Holistic education in perceiving nature

Experiences in agriculture lessons and botanical excursions at a Norwegian 'Living School'

Linda Jolly

In the beginning of the seventies, an expression emerged which was soon adopted widely in the entire Western world: namely, 'ecology'. Initially this term described the relationship between man and environment as well as the place where organisms live (*oikos* - Greek house). But this original meaning increasingly came to encompass the relationship between man and nature, between individual human beings and groups of human beings (social ecology). The focus of interest became directed towards the relationship between living organisms. This attention to relationships, i.e. on something prevailing between certain entities, points to a new way of looking at things, and at the same time to a shift in consciousness compared to the more traditional attitudes of earlier times, which tended to focus on individual organisms.

Teachers are often confronted with a question which is both legitimate and important, and that is: "What are you doing about ecology?" Pupils want to know what the school and the adults around them are doing in concrete terms to tackle ecological problems.
As a teacher of gardening and biology I have had ample opportunity to learn from the pupils themselves what they associate with the word 'ecology'. Ecology to them means information about environmental problems, e.g. the pollution

of air and water, etc. There is certainly no lack of awareness of this kind of 'ecology' among the pupils and one could easily be tempted to contribute even more to this type of information and awareness in the school context. Yet the multitude of catastrophic news items pouring out over our children today is apt to engender discouragement and pessimism – a fact acknowledged by many educators today. Young people long for real experiences of nature and what they want to feel is that they can do something towards saving nature. So the question must be: What can schools do to enable children to experience positive ecological actions of human beings in nature as a counterweight to all the disaster reports? How can we help the children and youth to experience nature at a deeper level and attain a better understanding of the relationships between all living organisms?
In the following I will describe two of the periods our school in Bergen, Norway, did outdoors, in the context of the lessons in agriculture in class 9, as well as the botany excursion with class 11. Both lessons aim to meet the pupils' need to experience nature for themselves and to gain some insight into the web of relationships which intimately connect our own existence with nature.
The work experience that was part of the agriculture main-lessons needed sound preparation in the classroom. After all, children should not just be sent out to work on the land without the preparation necessary to understand the manifold connections of rural life to their own modern life style. Hence, at the end of class 8, the classroom part of the agriculture lesson starts with a historical survey of the early development of agriculture (early settlement, domestication, plant cultivation, etc.), which will not be related in greater detail here.

Agriculture lesson

After the summer holidays, the pupils of the ninth class, together with a number of teachers, go to spend some time on a biodynamic farm with mixed husbandry (Skillebyholm in Järna, Sweden). The main-lesson is now continued, following on from the previous term's introduction to the history of agriculture; now the focus will be on the development of agriculture in northern regions where everything began a few thousand years later than it did in the civilisations of antiquity. As one travels through those landscapes of Norway or Sweden today which were developed and cultivated by man, it is not easy to imagine that once upon a time the great woodlands were only broken up in a few places by a mountain peak or crest, or moors in some cases. There was otherwise no open land. It was the need for pastures for domestic animals as well as arable land which led to the creation of open spaces by means of fire clearing. This type of ground clearance has been confirmed by the sampling of pollen preserved in the moors. From this we also know that the original deciduous forests were relatively poor in species – about four species per square meter. These early plant communities had to make way for pasture plants comprising 36 species per square meter. This was followed by the development of meadow plant communities comprising 42 species per square meter. Alongside the plants came also insects, small animals and birds, which found new habitats there. Here we find motifs that are of relevance to our pupils: greater wealth and variety in nature was created through the work of human hands. The great wealth and variety is still preserved in the landscapes of Scandinavia which is made up of a mosaic of woodland, pasture and arable land. However all of this is not a product which, once created, will last forever. Such land use needs continuous cultivation. Without cultivation and without domestic animals, the uniform woodlands would take over again. The pupils can see this for themselves in nature and hence also understand an important viewpoint in the present public debate around the future of agriculture in the Scandinavian countries.
Then we continue our studies of the development of agriculture in the North and learn about the way of life on the large family farms of the Viking age. An important aspect to point out here is that especially the grazing areas were worked for the

