cooperation projects and funding. Museums / learning centers, on the other hand, could reconsider the design and purpose of their exhibitions and adopt central principles of ecomuseology.

7.2.1 Revision of ESD and the National School Curriculum

The national school curriculum forms an indirect link between museums and schools. It defines the learning content of school education, it affects the teachers` choice of school programs at museums / learning centers and therefore the design of such programs. Aspects of ESD and topics related to it are significant in a number of subjects at secondary school. Cultural history, which is largely omitted in Norway`s ESD strategy, is a relevant field in the curriculum. However, as it stands now, the Norwegian school curriculum presents historical issues as somewhat removed from contemporary SD matters and from future society in particular. Indeed, it addresses the ways historical events have shaped current society in its competence goals, but does not clearly indicate how cultural heritage as living, intangible heritage still has an impact on us in the form of values, narratives or practices and as such also impact the future. ESD is essentially about the future, about how today`s actions affect the coming generations and about vision building.

I suggest that a link between cultural history and SD would boost the clout of both. First, cultural history would be elevated from a field which provides background information for current society to living heritage, a heritage which affects lifestyles, values and the visions based on them. ESD in turn would benefit from integrating history in that it embraces a holistic access to cultural ideals and their role for SD.

Secondly, a holistic consideration of past, present and future may to a certain extent counteract the kind of one-sided indoctrination in ESD which, as criticized by Jensen and Schnack (1997), Courtenay-Hall and Rogers (2002) and Stevenson (2007) regard as a challenge. On the contrary, it may encourage a comprehensive and critical examination of current values and lifestyles, including an exploration of alternative futures and lifestyles and through that commitment for action.

Such a connection between cultural history and sustainable development could begin in the curriculum, where it would impact the work of schools and thereby the school

programs of museums / learning centers. The four museums / learning centers I examined touch on ESD topics, but none of the exhibitions and two of the programs (*From the Worktop to the Planet* / Nobel Peace Center and *I Want to Decide too!* / Norwegian Folk Museum) seem to integrate all three temporal dimensions.

Although this may sound convincing in theory, it will be challenging in practice. Adding yet another concept to the already tight curriculum may not do justice to that concept`s potential, and could even weaken other competence goals. On the other hand, an overarching principle of past, present and future in the core curriculum could turn into a rhetorical issue, similar to the section on the environmentally conscious human in the general part of the national school curriculum. Nonetheless, there is a potential for integrating these principles of past, present and future. They provide a general didactic approach to SD related topics rather than that they imply specific academic contents. As such they could be listed without adding additional content to the curriculum.

Further revisions of the curriculum could also take into account a more detailed explanation and exemplification of the term 'sustainable development'. This would direct equal attention to matters of development and the environment, as well as underlying cultural, social, economic and environmental factors.

7.2.2 Cooperation and Funding Projects

In the course of this thesis, I have mentioned different forms of funding programs, the Cultural Rucksack, the Natural Rucksack and the lektor2 program. The programs allow the realization of high-quality and resource-demanding projects carried out by a partnership between schools and external agents like museums and learning centers.

Such incentives target only the school offices of museums / learning centers and do not necessarily affect conservation and exhibition agendas. The school offices of the institutions in this study seem to be generally aware of SD and its relevance for the school curriculum, but reported that they would not prioritize ESD. Different incentives for a holistic inclusion of ESD at museums / learning centers are possible. These could include information campaigns directed at museums / learning centers to highlight their role in ESD and to inspire them to explore the potential of their

exhibitions for this kind of learning, including development education. In addition, the municipalities could introduce awards or certifications for innovative ESD examples, similar to the climate prize which the Union of Education Norway distributes to schools annually.[51] Similar to that, Norway could establish a network to share best ESD practices – not only for schools, but also for external agents like museums / learning centers. However, all these projects and incentives require an acknowledgement of ESD as relevant beyond formal schooling.

7.2.3 Embracing Ecomuseology and Revision of Performance Standards

Ecomuseums are particularly relevant for ESD since they offer approaches to three main challenges faced by museums / learning centers: First, they dissolve the human-nature divide; second, they involve the local community and third, as a consequence they address local issues.

Ecomuseums often include the human and natural environment that belongs to a place as well as human-nature interaction (cf. Davids, 2011, p. 271). In chapter three I mentioned two examples for that; the efforts of the Ha Long Bay Museum to revitalizes traditional fishing techniques and the Lihu Ecomuseum in China which safeguards the traditional lifestyle of the White-trousered Yao, a culture which lives in close communication with nature.

Further, the exhibition and design processes at ecomuseums incorporate the local community and local knowledge. In this process different attitudes, views and experiences are given a voice, and these in turn promote discussion and make the museum a place for living cultural exploration. In this way, ecomuseums eliminate the walls between society and the exhibitions – not only because the exhibition sides are fragmented and spread across the community, but because they turn visitors into participants. In addition, ecomuseums are about places specifically; they have the power to address local topics, and to take into account local knowledge when dealing with local challenges and exploring local solutions. Again, both the Lihu Ecomuseum and the Ha Long Bay Ecomuseum are good examples for that.[52] Ecomuseums are not

[51] Germany is distributing ESD certification to outstanding projects. See http://www.bne-portal.de/engagement/ausgezeichnete-massnahmen/

[52] See Davids (2011) for more examples.

dedicated to ESD per se, but they do have the potential to fuel culturally and locally specific visions and to increase community commitment and local action. These aspects of ecomuseology cannot be embraced by school programs alone, but would have to be integrated holistically into exhibition planning, design and conduction if they are to make a difference.

This is not to say that every museum / learning center should transform into an eco-museum, nor does it mean that they should prioritize ESD at the expense of other educational ideals. The point is that adopting certain features of ecomuseums, such as community inclusion and development, would increase the institution`s significance for ESD while keeping its individual focus.

Further, Worts (2006b, p.49) has designed an alternative framework for performance measurement which has at its heart an assessment of the museum`s impact on the visitor and on the local community. With slight modifications, it could also be used by learning centers as a supplementary tool for performance measurement.

Although the framework does not address ESD as such, it includes important aspects of it, such as reflection, value creation, and motivation to take a stand for the greater good of the local and global community. By doing this, it offers valuable input for the promotion of ESD at museums / learning centers.

7.3 Summary - Acknowledging Museums and Learning Centers as Important Supporters for Education for Sustainable Development

Museums, cultural history museums in particular, have great potential to contribute to ESD. Their historico-cultural focus brings an essential socio-cultural aspect of sustainability into ESD, such as values and narratives which impact today`s society. These aspects have not received much attention in Norway`s strategy. Learning centers may adopt a historical focus, but are generally freer to choose their temporal orientation.

A second strength, and this concerns both museums and learning centers, comes along with their objects or other sensual triggers. These help to make complex and geographically or temporally distant topics more comprehensible. This is of great

value for ESD, which addresses global interaction as well as complex systems and processes.

Still, there is more room for museum / learning center development with regard to ESD. First of all, it is necessary to strengthen the connection between past, present and future. This connection is an important factor for cultural comprehension, culturally specific vision building and hence individual and community commitment. Secondly, the museums / learning centers in this study could implement ESD topics more thoroughly; they could increase possibilities for practical learning and reconsider their exhibitions with regard to human-nature relations.

There are different steps that would promote this integration of ESD principles at museums / learning centers. These include further revisions of the Norwegian school curriculum which acknowledge the interrelatedness of past, present and future, or the integration of cultural history and cultural heritage in SD and ESD. There already exist promising governmental incentives to increase the status of ESD at museums / learning centers, especially when it comes to school programs. Certification, awards and the establishment of networks of best practice could elevate the relevance of ESD beyond the sphere of school collaboration and create an awareness for ESD in exhibition design or in the overall project of the learning institution.

