

# Workshop, nature and technique

## Learning about sustainable development and education

Nature and technique is the answer, but what is the question? What do we want the subject to contribute to, with regard to the trained teacher and with regard to the children, young people and adults who are to learn something? In my view, the central question is how we learn to manage the planet's resources so that humanity can continue to live life on earth – even in 20, 50 and 100 years' time. We need positive visions for our common future as well as concrete solutions to the climate challenge, to our resource and energy use, and, not least, we need the younger generations to commit themselves to how they are to live and survive in an uncertain future.

The subject Workshop, nature and technique, a part of the pedagogical education in Denmark, focuses on the creative involvement of handicraft, art and the natural and technical sciences. This chapter focuses on children ages 2-6 and the dimensions which form part of the learning themes Nature and natural phenomena and Cultural modes of expression and values.

### New forms of learning within sustainable development

Many of the elements in the subject Workshop, nature and technique take their points of departure in both the abstract and the very concrete, so the subject can easily experiment with new forms of learning which involve both aesthetic as well as artistic elements. When I instruct children and young people at the Samsø Energy Academy<sup>i</sup> in innovation, renewable energy, fossil independence, CO<sub>2</sub> and kilowatt hours, I always start by giving them a choice. I ask them directly if they want to participate or not, because I see the independent and individual choice as crucial for the learning situation. Teachers, too, have to ask themselves why they are preoccupied with nature and technique and why it is important. In order to answer these questions they may have to retrieve things from their own nature and experiences or wisdom from their parents or from earlier times. Getting in contact with other people, with themselves and with nature is what makes the theme so relevant, and at the same time this is the prerequisite for a sustainable life and society.

In the natural sciences there is a great deal of uncertainty towards many of the things which cannot be measured or weighed in exact values and numbers. As a teacher, however, one should not shy away from using 'the wrong' as a deliberate strategy in one's communication. When you as a human being – and I as an educator – employ your inner resources, your inner child, you can easily start with a 'tall story' and end up with a true or correct version. I personally do not do this to engage in a fashionable innovation culture

where failing is allowed, I do it to offer some liberty of action to the children and young people I work with. I often show a short film about a Frenchman (Mr. W.), who behaves like the wind and on his way around town does all the things that the wind might do, which is definitely not 'proper' or 'correct' behaviour. In one scene, someone has collected empty bottles in a shopping trolley, and the ill-adjusted man swings his arm so the bottles go flying in all directions. In another scene, a person exits his house and puts up his umbrella, whereupon the Frenchman knocks it down so it curves upwards. It creates a completely different kind of contact with and relation to children and young people when they experience and feel that it is not about doing 'the right thing' and about achieving something, but that it is rather about being present and attentive towards what is and about sharing experiences and knowledge with one another.

The purpose of the learning theme Nature and natural phenomena is that the children gain insight into important phenomena and connections and that they develop thoughts, language and concepts about nature and technique which are valuable in everyday life. About the purpose of the learning theme it is furthermore written that children's experiments and experiences through nature experiences are central elements in their emotional, mental and physical development (uvm.dk). Taking as a starting point children and young people's everyday lives and concrete sensing experiences with resources and energy contribute to create the key contact between them and their teachers. When I teach about resources and renewable energy, I talk to the children and young people about the fact that, on average, we will each own ten mobile phones in our lifetime. I ask them to each draw ten phones and we then place all the drawings on the floor. I ask them how much space they think the used phones will take up at the rubbish dump, and we talk about recycling and the cradle to cradle principle (a design concept developed with inspiration from nature, where surplus materials from one season enter into the next season as nutrients and base materials). Children and young people need to experiment. Through experimenting they gather experiences with and feel the powers of nature or energy – such as the wind's or the sun's – and visually and corporally experience that new solutions are needed. We often go to visit a windmill, a farm or a biogas plant so they can see how sustainable solutions function in practice.