benefit of the whole community. In the Middle Ages the Cistercians played an important part in developing the cultivated landscape by draining the water-logged land, channelling rivers, terracing steep hills, planting superior tree species and introducing medicinal herbs and vegetables, and probably also fruit trees and berry bushes.
The beginnings of 'modern' agriculture can be illustrated with the introduction of the potato in the 18th century. The potato, an immigrant from the age of discovery, had been known in Norway for several generations, since 1750, before its value as a food plant was accepted around 1820. This is when harvests of four times the weight of grains were recognized as an important source of food. Then it was discovered that one could do more with the potato than merely eat the tubers. Potato schnapps became a surplus product of big farms, and thus the foundations were laid for a profit-oriented agriculture with focus on production of trade goods. The production of spirits represented the beginning of specialisation, which took the place of the earlier forms of natural and self-sufficient husbandry. When one includes the aspects of mechanisation and the influence of the Industrial Revolution, the pupils see how the first steps towards modern agriculture were taken.
Replenishing the soil through use of manure was a central task in the agriculture of the Middle Ages and it was regulated by law. The earlier Frostatings Law (about 950 A.D.) provided for application of manure in four-year-cycles. The number of animals on a unit of land was regulated by law in order to prevent soil impoverishment. Maintaining a state of balance between animals and arable land was considered essential for soil fertility.

The mineral theory of Liebig paved the way for a radical change in animal husbandry. Liebig's analysis identified three chemical substances as promoters of plant growth. Phosphorus and potassium could be produced by mining. The limiting factor was nitrogen. When it became possible after the First World War to produce nitrogen fertilizer industrially, agriculture and animal husbandry could be practised in isolation from each other. This in turn facilitated large-scale production. Thus, an ecological balance that had been maintained over several thousands of years began to erode. The pupils then learned that the introduction and increased application of artificial fertilizers led to problems in relation to animal fertility as well as to higher levels of degenerative diseases affecting cultivated plants. We see how organic farming had its origin in the problems which arose around the new methods. Working on a organic (biodynamic) farm gives the pupils an opportunity to understand in real terms what the concept of the farm as an organism, with a location-dependent state of balance between farm animals and plant production, actually entails. By now the pupils will have met all the 'inhabitants' of the farm and will have grasped the fact that its variety is the most important foundation for an ecologically sound agriculture.
The main subject in the final week of our agriculture work-experience project was the supply of food in industrialized and developing countries. Against the background of reports and articles in newspapers and magazines as well as the fundamental question of "Why do we have so much and they so little?", we study food production from a global perspective. The use of non-renewable energy resources in conventional Western agriculture is compared to the so-called primitive systems of agriculture as well as to systems of agriculture based on ecological principles. We also study the consumption of natural resources in the production of animal produce - meat, eggs, cheese and milk - which are consumed in massive quantities in the West. This was followed by a comparison with the use of resources in the context of plant-based production. We also take a look at the energy costs incurred on route from the producer via the shops to the consumer. We pay close attention to the EU-debate about the free flow of goods and prices, as well as the agricultural situation of the developing countries in their former position as

colonies and their present function as suppliers of certain raw materials, such as coffee, tea, tobacco, cotton etc. Questions of landownership, debt policy and the involvement of multinational companies are also raised in this discussion.
In spite of the fairly comprehensive study of the development and position of today's agriculture, practical work is the most important element of our stay on the farm. Tackling practical tasks in all areas of the farm production gives every pupil a real experience of working together with nature to the rhythm of the seasons.
The pupils usually worked in groups of five to six with one work leader from the farm or a pupil from our Upper School. Pupils from classes 11 or 12 or even older youths serve as good examples and encourage the younger ones to do their best. From a social point of view it is of great importance that the older pupils act as guardians for the children of class 9. In addition, some of our oldest pupils get a taste of what it is like to act as teachers.
Artistic exercises are also part of the social ecology of this enterprise. These are either in music or theatre production. At the end of our sojourn on the farm we offer the results of this artistic work to our hosts as a gest of gratitude. Practical work on the farm, evaluation of today's agriculture methods in relation to nature and joint artistic exercises combine to make the agriculture lesson a memorable experience that many pupils look back to with fondness. "This is how school should be every day" - a comment I would heartily concur with.

