

# With and about

# our senses

# in the nature



# Working outdoors and subject-integrated with and about our senses



#### Project part-financed by the European Union

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#### Preface

Learning indoors is often done only with the sight and the hearing senses. Besides, these two senses are not utilised as much as they could have been. The sight is most often used to watch one-dimensional texts and pictures and the hearing is used to listen to facts that someone else has discovered. We must give our children the opportunity of having firsthand experiences and not only being reduced to other people's written experiences.

The purpose with this chapter is to show that there is a way to work outdoors using all our senses when learning more about ours and other animal's senses, and at the same time integrating various school subjects. An inevitable positive side effect of being outdoors and using all our senses is that it is an experience, which in turn gives knowledge about our surrounding world. That physical activity is integrated automatically by moving the education outdoors is a positive bonus.



#### Stinging nettle

The stinging nettle is one of few plants that students recognise. Is that because the schoolbook has an extra extensive chapter about this plant?

#### What does the curriculum Lpo 94 state...

The school work should include and emphasise the intellectual aspects as well as the practical and artistic aspects, and those aspects pertaining to the senses. The students should be able to experience different expressions of knowledge. They should be able to test and develop different forms of expressions and experience feelings and emotions.

#### ...about biology?

The goal that the students should have reached at the end of the fifth school year concerning biology:

- To have knowledge about important organs and their function in the body

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#### Create in clay

- Let the students touch and feel different nature objects, maybe wearing blindfold. The students will thereafter use clay to shape these nature objects.
- Work in pairs and let each pair have some nature objects in front of them. One of the students holds an object and describes with words how it feels and which shape it has. The other one, who is listening and is blindfolded, will at the same time form the object using clay, and thereafter guess which object was created. Another way to do this is that both students of the pair form their clay object at the same time and then guess what the other one has made.
- Create bouquets of sense. Let the students fetch five nature objects each, one for each sense. Make a bouquet or a work of art by sticking the objects into a lump of clay.

#### Blind in school

Let the students do different assignments when they are blindfolded. Start in the classroom, continue outside the classroom and then out on the schoolyard. They can walk to the reception and fetch something, or walk from the classroom to the sports hall.

#### The worm

Make a ring (about 15 cm in diameter), for example of lemon syrup, on a table. Put a worm in the middle – how does the worm react when it touches the ring? Put some water on the worm now and then for it not to dry out. Try other liquids, such as sugar water. The worm reacts on the liquids' pH values and they feel comfortable when it is close to neutral, around pH 7. Compare how many worms there are in a forest with hardwood trees (deciduous) to a forest of softwood trees (coniferous). The coniferous forest's earth is much sourer than the deciduous forest. Compare how fast the needles and the leaves are decomposed.

#### Divide into groups

By dividing the students into groups, the children who usually do not interact with others will thus get an opportunity to cooperate. Use the sense of hearing when dividing into groups, i.e. use tins (as many as the number of students) containing various nature objects. If it is suitable to divide the class into 5 groups with 5 students in each group, then fill 5 containers with sand, 5 with small stones, 5 with acorn, 5 with rowanberry and 5 with lichen or whatever is available. Let the students shake the tins and listen to each other's tins. Those with similar objects will form a group.

# One day outdoors with all the senses

#### **Gathering and introduction**

The class is gathered outdoors and after introduction of schedule and practical details, we usually start talking about the senses of various animals. The elk's big nose, turnable ears and 'parabolic horns' are examples on what can be discussed before the walk. At this moment we also distribute magnifying glasses to hang around our necks during the rest of the day.



We usually show the elk's ears; the students cup their hands in front and behind their ears to be able to compare.



The magnifying glass hangs around the neck all day long for the students to quickly use their sight and look at anything exciting they may find.

	1 0
8.30	Gathering and introduction
9.00	Walk
9.30	Break
10.00	The path of senses, the wild animal game
11.15	Gathering
11.30	Lunch
12.15	The rope and the colours of nature
13.00	Conclusion with evaluation

Example of agenda



The blindfold is often used when we want to use other senses rather than our sight.