Aesthetics and art can and should contribute to the creation of new forms of communication and teaching and new learning environments within sustainable development. There is a need for new paths in the subject Workshop, nature and technique because this subject offers children a basic experience with the fundamental preconditions for all life. In the coming years, the global agenda will be marked by major challenges such as climate change, technological transformations, changes in the world economy, cultural and social tensions and new health risks. The task of finding ways to secure a sustainable development will in all probability be ever more insistent. Sustainable growth can only be realised if everybody experiences ownership, leadership and community concerning the global challenges we share. There are two stories – the good and the bad. The latter story concerns a world six degrees warmer, a world which several scientists see as the most realistic scenario at 100 years' sight. The good story is

about Samsø which in less than ten years became Denmark's renewable energy island and which has now set a goal of becoming independent from fossil fuels already by 2030. This is 20 years before all of Denmark is to be independent of fossil fuels, which is the most ambitious national climate goal in the world.

Many children and young people are afraid of this development. They fear the climate catastrophe and the end of the world and they – like adults, incidentally – become encouraged by seeing that it is possible to create solutions which make sense to both humans and the environment. Education for Sustainable Development (ESD) – as in Nature and natural phenomena (and in school Nature/Technique) – is ideally to engage in the many complex aspects of sustainability. It is not only about nature, technique and the environment but equally about the social, cultural and ethical aspects.

## **The workshop – the large and the small housekeeping**

Earth to earth, ashes to ashes, dust to dust! This could function as a working title when dealing with ecology. The word 'ecology' comes from Greek, it means housekeeping, and one might say that it is about keeping one's own house. By this is understood both the big 'house' which is the planet and the small house where you work and live, that is, the local environment. In the last decade, ecology has become an integrated part of the complex sustainability agenda. Ecology and ecological intelligence are reactions against and an alternative to the hegemonic growth mindset and ideology and it is about much more than food production, animal welfare and pesticide residue. If anything, ecology is a mindset or an expression of a symbiotic relation between nature, resources, the environment and human beings. When I instruct children and young people in ecology I try to show them the connections e.g. between planting, caring for, preserving and eating, that is, the relation between us and our surroundings. One of the exercises I use consists in showing the children and young people three pictures: one of a seed, one of a bud and one of a flower. I ask them to choose the picture that best describes where they see themselves in their lives right now. None of them chooses the seed, and that stimulates further conversation. I e.g. tell them about the banana which has built its own packaging that can produce a new banana, and about fertilizer and the connection between that which we eat and that which comes out the other end. On the societal level we have lost the feeling for the 'seed' and the vital processes inherent in the fact that waste is food for new products which we need to survive.

As an institution it is possible to work with ecology on a larger or smaller scale. Haver til Maver (Gardens for Tum mies) is an inspiring non-profit project launched by Aarstiderne (The Seasons) in 2006: "Haver til Maver is an organic sensing and nature experience center with a gastronomic focus aimed at children and young people. Through education and experiences we want to develop children's knowledge about and insight into nature, agriculture, movement/exercise, cooking, healthy eating habits and edible experiences." Children and young people e.g. visit farms where they see how things hang together and how they take place in practice. Another example of an institution working with

sustainability in a child-friendly fashion is Skansen Hus & Have (Skansen House & Garden), a converted leisure center in the centre of Aarhus. The Energy Academy contributed to the process with inspiration regarding how sustainability in the education of young people may unfold and how young people can contribute in the rebuilding of the leisure center. The young people have taken part in the project right from the start and together with the head architect Peter Skjalm they have defined their dreams for a new youth club. Today the center houses both a bicycle workshop, ornamental gardens, kitchen gardens and many other things. Environmental and cultural well-being have been prevailing values in the Skansen Project, and that goes for everything from the recycling of the materials used in the building activities to the food culture and the learning that is passed on to the children. It has become apparent that the young people between 11 and 17 years have the courage, the desire and the creativity to influence their everyday lives and create their own futures. Haver til Maver and Skansen Hus & Have are good examples of how one can work in an exploring fashion with a new educational and holistic practice concerning citizenship, sustainable behaviour and learning through hands-on experience. These experiences can, with a bit of imagination, be turned into projects for smaller children in day-care institutions.