Botanical excursion

The main objectives of the botanical excursion with the eleventh class (age 17) are to work with nature experiences artistically and to cultivate the perceptive faculties of the senses in a systematic manner. To this end we travel to an island off the coast at a time when the flowering period is at its peak. We take with us watercolour paper and sketchbooks as well as plant identification books and magnifying glasses. We aim not just to become familiar with individual plants but also with an ancient landscape developed and cultivated by man, some of which is still preserved. Landscape as a kind of changing background scenery of our daily life is something we often barely notice. We race through the landscape by fast means of transport without becoming aware of our environment.
It is the unusual and especially strong impressions which occasionally provide us with a nature experience, such as autumnal woodlands glowing in rich colours after a frosty night or leafy trees opening up to the spring sunshine in the most tender shades of green. That is why it is necessary that we go out into nature and experience things of this kind. Only then can we appreciate the untiring work of previous generations, through which our cultivated landscape with its special composition has been created.
Our very approach to the island on the school's sailing schooner makes for an excellent start to this work. Sailing along the coast there are a lot of things to be discovered. The eye rests with pleasure on places where people still work the land and animals are put to pasture. The most beautiful and picturesque parts of the landscape can usually be found there where one sees the contrast between the open spaces created by human hands and the powerful untamed aspects of nature surrounding them. The old vicarage on the Fjelberg Island where we were to spend a week, is such a site: a little jewel in the shadow of a powerful fjell.

After arriving at the vicarage we use painting exercises as a tool to discover the landscape. We start with the meeting of light and dark (yellow and blue) on a sheet of paper. The colours are spread from opposite edges of the paper until they meet. This is a simple exercise which nevertheless can engender a feeling of discovery in relationship to our green-clad landscape. On the basis of the imaginary landscape that now appears on our painted sheets of paper, we go out into the open and paint a picture of what we see. We can see how the light of the skies meets the darkness of

the earth in the many shades of green on the horizon. A further step can be taken by practising with tones of green alone. How many nuances of green can be created in such a composition of colour? How much red is there in the green of nature? How far does green extend towards blue, red and yellow without losing its green?
Afterwards the pupils take their easels outside and paint the nuances of colour observable at the transition between woodland and meadow or between the many different types of plant that make up a hedge. In such an exercise one might experience "seeing green for the first time". Suddenly even the monotonous green of a commercial pine forest may speak a different language from the richly varied green of the neighbouring forest of leafed trees.
A blossom might stand out from the veritable sea of shades of green formed by the rounded roof of a deciduous wood as a foreign element, as something of a revelation. We come closer to that kind of experience through a painting exercise where certain areas are left blank in a 'sea' of green. Applying bright warm colours to these blank bits creates the experience of blossoms in a flowery meadow or a rhododendron hedge or even a rose bush! After all, the blossom is so different from the rest of the plant that its connection to it was not taken for granted. It was Goethe who first recognised that the entire plant is formed out of the elements of stem and leaf. He saw that the calyx and petals represented metamorphosed forms of the leaf element. In the case of yellow and blue blossoms this can be understood without undue difficulty through colour exercises. In the case of red, it is helpful to occasionally examine individual petals or single reddish tinted leaves of the remaining plant. And whoever tries to capture plants in painting will invariably find, whilst mixing his green from the basic colours, that every plant green has an admixture of red besides yellow and blue in it. In other words, the red blossom is already contained in the green of the rest of the plant in a hidden form. With this new experience in mind, we could go out again and capture our impressions in paint - for instance of a natural meadow in the midst of mountainous terrain or of a strip of vegetation along a path. This was then compared to an artificially fertilised piece of grassland. What differences in our experience of colour occur between such places?
We use also chalk and crayon in order to study particular situations. We go out into an oak wood, for example, with dark paper and white pastels. If we then find a place where the gnarled trunk of the oak tree and its branches contrast with the lighter leafy sections, or with the sky above, we have an ideal motif for reflecting on the form and character of the oak. Hatching the light areas of the motif gives prominence to the peculiar, heavy dark form of the oak. In other places we might notice how the light trunks and leaves of birch trees shine out against the darker background of the oaks - more impressions which can be captured in charcoal drawings. In this case we work with the motif by hatching the dark background and leaving blanks for the white slender stems and the tender veil of leaves. Such exercises are an opportunity to work with the relationships between the different elements of a landscape, with the relationship between colours, between light and dark. This gives a sense of something as a whole, as opposed to being fixated on an isolated object. Thus this method is appropriate to the ecological way of looking we desire to attain. In the exercise with oak and birch a familiar form engendered a new discovery through the work with the spaces in-between. After an exercise of this kind the pupils have a wholly new basis for understanding the essential character of different plants.
After a few days of working systematically, the pupils generally feel freer to find their own motifs in the surrounding landscape. It is important on such occasions to learn to perceive with the eyes and colour sense of others. For this reason we pin up our paintings every day and study them together.
The pupils are also expected to notice details and become familiar with individual plant species. Drawing with pastels can be very helpful for