If museums / learning centers are to contribute to ESD in the long-term, they need to reassess their performance standards and consider the participation of and the impact on the local community. By embracing the principles of ecomuseology and community participation, museums and learning centers could promote cognitive involvement, local engagement and practical learning related to SD topics.

8 Conclusion

This study set out to examine the potential of museums / learning centers for ESD. ESD includes cognitive, affective and practical sustainability learning, and aims to raise aware, committed and participating citizens. UNESCO outlines ESD as a broad concept which comprises different branches of education, targets people of all ages and includes matters of development and the environment in equal parts. In Norway ,this broad concept has been narrowed down significantly. According to the Norwegian strategy, ESD is a matter of formal schooling undertaken by young learners, and it is primarily seen as a matter of the natural sciences. Culture and cultural history – which are included in a fragmentary way in UNESCO`S understanding of ESD, are largely omitted in Norway's strategy. Norway`s message seems to be that museums and learning centers have little to contribute to ESD. The results of this study indicate the opposite.

Linking ESD and museums / learning centers could be a "win-win-move". Museums and learning centers would be encouraged to explore their exhibitions with regard to up to date topics and to make them more relevant to their visitors' lives. ESD in turn would be supplemented by a holistic approach to culture.

8.1 Status Quo of Museums and Learning Centers

Thanks to their individual focus on either technology, peace prize topics, nature and Norwegian culture, the museums / learning centers of this study cover all focus areas listed in Norway`s ESD strategy. The most prominent are energy, democracy and participation as well as health.

The exhibitions examined can be divided into two types. First, there are those that address contemporary topics, which are primarily to be found at the Natural History Museum, the Nobel Peace Center and the science center of the Norwegian Museum of Science and Technologies. Second, there are historically based exhibitions like the ones at the Norwegian Museum of Science and Technology and the Norwegian Folk Museum. Most exhibitions, especially the permanent ones, are informative and aesthetic in character. Many also feature certain values such as biodiversity; social participation and democracy; or physical and mental health. Thus, the exhibitions

examined allow primarily for cognitive and value-based learning. This does not necessarily make them relevant for ESD.

While the museums in this study address topics relevant to ESD, not all do completely line up with ESD as it is defined in Norway`s strategy. This is mostly because ESD is a matter of the present and the future. On the contrary, the exhibitions at the Norwegian Museum of Science and Technology and the Norwegian Folk Museum have a clear retrospective focus.

Furthermore, the study suggests that there are certain limitations to practical learning which results from, among other things, the isolated position of the museums / learning centers in the Oslo community. All museums offer a wide-ranging program, especially during the weekends and holidays, but in the end they present a model of a community rather than being part of it, and this is significant when it comes to skills of participation and action-taking.

All this is closely connected to the agenda of museums / learning centers. The museums / learning centers in the study talked about quantitative goals with respect to revenue or student numbers, and the direct impact these have on the design of school programs. Such programs are increasingly tailored to the school curriculum in order to cater to the demands of the teachers. Such quantitative targets, however, may impede efforts to focus on other objectives of the kind that foster SD, such as community impact and practical learning, as these could compromise revenue goals. Prioritizing quantitative goals may mean that entertaining offerings are favored, while practical learning and community action take second place.

School programs seem to be more innovative and more suitable for ESD. Most school programs offer a contextual frame for the exhibitions and are more directed at the student`s realities, covering sustainability topics such as waste, biodiversity and democratic participation. They include cognitive and affective sustainability learning to a greater extent than the exhibitions I examined. Thanks to their links to the local realities of the students some programs even served as a starting point for practical sustainability learning after the museum / learning center visit.

Likewise, the temporary exhibitions also seem to be more relevant for ESD. They tend to offer more diverse and critical perspectives on topics such as loss of biodiversity or social participation and make them relevant for today`s society.

Currently, there are several incentives promoting the collaboration of schools and external agents in matters of ESD and topics related to it, such as the Cultural Rucksack, the Natural Rucksack and the lektor2 program. Such initiatives have the potential to raise the status of ESD at museums / learning centers, but seem to be directed at the work of school divisions primarily. They may not have the same effect on other aspects of museums / learning centers, such as curatorial activities.

Finally, there is an overall tendency in the museums / learning centers of this study to focus on either humans or the environment exclusively or to present human interaction with nature as a threat. Such approaches are problematic for ESD, as they convey unrealistic implications which may impede SD in the long run. SD presupposes interaction between humans and nature, something which is hardly addressed in the exhibitions or school programs.

8.2 Bringing together Education for Sustainable Development and Museums and Learning Centers

The historical focus of many museums is not necessarily a disadvantage for ESD. On the contrary, it comes with great potential for the initiative. Cultural history museums such as the Norwegian Museum of Science and Technology and the Norwegian Folk Museum allow for holistic insights into cultural narratives, lifestyles and values, the comprehension of which is crucial if SD is to succeed.

An active integration of ESD at museums / learning centers would require them to reconsider temporal foci, perspectives and narratives, and exhibition goals. This would include a reassessment of modern success stories and their appropriateness for critical thinking, culturally specific vision building and action.

Objects and exhibition design can play a critical role here. They have the capacity to illustrate and exemplify, and can facilitate access to topics which are complex,

abstract or remote in time or space. This is of great relevance to ESD which touches on global processes and systems.

One way to foster a more holistic integration of cultural history would be to acknowledge it in future ESD strategies or other initiatives linked to sustainability education. This would also mean giving ESD a stronger significance in the school curriculum, e.g. through competence objectives that affect didactic strategies (emphasizing temporal interconnectedness and cultural implications). In the end, this would affect the school programs of museums / learning centers and could inspire a greater inclusion of ESD in such programs.

Furthermore, funding programs such as the Cultural Rucksack, the Natural Rucksack or the lektor2 program which are primarily relevant for school-related activities, could be supplemented by initiatives which target other aspects of museums / learning centers, such as curatorial activities. Certification, awards or the establishment of best practice networks for non-formal and informal actors could direct more attention at ESD outside the formal education sector, and inspire institutions like museums / learning centers to explore their exhibitions and activities from a different perspective. This could for example lead to a broader incorporation of the principles of ecomuseology. Ecomuseums encourage the inclusion of both humans and nature, and consider their interrelatedness. They also allow for practical learning, especially with regard to social participation and community development. They promote a turn away from object-centered perspectives towards a community-centered approach where objects serve as a channel for building local knowledge and development, and are not a goal in themselves.

Not all museums / learning centers may address relevant ESD topics. Many are dedicated to specific periods or include specific collections which are difficult to link to SD. However, this study indicates that some do have exhibitions and objects related to the field and can provide knowledge, values and possibly also practices relevant for a more sustainable future. In Oslo, this concerns museums / learning centers with high visitor numbers which reach out to the broad public

Schools educate for the future, a more sustainable future. Museums / learning centers can contribute to this education through their programs. In addition to that, they attract

people of all ages and may thereby help to make concepts such as sustainable development relevant to the broader public, here and now. Sustainable development concerns us all, this generation as much as future generations. Countries like Germany and Denmark acknowledge this by including informal learning institutions in their ESD strategies. When will Norway do that?

9 References

Abram, D. (2010). *Becoming Animal*. New York: Pantheon books.

Arbuthnott, K. D., Sutter, G. C., & Heidt, C. T. (2014). Natural History Museums, Parks, and Connection with Nature. *Museum Management and Curatorship, 29*(2), 102-121.

Arts Council Norway. (2012). Museumsstatistikk 2012. Retrieved 05.05.2014, from http://museumsforbundet.no/wp-content/uploads/2012/02/KR_museumsstatistikk-20121.pdf

Ballantyne, R., & Packer, J. (2005). Promoting Environmentally Sustainable Attitudes and Behaviour through Free-Choice Learning Experiences: What is the State of the Game? *Environmental Education Research, 11*(3), 281-295.