Today, many children and young people have to rediscover nature in order to understand that it is a giving, cyclical circuit, which brings us back to the example of the seed. We seem to have forgotten that we are part of nature, we have forgotten the reciprocity that exists between us and nature. When you talk to children and young people about what ecology, reuse and sustainability is about there are no right or wrong answers. Who sustains, who has the ability? What do our pictures of the earth and nature look like? Together we taste all these words.

One of the central challenges you can work with is how we can promote the individual's competences when it comes to handling dilemmas such as fear versus hope, challenges versus solutions, the world/nature versus the individual through workshop training, and with that connections between the large and the small housekeeping, that is, global sustainability and sustainability in the local area, in the individual organisation or in the individual human being. There are many questions to tackle: How should we build and live, how are we to keep warm during winter and find clean drinking water? How are we to eat, dress and transport ourselves? And how are we to engage ourselves with the communities and living environments we are part of such as the school, the workplace, the home, the day-care institution, the leisure or sports club? How can we understand the abstract and make it concrete?

All learning concerning sustainable development has to contain a democratic and an ethical perspective. Qualifications for democratic participation and the individual's choice is a precondition for learning and sustainable development, which are at once societal and individual learning processes. Sustainable education and transformation are then also a normative project as the individual is not only accountable to herself but to all life on the

planet. We have to work with both the collective and the individual levels because these are inseparably intertwined.

The workshop is commonly known as a place where you create art or repair things such as cars. The work that takes place in the workshop is often both sensuous and practical, and you learn by doing. As a communicator and educator you must seek to create a workshop which combines the large and the small housekeeping, which combines the abstract with the mundane, and which manages to involve the children in democratic and equal learning environment. You could also call it a 'being place' or a 'learning place', but either way, in this space, 'learning by doing' is an especially important skill when it comes to sustainable development and education.

'Learning by doing' first and foremost means that children and young people are not required to produce and display *one* type of result of their work. This openness becomes a tool for support in the learning process because the pupils will experience that what might have become a tripwire in their learning process instead becomes a stepping stone. Perceiving through the senses is an integral part of learning by doing and plays a part in underlining and maintaining contact with other people, with yourself and with nature. I am very preoccupied with understanding where children and young people are in their sensation with nature because I want to meet them where they are. That is the difference between having an open or a strategic relation. The strategic relation defines in advance what will come out of a meeting between people: If I say A, they will answer B, and we will reach C. The open meeting where you have to use your senses and be present and attentive together with the children and young people creates a completely different type of contact – both between child and teacher and in relation to that which you are working with. Openness, equality and sensing are indispensable elements in learning processes concerning nature, the environment and sustainability. Sustainable development holds many dilemmas, which must be handled both individually and collectively, and at the same time, sustainable development is an area which at present is constantly evolving.

Professor Steen Hildebrandt in his article "Sustainability and school management" is critical of the current evidence-based pedagogical efforts, the result of which is oversimplification. He uses the concept of "the world citizen" to underline the global as well as the ethical – or existential – perspectives as the absolutely central element in sustainable development and education. It is the connection between the earlier mentioned big housekeeping (the planet, the earth, the globe) and small housekeeping (the local community, the institution, the individual) this is all about. We need educators and pedagogues who are able to work with both these dimensions, and it is my experience that this demands a more open and personal involvement in the communication situation.