#### The walk

Taking a walk with the students is important to make them 'come to place' and become more aware. We stop nearby a rock which is covered by lichen. The students look through their magnifying glasses and tell us what they have seen. At this point we usually get many imaginative answers. When we ask how many of them have seen the hill, most of them raise their hands. They get confused when we say that they have not seen the hill at all, because it is covered by loads of lichen. Later during the walk, they will find out what lichen is by using their senses.

At the next stop the students work in pairs. One student is blindfolded and the other one leads the classmate towards a tree. It is OK to go round and spin a bit. At the tree the blindfolded student touches the tree to feel the surface and how big it is. The student who can see leads the classmate to the original place and the task is now to find



#### the tree.

First show how to do it with someone who volunteers.

To use the sense of taste, stop at a tree with bitter lichen. It is easy to recognise, it looks a bit like powdered sugar. Let the students taste and describe the taste. Tell them that they have tasted lichen.

Before next stop we pick some lichen that has fallen on the ground. We crush it in our hands (wet it if it is too dry). When all the students have smelled it, they tell us what it reminds them of (no one should say anything before everyone has smelled). Most students think it smells mushroom. When all of us have smelled, tasted and watched different kinds of lichen we explain what lichen is. The walk ends with a coffee break.



The bitter lichen is very bitter.



#### Lichen

Lichen is alga and mushroom living together as being <u>one</u> organism. They live in mutual symbiosis which means that both parties gain from the cooperation. The mushroom gets part of the sugar that the alga produces through the sun, and in turn the alga gets a protected place with access to water.

Signs of the senses along the path of senses.

#### The path of senses

While the students are having break we place signs of the senses on some paths. Thereafter the students walk (not run) along the path, one by one, and discover different things with their senses. At the *eye* sign the students look in their magnifying glasses and at the *nose* sign they close their eyes and smell the scents around the sign. The *ear* invites the students to stop, close their eyes and to listen. The *mouth* is placed close to something you can taste, e.g. bitter lichen or blueberry leaves. At the *hand* sign the students can feel what is there, e.g. a thorn bush or acorn placed in a hole in a tree. The students are usually very impatient before it is their turn to walk along the paths, they even want to run. While waiting, they can guess the scent from different cans that we brought with us in our pockets. Returned from the path of sense the students describe what they have experienced. We help them remembering which signs they have passed.

5











On the path of sense there may be a rotten trunk and/or a birdhouse where the entrances haves been made bigger for the students to put their hands inside to feel what is there.

#### **Predator and prey**

Returned from the path of sense the students form a circle. One student should act like a predator and three students act preys. We put jingles on the students' ankles. Different sizes

of jingles give different sounds, distinguishing the preys, and the biggest jingle is tied on the predator. Everyone is blindfolded, and the predator should catch the preys. If they get close to the circle you knock their shoulder twice so they know where the border is, which can be the end of the forest. The students who are forming the circle are watching the different strategies that the predator and the preys are using. Sometimes they sneak, stand still and listen, make sudden attacks, etc. Let the predator catch the preys until there are no one left. Make it difficult for the predator by approving only the catch of one specific prey. Facilitate by reducing the circle. The students may decide which animals they should be or it is already decided at the beginning; e.g. a fox, a deer, a hare, a field mouse, etc. It is important that those who form the circle are quiet so the jingles can be heard (although it is difficult not to laugh!) This game is most suited for grade 3 and upwards (and for adults) and it is described in the book *Sharing nature with Children* by Joseph Cornell.



The jingle on the predator's ankle



#### The rope

At lunch break we tie a 250 meter long rope on a height of one meter in the forest (plastic wash rope is good). The students should walk along the rope blindfolded. They walk one by one with a space in between to avoid queues but anyone catching up on the others can pass. Afterwards we discuss how it feels to be blind. Did anyone have a sixth sense, or as a student expressed; "the-intuition-sense"?

If you want to use the rope several times you can also tie different objects on the rope or tie the rope close to the ground so that the students can touch different objects.