learning concentrated and exact observation. Every pupil is supposed to draw up to twelve different plants. This also involved detailed drawings of different leaf shapes as well as sketches of flower configurations. Only after drawing several plants did we start using identification keys and discussing scientific classifications. Leaf metamorphosis is a further subject of study. The leaf shapes emerge best when painted black on white paper. The spectrum of variation resulting from each pupil's series of leaves from a plant of their choice provides a good basis for discussing common 'themes', i.e. what principals of development are found in all plants.

Through drawing plants we can discover a "wholeness" of expression with which we can recognize other closely related plants in the same family. This is preferable to concentrating on outer details which are often misleading. The pupils discover that rhythm, balance and harmony inherent in the world of plants can speak as evocatively as poetry. Auguste Rodin expressed it like this: "It is the artist who is truly familiar with Nature. The blossom engages him in a dialogue through the graceful curve of its stems and the harmonious play of its colours. Each blossom has an inner word bestowed upon it by Nature."

In conversation the pupils can also practice perceiving one another whilst practising plant perception. We start off by studying a certain plant together and go on to discuss the drawings we have pinned up. Now we discover how difficult it is to attain a sober and objective view when the imagination takes over. Others find a certain inner resistance to entering into the flow of movement and colour. The pupils help each other to overcome their one-sidedness and note their own progress from day to day.

At first, many scientifically inclined pupils may display a certain amount of anxiety and scepticism when faced with the task of practising a natural science discipline in this manner. But the joy of discovery, as well as the feedback provided by artistic activity, invariably results in a positive working mood. The workday is frequently a lot longer here than an ordinary school day, but the pupils take this for granted. Their responses speak for themselves. On returning to school we arrange all our work in an exhibition which enables the younger pupils to share in what the older ones have been engaged in.

Ecology has something to do with the relationship between things in living contexts - with relationships between organism in the landscape, between organs in the human body, between people working together. Our excursions with classes 9 and 11 made it possible for the pupils to become conscious of a positive and constructive relationship between man and nature. However, the whole enterprise is only successful when there is a real working together between the individual pupils as well as between pupils and teachers.

The class 9 pupils grew through the work they carried out together with their teachers. They discovered that the well being of nature is something for which adults, too, are willing to sweat. The pupils from class 11 appreciated a way of working together which involved their natural science teacher in the same amount of effort in producing drawings and paintings, and where art teachers, too, had to struggle with Latin terms and identification keys.□

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