## Sustainability for children

How do you bring forth the extraordinary in your institution and the people who use it? The question is a good starting point for thinking outside the box and working with nature, technique and sustainability in new ways. I emphasise the words 'learning' and 'being' a

lot in relation to the notion of sustainability when I describe Education for Sustainable Development, because *learning* and *being* are key prerequisites for the development of sustainable societies. For this reason we are witnessing a shift in emphasis from education to learning, which is about activating the individual as part of the community. We need to integrate the personal aspect if we are to activate children and young people. The existential and ethical elements are important irrespective of whether we are working with nature, environment, energy and technology or with the democratic and social aspects which are also fundamental to sustainable development and education. "We cannot change the outer world if we don't change the inner world", as professor Steen Hildebrandt expresses it. So how do we activate that which exists inside the organisation and inside the people who use it – regardless of whether we are talking about children, students, teachers or other adults?

By now a wide range of cases exist which each in their own way contribute to creating new communication forms and new learning environments. Below I have chosen to describe two cases or exercises which are both examples of how we as grown-ups – artists, educators, teachers, pedagogues – can create inspiring settings for complex learning processes by employing new means.

## **Case 1: Fishbones in molehills (2-3 years)**

The first case is about sensing and experiencing nature, and it can be carried out by every kindergarten or day nursery with access to a field or a forest with molehills. It is a different activity which contains elements of aesthetics and pedagogy brought together to reinforce small children's sense perception. Part of the preparation for the grown-ups and the artist who could be leading the exercise is having fish for dinner at home and saving the fishbones. Shells or something completely different could also be used. As a further preparation you need to make sure that there are small metal shovels and brooms or little brushes at the children's disposal.

Once the children are gathered they are given a short introduction by the adults who tell them that they are going to be archaeologists for a day. The talk is also about what it means to dig something up and that things found in the soil may be over a thousand years old so you have to be careful in order not to destroy the findings. All the children will be equipped with tools and walk together towards the "scene of the crime", a large field full of molehills. Prior to this, the artist has buried all the fishbones in about ten molehills. The children are told that the findings can be found in the molehills, and children and nursery teachers are let loose without delay. It is great watching the kids run along enthusiastically.

There will be a great deal of activity between the children as they start investigating the molehills. The children's conversations as well as the intensity of the situation will be peaking because they do not know what they are going to find. There will be talk about what a finding is, and if they do not find anything in a molehill there will be talk as well. Not least, of course, there will be great joy when a bone is dug out and a treasure found.

"You need to see something, come and look!", one of the children yells and everybody comes running to follow the process of sweeping the dirt off the fishbones.

The adults ask the children what they think the fishbones are. The children have many ideas, they are enthusiastic and absorbed in the task. The talk is cheerful and both boys and girls participate in the excavations in a lively and patient way. All fishbones are brought home to the institution where the findings are studied and the talk about how a fish could end up in a molehill continues.

I have tried this together with the artist Anne-Marie Holm, and I think the exercise is optimal because it is exciting for the children, and because the different elements – fishbones and molehills – do not go together naturally. The exercise mixes different elements such as art, aesthetics, nature, creativity and fantasy – and there are no right or wrong answers. It is pure sensing and experience, and that creates reflection.

## Case 2: Water and ink (3-6 years)

As a prelude, the kindergarten children and grown-ups are told that the body is made up of 70 percent water, and there is talk about what water looks like, if it is alive and how it moves in nature. There will also be talk about the ocean and lakes and about the ebb and flow of tides. The materials for this exercise are A3 and A4 sheets of brown paper without surface treatment which can be softened in water, an atomizer filled with a mixture of liquid black ink from a bottle (available in many colours) and water (in the scale 4:1), possibly stronger mixtures, and a large pipette for the adults. The papers are softened and soaked through and through under the tap together with the children while we talk about drinking water. The papers are gently put together and packed with the other materials.

Together, everyone walks to the "scene of the crime", which in this exercise is the beach, and the children are divided into teams. They are apprentices, and the grown-ups show them how to fold the papers and spray the liquid ink onto the edge of the paper farthest from the sea. The papers are submerged in the water and the children will have to wait for the surf to spread the ink on the paper. The pictures are then laid to dry on the beach and sand is shaken off when they are dry.