Benjaminsen, B. (2013, 16.08.2013). Flertallet mot Konsekvensutredning. *Lofotposten*. Retrieved 25.03.2014, from http://www.lofotposten.no/lokale_nyheter/article6810377.ece

Berner, A., Lobo, S., & Silva, N. (2013). *Strategic and Transformative Approach to Education for Sustainable Development.* (Master`s Thesis), School of Engineering, Karlskrona, Sverige. Retrieved 18.12.2013, from http://www.gaiaeducation.net/docs/A%20Strategic%20&%20Transformative%20Approach%20to%20ESD%20-%20BTH%202012%20Berner.pdf

Brunstad, P. O. (2002). Longing for Belonging. Youth Culture in Norway. In J. Gidley & S. Inayatullah (Eds.), *Youth Futures. Comparative Research and Transformative Visons* (pp. 143-154). London: Praeger Publishers.

Coates, P. A. (1998). *Nature: Western Attitudes Since Ancient Times*. University of California Press.

Courtenay-Hall, P., & Rogers, L. (2002). Gaps in Mind: Problems in Environmental Knowledge-Behavior Modeling Research. *Environmental Education Research, 8*(3), 283-297.

Curry, P. (2012). *Ecological Ethics. An Introduction*. Cambridge: Polity Press.

Danish Ministry of the Environment (2008). *Uddannelse for Bæredygtig Udvikling – Strategi for FN's tiår 2005-2014.* Retrieved 07.01.3013, from http://pub.uvm.dk/2008/ubustrategi/Voksen_og_efterudd.pdf

Davis, P. (2011). *Ecomuseums. A Sense of Place*. London: Continuum International.

DiBlasio, M., & DiBlasio, R. (1983). Constructing A Cultural Context Through Museum Storytelling. *Museum Education Roundtable Reports, 8*(3), 7-9.

Digitalt Museum. Retrieved 03.02.2014, from www.digitaltmuseum.no

Downey, S., Delematre, J. & Jones, J. (2007). Measuring the Impact of Museum-School Programs: Findings and Implications for Practice. *Journal of Museum Education, 32*(2), 175-188.

Dudzinska-Przesmitki, D., & Grenier, R. (2008). Nonformal and Informal Adult Learning in Museums: A Literature Review. *The Journal of Museums Education, 33(1)*, 9-22.

Egan, D., Gray, V., Kaufman, W., & Montrie, C. (2004). Curriculum: Education for Sustainable Development: The Role of Humanities and Social Sciences. *ULSF Publications, 7*(1).

Erikstad, L. (2010). Vår geologiske naturarv. Retrieved 04.03.2014, from http://www.geoportalen.no/nasjonalarv/hvahvordan

Falk, J. H. (2009). *Identity And The Museum Visitor Experience*. Walnut Creek: Left Coast Press.

Falk, J. H. & Dierking, L. D. (1997). School Field Trips: Assessing Their Long-Term Impact. *Curator: The Museum Journal, 40*(3).

Farina, A., Santolini, R., Pagliaro, G., Scozzafava, S., & Schipani, I. (2005). Eco-semiotics: A new Field of Competence for Ecology to Overcome the Frontier between Environmental Complexity and Human Culture in the Mediterranean. *Israel Journal of Plant Sciences, 53*(3-4), 167-175.

Fithian, C., & Powell, A. (2009). Cultural Aspects of Sustainable Development. Austin: University os Texas at Austin.

Friis Møller, S. (2013). If Museum is the Answer. In I. Brændholt Lundgaard & J. Thorek Jensen (Eds.), *Museums. Social Learning Spaces and Knowledge Producing Processes* (pp. 222-233). Danish Agency for Culture.

Garcia, B. (2012). What We Do Best. Making the Case for the Museum Learning in its Own Right. *Journal of Museum Education, 37*(2), 47-56.

German Commission for UNESCO. (2003, 10. / 11. Juli 2003). *Nachhaltigkeit lernen: Hamburger Erklärung der Deutschen UNESCO-Kommission zur Dekade der Vereinten Nationen „Bildung für nachhaltige Entwicklung“ (2005 – 2014).* Paper presented at the 63. Hauptversammlung der Deutschen UNESCO-Kommission. , Hamburg. Retrieved 08.01.2014, from http://www.bne-portal.de/fileadmin/unesco/de/Downloads/Dekade-Projekte/Hamburger_2520Erkl_25C3_25A4rung_25202003.File.pdf?linklisted=5040

German Commission for UNESCO. (2011). *UN-Dekade „Bildung für nachhaltige Entwicklung“ 2005–2014. Nationaler Aktionsplan für Deutschland*. Retrieved 21.05.2014, from http://www.unesco.de/fileadmin/medien/Bilder/Publikationen/UN_Bro_2011_NAP_110817_a_02.pdf

Grabove, V. (1997). The many Facets of Transformative Learning Theory and Practice. *New Directions for Adult and Continuing Education*(47), 89-96.

Griffin, J., & Symington, D. (1997). Moving from Task-Oriented to Learning-Oriented Strategies on School Excursions to Museums. *Science Education, 81*(6), 763-779.

Hicks, D. (2002). *Lessons for the Future: The Missing Dimension in Education*. London: Routledge Falmer.

Hicks, D., & Bord, A. (2001). Learning about Global Issues: Why most Educators only Make Things worse. *Environmental Education Research, 7*(4), 413-425.

Hicks, D. & Holden, C. (1995). *Visions of the Future. Why We Need to teach for Tomorrow.* Steffordshire: Trentham Books.

Illeris, H. (2012). Nordic Contemporary Art Education and the Environment: Constructing an Epistemological Platform for Art Education for Sustainable Development (AESD). *Nordic Journal of Art and Research, 1*(2), 77-93.

Illich, I. (1999). The Shadow Our Future Throws. *New Perspectives Quarterly, 16*(2), 14-18.

Infed. Informal, Non-Formal and Formal Education - a Brief Overview on Some Different Approaches. Retrieved 13.03.2014, from http://www.infed.org/foundations/informal_nonformal.htm

Jensen, B. B., & Schnack, K. (1997). The Action Competence Approach in Environmental Education. *Environmental Education Research, 3*(2), 163-178.

Jickling, B., & Wals, A. E. J. (2008). Globalization and Environmental Education: Looking Beyond Sustainable Development. *Journal of Curriculum Studies, 40*(1), 1-21.

Jordan, L. (2011). The Sustainability of Memory. The Role of Museums in Preserving Collective Memory. *ICOMNews,* 9.

Jorgensen, A. K. (2003). Consumption and Environmental Degradation: A Cross-National Analysis of the Ecological Footprint. *Social Problems, 50*(3), 374-394.

Laumann, K. (2007). *The Missing Story. Education for Sustainable Development in Norway.* (M.A. Master`s thesis), University of Oslo, Oslo. Retrieved 20.12.2013, from https://www.duo.uio.no/bitstream/handle/10852/32686/Laumann.pdf?sequence=1

Leinhardt, G., & Crowley, K. (2002). Objects of Learning, Objects of Talk: Changing Minds in Museums. In S. Paris (Ed.), *Multiple Perspectives on Children's Object-Centered Learning* (pp. 1-19). Mahwah, NJ: Lawrence Erlbaum Associates.

Lélé, S. M. (1991). Sustainable Development: A Critical Review. *World Development, 19*(6), 607-621.

Lindström, M., & Johnsson, P. E. R. (2003). Environmental Concern, Self-Concept and Defence Style: A Study of the Agenda 21 Process in a Swedish Municipality. *Environmental Education Research, 9*(1).