#### The colours of nature

Since the whole class cannot walk along the rope, the rest of the class practices something else in the meantime. Working in pairs, the students get a sheet of paper with a sandpaper strip glued on top. The task is to find as many colours as possible by scratching different nature objects on the sandpaper. No pens are needed but some students like to write down what



they have scratched. As comparison this can be done both during the spring and the autumn.

# Follow-up work

#### Path of sense 1

The groups can make their own paths of sense to each other. The visiting group either follows the signs or is guided and gets oral instructions by the group that made the path.

#### Path of sense 2

Sitting in a place in the nature all by oneself can be a very special experience. As a first step in daring to be alone, younger students can be stationed along a path. They can sit there, on a sitting pad, for five minutes (suitable time for the students). By doing this during several occasions (different seasons) the time can be extended from one occasion to another. The students may also get tasks to do; they can for example memorise all sounds they have heard. This may also give them a foundation to "my year with all my senses".

#### Path of sense 3

This type may be good for older students. Follow the students to the forest and station them one by one. All students are placed so that they can see the one in front of them. After fifteen minutes the first student starts walking towards the second student, and the second starts walking towards the third one, etc. Finally all are gathered where the last student is stationed.

#### **Buffet of senses**

In cooperation with the domestic sciences' teacher, the students may set a table outdoors with objects from the nature. Set a table with a meal that tempts all the senses and enjoy the meal, maybe wearing blindfolds. Let the students eat fruit salad wearing blindfolds, and let them guess which fruits are in the salad.

# more activities of sense

# **Outdoor activities and games**

#### The drum in the forest

Tell the students a story: That they lived in a village long time ago and they have just been visiting a neighboring village and are on their way home. But they have been delayed, maybe because of bad weather. They have to go home even though it is already night. Put blindfolds on the students and continue telling the story: Their chief is still in their village beating the big drum. By listening to the sound of the drum, the students should now walk back to their village. It is important that they cooperate so that no one is left behind.

#### Walking in the night

There are few moments when our senses are so undisturbed by other impressions as when you are out in the forest in the middle of the night. There are few cars and the wind often slackens in the evening. Not many students have been out in the forest during the night. Prepare a fire at the camp when the students get there. Around the fire you can tell stories or discuss relevant issues. With younger students it may be enough to stay in a familiar copse late in the afternoon during the dark season.

#### The sneaking game

A smaller group stands in a wide circle. One student stands in the middle, wearing blindfold and with a cap on the head. The others are getting closer, sneaking, to steal the cap. The student in the middle is pointing at those who are sneaking by carefully listening to the sounds. The person, who is pointed at, must then return to the circle. The person who takes the cap will be the next to be in the middle.

#### The photographer game

The students work in pairs. One is closing the eyes and pretends to be a camera while

the other one is the photographer. The 'photographer' leads the 'camera' to a place in the forest or on the schoolyard. When they have stopped, the 'photographer' presses the 'camera', e.g. on the nose. Immediately the 'camera' opens the eyes very quickly and closes them as quickly. Move to another place and repeat the exercise. Return to the first place. The student who is the camera should try to move to the spots where the 'photos' have been taken. Change roles.



# Handicrafts and techniques

#### Instruments

Make your own instruments using materials from the nature. For example, you can whistle with the hat of an acorn by holding the hat between the forefinger and the middle finger. Blow hard with the lips against the knuckles. With a triangle of maple leaves it is possible to whistle more discreetly. Make a triangle by tearing the leave by the fibers. The point of the triangle (the area of the stalk) should be put inwards on your tongue with the fibers downwards. Keep the tongue against the palate and make a strong lisp sound; ssssssssss. Before you know the technique well you will spit and drivel a lot.





#### Make scent traps

During the night most insects use the sense of smell to reach their food or a partner. Which insects can you catch with the help of different smells? Make traps and put different scents there. Keep the traps out overnight and examine the day after. Who managed to catch most insects and which scents were most useful? Examples of things that smell strongly are cheese, turpentine and fermented fruits.