When the papers have been laid at the water's edge there will be talk about whether the paper will break when the water washes ashore. There will be talk about whether human beings can float like the paper and about what happens to the ink when it is washed away into the sea. Is it dangerous when all the black merges with the sea? What might happen? When the papers are laid to dry you can talk about how they will dry and of course also about what the pictures look like. What is it? Are the clouds reflected in the paper in the same way as they are reflected in the sea? Or what is it on the paper?

It is a great exercise to repeat again and again. The children will get a better hold of how the materials work together, which will be an important sensing experience. At the same

time, it is an interdisciplinary exercise in and with nature which is even documented by a concrete picture for the children to take home.

## Sense and collection – about aesthetic learning processes

The words "sense and collection" are normally understood diametrically opposite from the way in which they are employed in this chapter. In the Danish language, if one leaves one's "sense and collection" it means that that person is incapable of using her senses and her reason, she is incapable of "keeping it together", one could say. I will request here that we employ both our senses and our collection in Education for Sustainable Development. Our senses (the aesthetic) and our reason must go hand in hand in new types of learning processes. Our work should not necessarily be result oriented, we should rather work procesually, in harmony with reality. Let me tell you a story that I got from the eco philosopher Ole Hansen: A school class went on an outing in the woods where they found a dead marten. The teacher decided that they should take it back to the school where the class buried it, but instead of covering it up with dirt they covered it with a wooden plate. In the time that followed they could follow the process of decomposition by lifting the plate, and they witnessed how the marten slowly dissolved and was eaten by smaller animals. In the end, when there was nothing left but the skeleton, each of the children was given a piece of bone with his or her name written on it. They will probably never forget that experience and the knowledge they obtained in the process. That is the kind of sense and collection we need to make use of to a much larger extent in the educational processes of the future.

Today the sensing aspect is highly underprioritized, perhaps because it cannot be measured and weighed, but probably also because it is demanding for us educators and teachers to work with. As I have mentioned earlier, it is crucial for me to direct my attention to where children and young people are in their sensing of nature and to be aware that I cannot know in advance where they are. From my experience of working in that way I of course already have an idea of where the children and young people are, but I always give them the benefit of the doubt and I am always open towards both the process and the new knowledge they are going to acquire. I might think that the children and young people are going to love flying kites, but for some the grasshoppers in the field are going to be the most interesting experience and we need to make room for that. I have to be in a process of continuous development, both of myself and of my teaching materials in order to be able to meet the children and young people where they are and be present with the things that take place when I am with them. If I do not develop and if I am not present our meeting will not be equal and giving. In far too many teaching situations the social and existential aspects labour under evidence-based professionalism.

Tatiana Chemi very precisely describes why we need to work with aesthetic learning processes. The following quote is from the article *Art and Science* on blivklog.dk:

*"The Work of Art in the Age of Mechanical Reproduction*, the title of an essay published by Walter Benjamin in 1935, and Adorno's critical approach towards the cultural industry are

examples of how technological progress based on new knowledge together with aesthetics can establish a mutual and active synergy for understanding the surrounding world (...) Thinking holistically in schools and educational institutions means engaging in art while engaging with science, taking them together and not in separate, independent units. We often see a strong separation of the 'hard' from the 'soft' subjects with the hierarchy that follows which places science at the top and expels art to the domains of leisure and entertainment. 'The idea seems to be that schools do intellect in the morning and emotions after lunch'! (Robinson 2001: 143). (...) More and more educational experiments integrate aesthetic and logical-rational strategies in order to span many different cognitive approaches to learning (the many intelligences) and many ways of learning (e.g. learning styles or *expeditionary learning*)."

In short, Chemi says that we need new ways of understanding our surroundings, that we need to work more holistically and that a number of educational experiments already integrate that which I in this chapter call sense and collection. Aesthetic learning processes ask questions while educational learning processes offer explanations. As Jens Raahauge, president of the folkeskole section of the Organisation of Teachers of Danish, puts it: "There is a certain spiritual laziness in the field of education which you do not find in the aesthetics".