Mathews, F. (2002). Letting the World Grow Old: An Ethos of Countermodernity. In Schmidtz, D & Willott, E. (Eds.), *Environmental Ethics: What Really Matters, What Really Works* (pp.221-230). New York : Oxford University Press.

McNeill, D. (2000). The Concept of Sustainable Development. In A. Holland, K. Lee & D. McNeill (Eds.), *Global Sustainable Development: An Ethical and Practical Challenge to the 21st Century* (pp. 1-18). Keele: Keele University Press.

Mezirow, J. (1997). *New Directions for Adult and Continuing Education* (Vol. 74): Jossey-Bass.

Mezirow, J. (2000). *Learning as Transformation*. San Francisco: Jossey-Bass.

Mogensen, F., & Schnack, K. (2010). The Action Competence Approach and the 'new' Discourses of Education for Sustainable Development, Competence and Quality Criteria. *Environmental Education Research, 16*(1), 59-74.

Mork, S. M. (2013). Revidert læreplan - Økt Fokus på Grunnleggende Ferdigheter. *Naturfag.no.* Retrieved 08.01.2014, from http://www.naturfag.no/artikkel/vis.html?tid=2050395

Moser, S. C., & Dilling, L. (2007). Introduction. In S. C. Moser, & S. Dilling, (Eds.), *Creating a Climate for Change: Communicating. Climate Change and Facilitating Social Change*. Cambridge: Cambridge University Press.

Museums Libraries and Archives Council UK. (2008). Generic Learning Outcomes. Retrieved 06.02.2014, from http://www.inspiringlearningforall.gov.uk/toolstemplates/genericlearning/

Neumann, R. P. (1998). *Imposing Wilderness. Struggles over Livelihood and Nature Preservation in Africa*. Berkeley: University of California Press.

Nobel Peace Center. (2013). 2012 Ble Rekordår for Nobels Fredssenter [Press release]. Retrieved 22.01.2013, from http://www.nobelpeacecenter.org/pressemeldinger/2012-ble-rekordar-for-nobels-fredssenter/

Nordgaard, K. (2011). *Living in Denial: Climate Change, Emotions, and Everyday Life*. Massachusetts Institute of Technology: MIT Press.

Norwegian Arts Council. (2012). Samlingene vokser stadig. retrieved 04.02.2013, from http://kulturradet.no/vis-arkivartikkel/-/asset_publisher/U1Cc/content/aktuelt-museum-samlingene-vokser-stadig

Norwegian Directorate for Education and Training. (2006a). *Den Generelle Delen av Læreplanen*. Retrieved 14.01.2014, from http://www.udir.no/upload/larerplaner/generell_del/generell_del_lareplanen_bm.pdf.

Norwegian Directorate for Education and Training. (2006b). *Læreplan i Biologi*. *Programfag i Studiespesialiserende Utdanningsprogram*.Retrieved 21.05.2014, from http://www.udir.no/kl06/BIO1-01/Hele/?read=1.

Norwegian Directorate for Education and Training. (2006c). *Læreplan i Geografi - Fellesfag i Studieforberedende Utdanningsprogram*. Retrieved 09.01.2014, from http://data.udir.no/kl06/GEO1-01.pdf?lang=nno.

Norwegian Directorate for Education and Training. (2006d). *Læreplan i Historie og Filosofi. Programfag i Studiespesialiserende Utdanningsprogram*. Retrieved 21.05.2014, from http://data.udir.no/kl06/HIF1-01.pdf?lang=nob

Norwegian Directorate for Education and Training. (2006e). *Læreplan i Kunst og Håndverk*. Retrieved 09.01.2014, from http://data.udir.no/kl06/KHV1-01.pdf?lang=nob#page=1&zoom=auto,0,849.

Norwegian Directorate for Education and Training. (2006f). *Læreplan i Mat og Helse*. Retrieved 09.01.2014, from http://data.udir.no/kl06/MHE1-01.pdf?lang=nno.

Norwegian Directorate for Education and Training. (2006g). *Læreplan i Teknologi og forskningslære. Programfag i Studiespesialiserende Utdanningsprogram.* Retrieved 21.05.2014, from http://data.udir.no/kl06/TNF1-01.pdf?lang=nob

Norwegian Directorate for Education and Training. (2006h). *Utdanning for Bærekraftig Utvikling*. Retrieved 29.04.2014, from http://www.miljolare.no/info/Barekraftig_utvikl_rapp.pdf.

Norwegian Directorate for Education and Training. (2007). *Læreplan i Entreprenørskap og Bedriftsutvikling - Programfag i Studiespesialiserende Utdanningsprogram*. Retrieved 14.01.2014, from http://data.udir.no/kl06/ENT1-01.pdf?lang=nob.

Norwegian Directorate for Education and Training. (2008). *Læreplan i Religion, Livssyn og Etikk*. Retrieved 09.01.2014, from http://data.udir.no/kl06/RLE1-01.pdf?lang=nob.

Norwegian Directorate for Education and Training. (2009). *Læreplan i Historie - Fellesfag i Studieforberedende Utdanningsprogram*. Retrieved 15.01.2014, from http://data.udir.no/kl06/HIS1-02.pdf?lang=nob.

Norwegian Directorate for Education and Training. (2012). *Rundskriv. Udir 01-2013: Kunnskapsløftet om Fag- og Timefordelingen for Grunnopplæringen og Tilbudsstrukturen i Videregående Opplæring*. Retrieved 09.01.2014. from https://www.austagderfk.no/Documents/Kvalitetsdokumenter/Rundskriv%20om%20fag%20og%20timefordelingen%20for%20grunnoppl%C3%A6ringen%20og%20tilbudsstrukturen%20i%20videreg%C3%A5ende%20oppl%C3%A6ring%202013%20-%202013.09.03.pdf.

Norwegian Directorate for Education and Training. (2013a). *Læreplan i Engelsk*. Retrieved 10.01.2014, from http://data.udir.no/kl06/ENG1-03.pdf?lang=nob.

Norwegian Directorate for Education and Training. (2013b). *Læreplan i Naturfag*. Retrieved 08.01.2014, from http://www.udir.no/Upload/larerplaner/Felles%20allmenne%20fag/L%C3%A6replan%20i%20naturfag%20-%20fastsatt.pdf?epslanguage=no.

Norwegian Directorate for Education and Training. (2013c). *Læreplan i Norsk*. Retrieved 09.01.2014, from http://data.udir.no/kl06/NOR1-05.pdf?lang=nob.

Norwegian Directorate for Education and Training. (2013d). *Læreplan i Samfunnsfag*. retrieved 09.01.2014, from http://data.udir.no/kl06/SAF1-03.pdf?lang=nno

Norwegian Ministry of Education. (2011). Åtte Nye Valgfag på Ungdomstrinnet [Press release]. Retrieved 09.01.2014, from http://www.regjeringen.no/nb/dokumentarkiv/stoltenberg-ii/kd/Nyheter-og-pressemeldinger/pressemeldinger/2011/atte-nye-valgfag-pa-ungdomstrinnet.html?id=648721

Norwegian Ministry of Education. (2012). *Kunnskap for en Felles fFamtid. Revidert Strategi for Utdanning for Bærekraftig Utvikling 2012-2015*. Retrieved 10.08.2013, from http://www.regjeringen.no/upload/KD/Vedlegg/UH/Rapporter_og_planer/Strategi_for_UBU.pdf.