#### To dye yarn

Simmer non-coloured wool yarn together with alum. Estimate 25 g alum for 100 g yarn. Rinse and dry the yarn. Being outdoors, the students should collect nature objects that they believe will colour the yarn. Make one or several fires. Every student or group puts nature objects together with a piece of yarn in a tin filled with water. Boil on top of the open fire for fifteen minutes to one hour. Different plants, and lichen and mushrooms make different colours.



#### Make paper

Make pulp traditionally using old newspapers. Add nature materials in the pulp, such as flowers and grass, cinnamon, wild rosemary or other plants that tickles the senses. Christmas cards made by own paper with scent of cloves and coloured by saffron (or turmeric, which is cheaper).

#### Tips

Make your own Christmas cards with scents. Patch some glue on the card and flavour it with e.g. cinnamon, clove or ginger. Or create a Christmas card with figures of whole clove, cinnamon or whatever you like.

## **Pictures and music**

#### The rainbow on a piece of white cloth

Divide the class into groups. Each group gets a piece of white cloth and the task is to collect leaves. The students put the leaves on the white cloth in a range of colours as a rainbow. Naturally the exercise is most easy to do in autumn when there are red, yellow and orange colours, but also later in the autumn with different brown tones or earlier with different green tones. Take photos of the leaves with a digital camera or perpetuate them in another way.



#### The orchestra of senses

Make an orchestra with the instruments that you made of nature materials. Hold a concert to the parents on a day when fixing up the schoolyard or on a picnic.

## Swedish using the senses

#### The square of senses

The students use for example a two meter long rope to enclose an area in the nature. Describe the area using the sense of sight. Which adjectives did you use in the description? Wear a blindfold and experience your area again. Which adjectives did you use this time?

#### Fruits and vegetable Swedish

Put some fruits and vegetables on a piece of cloth. Put also small pieces of the same kinds of vegetables and fruits in bowls. Without looking the students should now taste the small pieces and guess which fruits/vegetables they are by touching those on the cloth. This can be done also with wild plants if the teacher has knowledge about what is edible or not.

#### Sense poetry

*Haiku* is a Japanese type of poetry consisting of three lines with five, seven and seven syllables on each row respectively.

"very cold gray stones	(5)
the very soft greenish moss	(7)
the brown earth smelling of spring"	(7)

*Cinquain* is a syllable poem with five lines, where each line expresses something special (it derives from the French word for 'five').

- 1: The title with two syllables
- 2: Description of the title with four syllables
- 3: Description of an action with six syllables
- 4: Description of a feeling with eight syllables
- 5: Another word of the title with two syllables

"The glade	(2)
Light and blooming	(4)
Smelling a violet	(6)
Happy from tasteful red berries	(8)
The copse"	(2)

#### My year with all the senses

A copying support is included at the end of this chapter for the purpose of making a small 'sense' folder consisting of 8 A5 size pages. The idea is that every student should be able to use this folder for a whole year, either by planning outdoor days or in connection to another outdoor activity. The most important is that the student will have the chance to experience all

four seasons using their senses. A good idea is to return to exactly the same place in the nature to see the differences between the seasons more clearly. Each student can mark their spot by tying a piece of yarn or rope on a branch, or make a map of the area with the different spots marked. The students can write, draw, take photos, and collect nature objects and other things that will illustrate the experiences of nature. For some students it may not be enough with this small folder if the creativity is excessive, but it can be used as a basis for further education.



## **English using the senses**

#### Sense poetry

Let the students sit in the forest, preferably during spring, and write poems about the moment. Using English they can describe what they feel with the senses. Write with and without rhymes (see below).

I can feel the warm sun and hear the ants run It smells like spring and I can se a fluttering wing

#### Verbs, nouns and adjectives

Let the students lie on their back in the nature. When they gather again they should use three words describing what they have experienced with their senses. It must be a verb, a noun and an adjective. Let the students make sentences including the three words. Say the sentences loudly in front of the class or in smaller groups.

- Moving
- Trees
- Warm

A warm breeze is moving the leaves in the trees.