An aesthetic experience is a sensing experience, an experience which involves the use of our senses of sight, hearing, smell, taste and touch. Aesthetic experiences are perceptible, bodily experiences which we can have when we e.g. eat, listen to music, take a walk in the forest, swim in the sea or spend time with other people – and which should also be part of the education in sustainability. Theologian and philosopher K. E. Løgstrup wrote in the book *The Ethical Demand* (1956): "The individual is never concerned with another person without holding part of that person's life in his hand". In an ecological perspective it is exactly the interaction between the individual and her surroundings which is central. For that reason, empathy is of crucial importance when it comes to people's relations to nature, the environment and the resources. Being able to put oneself in someone else's shoes is a key quality when talking about sustainable development because the social and human community are the essence. At the same time, it is crucial that we as educators and communicators are able to reflect on and take into consideration how much children and young people can cope with knowing about the state of the world. I am very interested in stories that on the one hand deal with the big things and feelings of grief and anxiety but which on the other hand give children and young people hope and the will to change.

In spite of our difficulties with climate change, resource shortages, global crises and doomsday scenarios we have to stay in dialogue with one another and with children and young people. Narratives can easily have several levels where adults experience one thing while children and young people experience it in a different way. It can be difficult to confront children and young people with the harsh and scary realities, and we do not always seek out the confrontation because we do not have definitive answers to how we

are to handle the challenges. Still, I think we should talk about it, because who is it we are taking into consideration?

## Rounding off

In the past century, many children, young people and adults' everyday lives have become increasingly decoupled from nature. This is not least due to the urbanisation, globalisation and our industrial methods of production, and it means that we as human beings become still further removed from the resources and the environment which we depend on for survival. The earth will surely survive, but the question is whether we will make it. We know so little about the future in the long view, so we all have to be trained in examining and investigating both the seriousness of the global crises and the vision of a sustainable society. There are examples, including Skansen Hus & Have, Haver til Maver, Energy Camp and Energy Safari, which are pioneers with good results worth building on. The involvement of children and young people with a focus on the existential choice, on sensing, on the process oriented and the positive creates the balance and synergy between the good story and the bad story, which we need.

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## Key concepts

**Sustainable development:** Development that meets the needs of the present without compromising the ability of future generations to meet their own needs (the Brundtland Commission, 1987).

**Education for Sustainable Development (ESD):** A term used by e.g. the UN to denote learning processes within the field of sustainable development. ESD covers a multitude of methods and tools which are currently being developed in a range of institutions.

**Aesthetic learning processes:** Learning processes concerning sense perception involving the senses of sight, hearing, smell, taste and touch and which create the possibility of both emotional and cognitive development.

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## Study questions

How much room should the workshop take up in the educational practice?

Working with the learning theme Nature and natural phenomena demands a well-prepared educator. How would you organize a project about nature for the 0-3 year-olds? The 3-6 year-olds?

Working with sustainability makes good sense to many people. Let yourself be inspired by the text and make up your mind as to whether day-care institutions should work with

sustainability as a special focus or whether it should be a general element in the daily educational practice.

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## Literature

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## Suggestions for further reading

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## Note

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<sup>i</sup> Since 2007 The Energy Academy has offered education in sustainable development. In the beginning, the target group was primary and lower secondary school classes but today the school also targets kindergarten children, high school students and professionals at home and abroad. Energy Camp and Energy Safari collaborate with the Energy Service (Energitjenesten) and are supported by the Energy Foundation (Energifonden). Every year 2000 pupils are taught in natural science, renewable energy and sustainability, and the school's success can among other things be attributed to the focus on involving the pupils, showing them their possibilities of action and making issues of sustainability relevant to their everyday lives. The school's staff members facilitate the processes and develop ideas and visions together with the pupils. The contact with the pupils is fundamental for a good learning experience. The Energy Academy is yearly in contact with more than 10.000 people. Read more on [www.energiakademiet.dk](http://www.energiakademiet.dk).