Norwegian Ministry of Education. (2013). Reviderte Læreplaner Fastsatt [Press release]. Retrieved 14.01.2014, from http://www.regjeringen.no/nb/dokumentarkiv/stoltenberg-ii/kd/Nyheter-og-pressemeldinger/pressemeldinger/2013/reviderte-lareplaner-fastsatt.html?id=731407

Norwegian Museum of Science and Technology. Publikumsrekord på Teknisk Museum. Retrieved 04.02.2013, from http://www.tekniskmuseum.no/besok-oss/nyheter/58-publikumsrekord-pa-teknisk-museum

NTB. (2012, 23.01.2012). Nordmenn positive til oljenæringen. *Teknisk Ukeblad*. Retrieved 23.01.2014, from http://www.tu.no/petroleum/2012/01/23/nordmenn-positive-til-oljenaringen

Næss, A. (2005a). Self-Realization: An Ecological Approach to Being in the World. In Glasser, H & Drengson, A. (Eds.), *Selected Works of Arne Næss* (pp. 515-530). Dordrecht: Springer.

Næss, A. (2005b). The Shallow and the Deep. Long-Range Ecology Movement: A Summary. In Glasser, H.& Drengson, A. (Eds.), *Selected Works of Arne Næss* (pp. 7-12). Dordrecht: Springer.

O`Loughlin, M. (1992). Rethinking Science Education: Beyond Piagetian Constructivism. Toward a Sociocultural Model of Teaching and Learning. *Jounral of Research in Science Teaching, 29*(8), 791-820.

O`Sullivan, E. (2002). The Project and Vision of Transformative Learning. In E, O'Sullivan, A. Morrell & M. O'Connor (Eds.), *Expanding the Boundaries of Transformative Learning: Essays on Theory and Praxis* (pp. 1-12). New York: Palgrave Macmillan.

OECD. Skills beyond school. Recognition of Non-formal and Informal Learning. Retrieved 21.05.2014, from http://www.oecd.org/education/skills-beyond-school/recognitionofnon-formalandinformallearning-home.htm

Ojala, M. (2012). Hope and Climate Change. The Importance of Hope for Environmental Engagement Among Young People. *Environmental Education Research, 18*(5), 625-642.

Olvitt, L. (2013). Environmental Ethics as Processes of Open-Ended, Pluralistic, Deliberative Inquiry. In Stevensen, R.B., Brody J. Dillon & A. E. J. Wals (Eds.), *International Handbook of Environmental Education Research* (pp. 115-122). New York: AERA.

Online Etymology Dictionary. (2013). from http://www.etymonline.com/

Orr, D. (1991). What is Learning for? Six Myths about the Foundations of Modern Education, and Six New Principles to Replace them. *In Context*(27), 52-55.

Orr, D. (1992). *Ecological Literacy*: Sunny Press.

Paardekooper, R. (2011). Evoking the Past, Shaping the Future. How Archeological Open Air Museums Create New Memories. *ICOMNews,* 8.

Raabs, N. K. (2010). *No Child in the Norwegian Woods? A Study on Education for Sustainable Development in Norwegian Primary Schooling.* (Master of Arts), University of Oslo, Oslo. Retrieved from https://www.duo.uio.no/bitstream/handle/10852/32611/Thesis_NKR_DUO.pdf?sequence=1

Rickinson, M., & Lindholm, C. (2010). Exploring Student Learning and Challenges in Formal Environmental Education. In R. B. Stevenson & J. Dillon (Eds.), *Engaging Environmental Education: Learning, Culture and Agency* (pp. 13-29). Rotterdam: Sense Publishers.

Robottom, I. (2012). Changing Discourses in EE/ESD. A Role for Professional Self-Development. In R. B. Stevenson, M. Brody, J. Dillon & A.E.J. Wals (Ed.), *International Handbook of Environmental Education Research* (pp. 156-162). London: Routledge.

RORG. (2010). Bidrar Norske Skolebøker til Avmakt i Møte med Verden? Retrieved 22.01.2014, from http://www.rorg.no/Artikler/2201.htm

Schreiner, C. (2007). Kunnskapsløft Uten Bærekraft. *Naturfag, 01*(07), 12-13.

Schreiner, C., Henriksen, E. K., & Kirkeby Hansen, P. J. (2005). Climate Education: Empowering Today's Youth to Meet Tomorrow's Challenges. *Studies in Science Education, 41*(1), 3-49.

Selby, D. (2006). The Firm and Shaky Ground of Education for Sustainable Development. *Journal of Geography in Higher Education, 30*(2), 351-365.

Selwood, A. (2009). Making a Difference: The Cultural Impact of Museums. Executive Summary: NMDC.

Shallcross, T., & Wals, A. E. J. (2006). Mind your Es, Ds and Ss: Clarifying some terms. In T. Shallcross, J. Robinson, P. Pace & A. E. J. Wals. (Eds.), *Creating Sustainable Environments in our Schools* (pp. 3-10). London: Trentham Books.

Sipos, Y. R. (2005). *Transformative Sustainability Learning: A United Pedagogy of Head, Hands and Heart.* (Master of Science), University of British Columbia, Vancouver. Retrieved 20.12.2013, from http://circle.ubc.ca/bitstream/handle/2429/16432/ubc_2005-0315.pdf?sequence=1

Sipos, Y. R., Battisti, B., & Grimm, K. (2008). Achieving Transformative Sustainability Learning: Engaging Head, Hands and Heart. *International Journal of Sustainability in Higher Education, 9*(1), 68-86.

Sterling, S. (2008). Sustainable Education - Towards a Deep Learning Response. *Education for Sustainable Development*(6).

Sterling, S. (2010). Transformative Learning and Sustainability: Sketching the Conceptual Ground. *Learning and Teaching in Higher Education, Issue*(5), 17-33.

Stevenson, R. B. (2007). Schooling and Environmental Education: Contradictions in Purpose and Practice. *Environmental Education Research, 13*(2), 139-153.

Stoknes, P. E. (2013, 30.01.2013). *Klimapsykologi: Vi Har Store Planer for Energibesparelser og Klima, men Har vi Folk med?* Retrieved 20.04.2014, from http://www.regjeringen.no/upload/subnettsteder/framtidens_byer/Forbruk%20og%20avfall/2013/Lost_in_the_Supermarked/Presentasjoner_jan_2013/Stoknes.pdf

Sutter, G. C. (2008). Promoting Sustainability: Audience and Curatorial Perspectives on The Human Factor. *Curator: The Museum Journal, 51*(2), 187-202.

Svanström, M., Lozanzo-Garcia, F. J., & Rowe, D. (2008). Learning Outcomes for Sustainable Development in Higher Education. *International Journal of Sustainability in Higher Education, 9*(3), 339-351.

Svarstad, J. (2013, 29.05.2013). Dette Skal Elevene Lære på Skolen. *Aftenposten.* Retrieved from http://www.aftenposten.no/nyheter/iriks/Dette-skal-elevene-lare-pa-skolen-7214707.html#.Us7EX7SFeF8

Tal, T., & Morag, O. (2006). School Visits to Natural History Museums: Teaching or Enriching? *Journal of research in Science Teaching, 44*(5), 747-767.

The Natural Rucksack. (2014). Skoler som har fått tildelt midler fra DNS for 2014/2015. Retrieved 01.06.2013, from http://www.natursekken.no/c2000610/prosjekter/index.html?tid=2006457

Tidemann, G. (2013). Norges Mest Populære Museum. *UNIFORUM*. Retrieved 06.06.2013, from http://www.uniforum.uio.no/nyheter/2013/02/norges-mest-populare-museum.html

Trautmann, C. H. (2007). A Change in the Weather. European Museum Coverage of Global Climate Change. Ithaca, NY.

UN. (1987). Our Common Future. Report of the World Commission on Environment and Development. Rerieved 29.04.2014, from http://www.un-documents.net/ocf-02.htm

UNECE. (2005). *UNECE Strategy for Education for Sustainable Development*. Retrieved 20.12.2013, from http://www.unece.org/fileadmin/DAM/env/documents/2005/cep/ac.13/cep.ac.13.2005.3.rev.1.e.pdf.