#### **Chasing words**

Working in groups the students should look for English words, either on the schoolyard or in the nature. Look for verbs, adjectives and nouns. Write all the collected words, both English and Swedish, for example on the board in the classroom. The Swedish words are translated into English. The groups can now give assignments to each other using the words, e.g. "Run to a small tree with green needles and jump three rounds around it while singing a Christmas song".

#### Sense assignment

Prepare some assignments on notes, which are put up either in a copse or on the schoolyard. The notes may also be placed in a box from where the students pick their assignments. The assignments may be generally written or adjusted for a specific area. Example of an assignment in a familiar area:

Walk down to the big birch and turn left. Walk straight ahead and when a tree stops you; look at the leaves (or buds) and feel it with your hands. Go back to your teacher and describe the leaves with words and hands.

**Tips for discussion** How would the society be if all people were blind? Write a story about a day in such a world.

### Mathematics using the senses

#### **Geometrical back-figures**

Working in pairs the students can make geometrical figures on each other's backs. Change places when the correct figure is guessed. This can also be done with numbers.



#### Geometrical dud

Working in groups on a large lawn the students make big geometrical figures with e.g. 10 meter long ropes and pegs in the corners. The task is to visit each other's figures wearing blindfolds. You can either touch with your hand or your foot. When everybody in the group has touched the figure they all guess which geometrical figure it is. Try also with numbers or other symbols. To avoid making the figure visible when the students are getting there, they can walk the "millipede".

#### **Smell mathematics**

Let the students work in pairs. Each pair should have 12 tins (e.g. small photo containers). Fill the tins with different objects that smell. Write down a number for each scent, e.g. 1 = cinnamon, 2 = white pepper, 3 = honey, 4 = mustard, 5 = thyme, 6 = oregano, 7 = coffee, 8 = tea, 9 = orange, 0 = curry. Make turns by giving each other different tasks, e.g. coffee + orange = 16 or oregano x mustard = 24. One student who is wearing a blindfold guesses the answer. The other student holds the results and replies "correct" or "wrong" using a tin containing nice smell or bad smell. To make it more difficult the calculation methods can also be defined as scents (or add sound or taste symbolising the calculation methods).

#### The mathematic rope

Put up a long rope in the forest or on the schoolyard (see title; The rope). Tie numbers (made of wood or plastic) or different numbers of clothes pegs evenly on the rope. Define which calculation methods to be used or put them also on the rope. The students wear blindfolds and walk along the rope, touch the numbers or clothes pegs and calculate the sum. Make a test by putting geometrical figures along the rope. When the students return, show them pictures of geometrical figures and ask them which ones they met along the way.



#### **Catch geometrical figures**

Use a camera when catching geometrical figures outdoors. Start in the schoolyard and then continue in the nature. This is a very good exercise concerning the children's comprehension of room. They can move around different types of objects and take photos in different angles to find the geometrical figures. The camera can catch both big and small shapes. Use macro adjustment on the camera to discover the very smallest figures in the nature.







# The Senses in Nature

#### Sense of Smell

*The stinging mosquito's* sense of smell is very important for it to be able to smell where to find nectar, fruits and berries. The male mosquito lives on fruit juice his whole life while the female lives on blood when she approaches the breeding. The mosquitoes use small outgrowths on the antennas to smell. The outgrowth can catch single molecules. The female mosquito flies towards an increased

concentration of molecules and thereby gets her victims.

*Butterflies* only need five molecules to be able to feel scents, while the human beings need several millions. Besides, people's organ of smell only functions during inhale. Research is ongoing about butterflies' organ of smell. This knowledge could be used to create artificial noses that can even smell land mines for example.

*The elk's* nose is 200 times larger than the human's. During the female's heat, the male elk can use his"extra nose", which is placed in the palate.

#### Sense of Hearing

*The owls* do not have any outer ears and their ears are concealed under the feathers. When it is totally dark outside, some owls use their ears to locate their prey. Their faces are parabolic shaped to be able to catch sounds. Many owls do not even have symmetrical ears. One ear is placed higher than the other. The sound from the prey does not come to both ears at the same time - a "stereo effect" rises – and that helps the owl to determine where the prey is located.

*The stinging mosquito* uses the long bristle on the antennas to hear. The male mosquitoes' bristle is much bigger than the female's. With help from the good hearing, the male mosquito can determine whether the humming from the female comes from the right mosquito species, which is vital for the mating to succeed.

*The elk's* ears are 60 times larger than the human's. Besides, the ears are turnable for the elk to be able to listen both straight ahead and backwards. The male elk also uses the big horns to direct the sound to the ears.

*Spiders* listen to their environment using the hair on their legs. The hair catches the sound from an approaching insect and helps the spiders to catch their preys.



#### Sense of Sight

The eyes of birds are bigger than the brain and the sight is the most important sense for the bird.

*The owl* has eyes on the front of the head, almost like a human, but they can only turn their eyes two degrees while humans can turn their eyes 100 degrees. On the other hand, the owls can turn their head all the way around, so the eyes are on top of the neck.

*The woodcock* has, unlike the owl, the eyes placed on the sides of the head. They can see both straight ahead and backwards without turning their head. For a bird of prey the most



important is to see straight ahead and to judge distances, while a bird that risks becoming prey to a bird of prey needs a wider range of sight to discover enemies.

Insects have compound eyes. Each compound eye is like a pixel in a digital camera and together those compounds form a picture that the insect sees. Therefore insects see a general picture of the environment just like we do. The compounds can be compared to our cones

which are placed on the inside of our eyes. *Mosquitoes* (and flies) have a kind of compound eyes built-up by light sensitive cell bundles, among insects they are the only species with this. Using the eyes, the mosquitoes can get a general picture of objects that are very close. The eyes cover a big area of the back of the head and therefore they can see in all directions. Sting mosquitoes are good in differing between dark and light things and are particularly drawn to the dark.

*Spiders* have, like humans, eyes with lenses and retinas, which functions as a camera. Usually spiders



have eight eyes. Some of the eyes see details, while the other eyes register movements.

#### Sense of Taste

Humans have thousands of taste buds on the tongue while birds have less than hundred. An old saying from nineteenth century is that the tongue is divided into different taste areas, e.g. sour and salt. Now we know that we have the various tastes all over the tongue.

*The cod fish* and the European catfish use the barb to taste the bottom of the sea when searching for food. The taste buds on the barb register the taste of different small bugs living on the bottom.

*Flies* walking on your plate do that to feel the taste of your food. The fact is, they feel the tastes using the legs.

#### **Sense of Tactile**

*The common snipe* is a shore bird that has a very sensitive bill. Since they eat insects living hidden in the dune, they cannot use their eyes. Instead they use their long bill as tactile organ. The tip of the bill is movable and consists of tactile bodies helping the bird to feel the insects in the dune.

The brush-like outgrowth on the body of the *stinging mosquito* is the tactile organ that feels warmth, wind and humidity.

*Bees* adjust their speed when they are flying by feeling how much the antennas are bent backwards by the wind. If they are bent too much, the bees know it is time to slow down.

Sources to the senses in nature: Sveriges Natur 4/04 Sveriges Natur 5/04 Fåglar, Fakta i närbild, Bonnier Carlsen 2002 Stickmyggornas liv, Christine Dahl, Universitetstryckeriet Uppsala 2002 www.biol.lu.se/zoofysiol/svar

Tips of litterature: Joseph Cornell, Sharing nature with children My best memory from the year

8



# My year with all the senses $\sqrt[3]{2}$

Name:

My scents		My poem		
Spring	Summer		Spring	Summer
		-		Winter
Autumn	Winter		Autumn	Winter
2		10		7
2	•	18		1

# What I felt against my skin

# What I saw from my spot

Spring	Summer		Spring	Summer
Autumn	Winter		Autumn	Winter
6		19		3

My tastes		What I heard when I closed my eyes			
Spring	Summer	Spring	I	Summer	
Autumn	Winter	Autur	nn	Winter	
4	•	20	ち		