UNESCO. Education for Sustainable Development. *Website.* Retrieved 22.01.2014, from http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/education-for-sustainable-development/education-for-sustainable-development/

UNESCO. (2003). *United Nations Decade of Education for Sustainable Development (2005-2014). Framework for the International Implementation Scheme.* Paper presented at the General Conference. Retrieved 09. 12. 2013, from http://unesdoc.unesco.org/images/0013/001311/131163e.pdf

UNESCO. (2005a). *Guidelines for the Integration of Education for Sustainable Development (ESD). Perspectives into National Education Policies*. Harare Cluster Office: Retrieved 20.12.2013, from http://unescodoc.unesco.org/images/0012/001272/127274e.pdf.

UNESCO. (2005b). *United Nations Decade of Education for Sustainable Development (2005-2014): International Implementation Scheme*. UNESCO Education Sector Retrieved 16.12.2013, from http://unesdoc.unesco.org/images/0014/001486/148654e.pdf.

UNESCO. (2006). *Education for Sustainable Development in Action. Learning & Training Tools N°1*. UNESCO Education Sector Retrieved 16.12.2013, from http://unesdoc.unesco.org/images/0015/001524/152453eo.pdf.

UNESCO. (2009a). *Education and the Search for a Sustainable Future*. Retrieved 09.12.2013, from http://unesdoc.unesco.org/images/0017/001791/179121e.pdf.

UNESCO. (2009b). *Review of Contexts and Structures for Education for Sustainable Development* Paris: Retrieved 06.01.2014, from http://www.unesco.org/education/justpublished_desd2009.pdf.

UNESCO. (2013). Hangzhou International Congress: Placing Culture & Creativity at the Heart of Development. Retrieved 22.01.2013, from http://www.unesco.org/new/en/unesco/resources/hangzhou-international-congress-placing-culture-creativity-at-the-heart-of-development/#sthash.mMOezZjL.dpuf

Vetlesen, A. (2008). Natursyn, Teknologi og Miljøkrise - Utfordringer for en Miljøetikk. In A. Vetlesen (Ed.), *Nytt Klima. Miljøkrisen i samfunnskritisk lys* (pp. 9-119).

Weiner, D. W. (2005). A Death-Defying Attempt to Articulate a Coherent Definition of Environmental History. *Environmental History, 10*(3), 404-420.

Witoszek, N. (2012). The Empire of Vogue. In K. Bjørkdahl & K. B. Nielsen (Eds.), *Development and Environment: Practices, Theories, Policies* (pp. 119-126). Oslo: Unipub.

Worts, D. (1998). *On Museums, Culture and Sustainable Development*. Paper presented at the Summit of the Museums of the Americas, Costa Rica. Retrieved 11.03.2014, from http://douglasworts.org/wp-content/uploads/2009/06/icom-98-worts.pdf

Worts, D. (2004). Museums in Search of a Sutainable Future. *Alberta Museums Review*, 40-57.

Worts, D. (2006a). *Transformational Encounters: Reflections on Cultural Participation and Ecomuseology. Canadian Journal of Communication* Vol. 31(1). Retrieved 25.05.2014, from http://www.cjc-online.ca/index.php/journal/article/view/1772/1895

Worts, D. (2006b). Measuring Museum Meaning: A Critical Assessment Framework. *The Journal of Museum Education, 31(1),* pp. 41-49.

Worts, D. (2008). Rising to the Challenge: Fostering a "Culture of Sutainability". *MUSE, 26,* 6-7.

Worts, D. (2011). Culture and Museums in the Winds of Change. The Need for Cultural Indiactors. *Culture and Local Governance*, 117-132.

10 Appendices

Appendix A: Detailed HHH-concept as presented by Sipos (2005, p. 27ff.)

Head

Cognitive Engagement	Observable sustained, engaged attention during a task requiring mental effort (Corne and Mandinach, quoted in Stoney & Oliver, 1999).
Understanding of Sustainable Development	Sustainability is understood as a complex, interdisciplinary challenge that must reconcile competing interests in socio-economics, socio-cultural and bio-physical and ecological goals (Grimm, 2004).
Understanding of Global Citizenship	An appreciation of how to assume and fulfill responsibilities as citizens of the world (UBC President Martha Piper, 2005).
Critical Analysis	Considering various claims from theorists, governments and other authorities, taking into account what they are based on and whether or not they apply in a given situation. Critical analysis involves splitting categories into and studying component parts (du Boulay, 1998).
System Thinking	Using complexity theories and an "ecosystem approach" to recognize that seemingly discrete activities are in fact a part of many interdependent social, ecological, and economic systems that together form the complex global system. Such thinking encourages us to critically assess the boundaries we assume our activities lie within, and to expand or modify those boundaries where appropriate (Sustainability Now, 2003).
Transdisciplinary Curriculum	An inter-/transdisciplinary curriculum integrates knowledge from different disciplines, embedding streams of knowledge into one another (Somerville 2003).
Conflict Resolution	Creative and effective ways to avoid, transform and resolve conflict (Kaner, Lind, Toldi, Fisk & Berger, 2001).
Problem-Based Learning	Learning that is focused, experiential and organized around investigation of real-world problems. Authentic experiences foster active learning, support knowledge construction and integrate school learning and real life (Association for Supervision and Curriculum Development, 2005).
Participatory Action Research	Involvement of participants in the research process, commitment to social change, and aspects of social learning (Moore, 2004).

Hands

Experiential Learning	Actively engaging students in experiences with real consequences so that participants make discoveries and experiment with knowledge in a personal way. Reflection plays an important role in experiential learning, and aids in the development of new skills, new attitudes and even theories and attitudes (Kraft & Sakofs, 1988). John Dewey (1998) was an early promoter of the idea of learning through direct experience, by action and reflection.
Applied Learning	Contextualizes learning in a way that empowers and motivates students, while assisting them in developing skills and knowledge required for employment, further education and active participation in their community (State of Victoria, 2004).
Collaborative Learning	Working together with the greater community (Princeton University, 2003).
Community Service	Participants learn and develop through service conducted in and meeting the needs of a community, in coordination with an institution of higher education. Helps foster civic responsibility and includes structured time for students to reflect on service experience (American Education for Higher Education, 1993).

Cooperative	Concerted and united action for a common purpose or benefit; also accommodative, willing to adjust differences in order to obtain agreement (Princeton University, 2003).
Ecological Footprinting	A measure of the area of productive land and water ecosystems required to produce the resources that a designated population produces, wherever on Earth the land and water is located (Wackernagel & Rees, 1996).
Creativity	Process of building or enacting something new (Princeton University, 2003)
Participatory Decision-making	Participants own the process and therefore the solutions (e.g. Kaner et al., 2001).
Democratic Classroom	Shared notion, access to and enactment of leadership and justice (Giroux & McLaren, 1996; Thayer-Bacon, 1996).

Heart

Transformative Learning	A marked change, as in character or appearance, usually for the better (Princeton University, 2003). Also a radical and instrument change in the structure of society, such as from existing social arrangements (Harper & Leicht, 2002).
Reflective Learning	Reflection is an activity in which people "recapture their experience, think about it, mull it over and evaluate it" (Boud, Keough & Walker, 1985).
Empowering Learning	Imparting a greater sense of authority, enablement (Princeton University, 2003).
Creative Learning	A process that brings into being (Princeton University, 2003).
Fun	Amusing or enjoyable (Princeton University, 2003).
Value-focused Thinking	Developing alternative solution to problems based on human needs and values by enabling subjective judgments about belief and/or emotional judgments (Sustainability Now, 2003). Values-focused thinking is easily accessible and enables comparison of several alternatives in traceable and robust ways (Keeney, 1992).
Inclusivity	Ensuring equal access for involvement in educational, social and cultural activities (Equal Opportunity Office).
Equitable	Implying justice dictated by reason, conscience, and a natural sense of what is fair to all (Princeton University, 2003).
Place-based Learning	Engaging Learners through the positioning of a curriculum within the context of participants 'own lives, communities and regions, thereby taking advantage of students` and communities 'natural interest in the local (Smith, 2002).

References by Sipos

American Association for Higher Education (1993). *Series on Service Learing in the Disciplines.*

Association for Supervision and Curriculum Devlopment (2005). *The Definition of Problem-Based Learning*. Washington DC. Retrieved from

http://www.ascd.org/portal/site/ascd/menuitem.a4befa0de1b8d1fddeb3ffdb62108a0c/

Boud, D., Keogh, R. & Walker, D.(1985). *Reflection. Turning Experience into Learning*. London: Kogan.

duBolay, D. (1998). *Critical Analysis, Argument and Opinion*. University of Sussex Language Institute. Retrieved from

http://www.sussex.ac.uk/langc/skills/conc-det.html

Equal Opportunity Office (2001). *Working definitions and Principles. Inclusive Language and Presentation for Use by the Inclusivity Policy Working Party of the Student Equity Committee*. University of Southern Queensland. Retrieved from

http://www.usq.edu.au/equalopp/inclusive.html

Giroux, H. & McLaren, P. (1996). Teacher Education and the Politics of Engagement. The Case of Democratic Schooling. In Leistyna, P, Woodrum, A. & Sherblom, S.(Eds.), Breaking Free. The Transformative Power of Critical Pedagogy.Cambridge: Harvard Educational Review, 301-332.

Grimm, K.A. (2004). *Interrelated Sustainability learning Projects: Field Course, Block Learning, A Walk Thru Time and Earth Literacy*. Teaching and Learning Enhancement Proposal. University of British Columbia

Harper, C.L. & Leicht, K.T. (2002). *Exploring Social Change. America and the World*. Upper Saddle River: Prentice Hall.

Kaner, S., Lind, L., Toldi, C., Fisk, S., & Berger, D. (2001) *Facilitator`s Guide to Participatory Decision-Making*. Philadelphia: New Society Publishers.

Keeney, R.L. (1992). *Value-Focused Thinking. A Path to Creative Decision-Making*. Havard University Press

Kraft, D. and Sakofs, M. (1988) *The Theory of Experiantial Education*. Association for Experiantial Education.

Moore, J.L. (20054). *Barriers and Pathways to creating Sustainability Education Programs: Policy Rhetoric and Reality*. Dept. of Curriculum Studies, University of Briotish Columbia.

Piper, M. (2005). *Global Citizen Conference*. Speech.

Princeton University (2003). *Wordnet*. Retrieved from

https://www.dictionary.com

Smith, G.A. (2002). Going Local. *Educational Leadership*, 30-33

State of Victoria (2004). *Applied Learning*. VCAL information Sheet.Retrieved from

http://www.vga.vic.gov.au/vga/pdfs/VCALinfoapplearn.pdf

Stoney, S & Oliver, R. (1983). Can Higher order Thinking and Cognitive Enaggement Be Enhanced With Multimedia? *Interactive Multimedia Journal Electronic Journal of Computer-Enhanced Learning 1(2)*

Somerville, M.A. (2000). *Transdisciplinarity:Recreating integrated knowledge*. (M.A. Master`s Thesis). McGill, Montral: Queens University Press

Sustainability Now (2003).*Professional Engineers and Geoscientist of BC Sustainability Website*. Retrieved from

http://www.sustainability.ca/index.cfm

Thayer-Bacon, B.J. (1996). Democratic Classroom Communities. *Studies in Philosophy and Education, 15(4),* 333-351.

Wackernagel, M. &Rees, W.E. (1996). *Our Ecological Footprint. Reducaing Human Impact on the Earth.* British Columbia: New Society Publishers.

Appendix B: List of Interviews and Interviewees

Museum staff

Håvard Heggelund, Head of the school division at the Norwegian Museum of Science and Technology, 13.11.2013

Cecilie Webb, Leader of External Affairs at the Natural History Museum, 15.11.2013

Toril Rokseth, Head of the school division at the Nobel Peace Center, 13.11.2013

Anne-Marie Svebak Grimstad & Siv Garles Sjåland, Educational Officer and Educational Consultant at the Norwegian Folk Museum, 07.11.2013

Teachers

Eva, teacher at an upper secondary school in Oslo, 20.11.2013

Cathrine, teacher at a primary school on Oslo , 28.11.2013

Hanne & Liv, teachers at an upper secondary school in Bærum, close to Oslo, 21.11.2013

Lilian, teacher at a lower secondary school on Oslo, 4.12,2013

Appendix C: Survey to Map ESD Related Activities of Museums / Learning Centers

Spørreskjema

1. **Vi befinner oss i FNs Tiår for utdanning for bærekraftig utvikling (UBU). Er UBU en del av museets formidlingsagenda (utstillinger, omvisninger og aktiviteter)? Kryss av ved å klikke på en av rutene nedenfor.**

   ☐ ja ☐ nei

2. **Er ett eller flere av disse punktene en del av museets utstillinger, omvisninger eller aktiviteter? Kryss av ved å klikke på en eller flere ruter nedenfor.**

   ☐ Bærekraftig byutvikling
   ☐ Energi
   ☐ Forbruk
   ☐ Ressurser og fordeling
   ☐ Klima
   ☐ Luftkvalitet
   ☐ Deltakelse og demokrati
   ☐ Interessekonflikter
   ☐ Likestilling av kjønn
   ☐ Reduksjon av fattigdom
   ☐ Risikoreduksjon av katastrofer
   ☐ Helse
   ☐ Kulturell mangfold
   ☐ Tradisjonell kunnskap
   ☐ Kulturminner
   ☐ Biologisk mangfold
   ☐ Friluftsliv og naturopplevelser
   ☐ Naturområder
   ☐ Vann

3. Har museet / senteret som mål om å bidra til et bærekraftig samfunn på en annen måte enn oppgitt ovenfor (f.eks. andre temaer, drift, bygningsmasse)? Vennligst spesifiser nedenfor.

4. Vennligst kryss av ved å klikke på en eller flere ruter nedenfor.

Hvis det skulle være aktuelt, er det en mulighet for at forskeren

☐ kan være med på utvalgte omvisninger.

☐ kan intervjue ansatte.

☐ kan intervjue publikum.

Appendix D: Sample of Interview Guide for the Museum / Learning Center Employees

Norwegian Museum of Science and Technology:

Norsk Teknisk Museum

1. **Er det noe kjernefilosofi som alle utstillingene er basert på?**

   Hvilke objekter/utstillinger gjenspeiler museets filosofi best?

   Noen utstillinger berører temaet bærekraftighet som *energiutstilling/vitensenteret* og *Industri langs Akerselva.* Hvordan ble de til og hvem initierte dem?

   Hvordan brukes disse utstillingene i museets formidlingsvirksomhet?

   Er det planer om å satse (enda mer) på temaet bærekraftig utvikling i utstillingene?

2. **Hvordan foregår skoleprogramutviklingen?**

   Dere skriver på nettsiden at det tilbys opplegg som passer både grunn- og videregående skole elever. Hvilken aldersgruppe er prioritert i deres skoletilbud?

   Hva er viktige punkter for dere i virksomheten rettet mot skoler?

   Hva er dere mest fornøyd med i skoleavdelingen i forbindelse med skolebesøk, skolesamarbeid og programutviklingen? Kan du gi eksempler?

   Hva er det som ikke fungerer like bra? Hva kan årsakene være til det?

   I hvilken grad spiller UBU (Utdanning for Bærekraftig Utvikling) inn i aktiviteter og omvisninger dere tilbyr? Kan du gi eksempler?

   Hvilken rolle spiller Den kulturelle skolesekken i utviklingen av nye opplegg?

   Hvilke tester/evalueringer og former for tilbakemelding bruker museet på opplegg som *Den industrielle revolusjonen*?

   Slik jeg forstår det, har noen departementer og skoler et tettere samarbeid med noen museer. Den nye videregående skolen på Tøyen skal ha tett tilknytning til Naturhistorisk museum. Har Teknisk Museum noe form for samarbeid med lærere, skoler eller departementer?

Hvordan ville et ideelt samarbeid mellom skolene og museet se ut fra museets side? Og hvilke utfordringer kan man støte på i et slikt samarbeid?

3. Hvilken rolle spiller dere i skolehverdagen?

Jeg vil gjerne høre litt om ditt inntrykk av lærernes utbytte av samarbeidet. Vet du noen lærere som tar i bruk noe fra utstillingen eller omvisningen i undervisningen (f.eks. *Den industrielle revolusjonen*)?

Blant alle klassene som har vært innom, hvor mange anslår du jobber med stoffet før og etter besøket i museet. Hva kan være grunnen til at lærere velger å jobbe med før- og etterarbeid eller dropper det?

Hva gjør lærerne konkret under omvisningen? Er/følger de med? Støtter de elevene? Stiller de spørsmål eller supplerer? Er de distrahert?

Hvilke opplegg oppfatter du bestilles oftest? Hvorfor tror du det er akkurat disse som bestilles?

Hvor mange skoleklasser, anslår du, besøker museet "på egen hånd" det vil si utenom oppsatte turer via Den kulturelle skolesekken?

Er det noe forskjell på de gruppene som kommer i sammenheng med Den kulturelle skolesekken og andre grupper (for eksempel disiplin, før- og etterarbeid, elevenes interesse, deltakelse av læreren)?

I hvilken grad, oppfatter du, supplerer dere skoletilbudet, særlig når det kommer til bærekraftighetsformidling? Hva er det dere tilbyr som ikke skolene har?

Appendix E: Sample of the Interview Guide for the Teachers

Norwegian Museum of Science and Technology

Norsk Teknisk Museum: *Den industrielle revolusjonen*

1. **Hvorfor valgte du å dra på Teknisk Museum med klassen denne gangen og har du gjort det før?**

   Hvor hørte du om undervisningstilbudet til Teknisk Museum? Kjenner du noen lærere eller andre som har brukt dette tilbudet?

   Hvordan får du informasjon om ulike utstillinger?

   Opplegget *Den industrielle revolusjonen* berører bærekraftighetsspørsmål. Jeg lurer på hvor viktig slike spørsmål er i skolehverdagen og hvorfor du valgte akkurat denne omvisningen (fremfor andre)? Dekker den deler av læreplanen?

   Hva synes du om dette opplegget i forhold til andre opplegg du har deltatt i med skoleklassen?

2. **I hvilken grad var klassen forberedt på besøket?**

   Ble det jobbet med temaet i klassen på forhånd? Hva gjorde dere?

   Brukte du materiale fra museet? Hva slags, hvordan og hvorfor?

   Hva visste elevene om selve ekskursjonen på forhånd?

3. **Hvordan opplevde du omvisningen?**

   Hvilket inntrykk har du selv av utstillingen og omvisningen? Hva synes du funket bra og hva mener du kunne vært droppet?

   Hva var din rolle under omvisningen? Var du forberedt på og komfortabel med denne rollen, eller kunne du tenke deg en mer aktiv/passiv rolle?

   Oppfatter du elevene har fått noe læringsutbytte av omvisningen? Kan du gi et eksempel for det?

4. I hvilken grad ble besøket fulgt opp da dere var tilbake på skolen?

I hvilken grad hadde du planlagt å jobbe videre med temaer som vannressurser, demokrati og helse i etterkant av besøket?

Hva slags etterarbeid gjorde dere i klassen? Hvorfor/hvilke temaer? Brukte dere materiale fra museet?

Hvordan oppfatter du at stoffet fra omvisningen passer med og gir verdifulle innspill i undervisningen i ettertid? Er det aktuelt å bruke et liknende opplegg i egen undervisning også senere i andre klasser?

5. Hvordan vurderer du personlig samarbeidet med museet?

Det er noen museer som har et fast samarbeid med skoler. Naturhistorisk Museum skal for eksempel jobbe tett sammen med den nye skolen som tar over bygningen av Hersleb skole. Hvor mye samarbeider du med og bruker museer for undervisningen din?

Hvilke temaer mener du er spesielt egnet for et samarbeid mellom museum og skole? Hvordan bør det legges opp?

Hvordan ville et ideelt samarbeid mellom skoler og museer se ut for deg? Hva er utfordringer for et slikt samarbeid?

Har du eller vurderer du et tettere samarbeid med et museum i Oslo-området?

Hva er dine beste tidligere erfaringer med museumsbesøk i skolesammenheng – med tanke på elevenes læringsutbytte og tegn på at en utstilling var viktig for dem? Kan du gi eksempler på det?

I mange fag har bærekraftighet blitt en del av læreplanen både i grunnskolen og på videregående skole. Utdanning for bærekraftig utvikling omfatter mange aspekter som klima, ressurser, fordeling, forbruk, deltakelse og demokrati, naturmangfold, helse, friluftsliv, avfall og gjenvinning, interessekonflikter, energi, naturområder og vannressurser. Synes du at disse temaene kommer godt nok frem i skolehverdagen – for eksempel i de fagene du underviser i?

Er det noen utfordringer ved å undervise i disse temaene? Mener du at museer kan supplere skolehverdagen her og hvis ja, hvordan?

Appendix F: Critical Assessment Framework - Museum Projects and Initiatives by Worts (2006b, .p.49)

Critical Assessment Framework—Museum Projects and Initiatives

(Rating performance without criteria is subjective. Discussions are useful and will generate criteria.)

When considering a new public program initiative, ask how well the program will:	*Poorly* 1	2	*to* 3	4	*Well* 5	*N/A*
Personal Level (members of community)						
Contribute and/or generate new insights						
Capture imagination						
Stimulate curiosity						
Encourage personal reflection						
Enhance ability to think critically and creatively						
Provide opportunity to examine and clarify values						
Demonstrate relevance and make connection to daily life						
Affirm, challenge, deepen identity						
Help develop a sense of place						
Help deal with complexity and uncertainty						
Increase responsible action						
Stimulate intrinsic motivation						
Community Level						
Address vital and relevant needs/issues/opportunities within community						
Generate information and connection at the personal, community, provincial/territorial, national, and global level						
Engage a diverse public						
Provide an outlet for the voices of diverse groups						
Encourage social interactions and debate						
Act as a catalyst for action						
Stimulate intergenerational interactions						
Link existing community groups to one another						
Initiate or enhance long term collaborative relationships						
Create partnerships that empower community groups						
Enhance the credibility of all involved						
Result in products & processes that have tangible impacts in community						
Generate information applicable to museum & community decision making						
Museum Level (employee and institution)						
Challenge personal and institutional assumptions						
Be guided by clearly articulated goals, objectives and outcomes						
Use the most effective vehicle for achieving goals *(Note: differentiate between goals, outcomes and strategies.)*						
Identify and value staff skills and resources						
Empower, transform and affect all who are involved						
Create a community of learning within staff						
Engage key players/champions/detractors early in process (ext./int.)						
Include multiple perspectives						
Engage different learning styles						
Integrate different dimensions of sustainability						
Integrate scientific, local and traditional knowledge						
Act as a catalyst for partnering community organizations						