Breath, Air in Motion (ages 3 - 4)

Possible Sequence Procedure		
Sessions	**Language Activities**	**Knowledge and know-how put to work**
Introduction Several sessions to put to work various means of moving objects and types of matter.	Putting words on objects and actions.	Exercising the body; exercising the imagination.
Active Discovery Session 1. Producing effects with air in motion.	– Using increasingly precise vocabulary. – Expressing success and difficulties.	– Controlling breathing . – Sorting instruments according to their effectiveness
Session 2. Making objects move through controlled breathing.	– Enriching others' suggestions with one's own ideas. – Using accurate vocabulary: I inhale, I blow and it moves...	Controlling parameters (way of breathing, direction of breath, breathing in).
Session 3. Transporting or moving.	Substantiating one's choices ("because...").	– Redeploying the control gained. – Completing a finalised action. – Being more specific in stating a problem.
Session 4. Choosing effective blowing instruments.	– Being able to say that one "moves air" by blowing out or breathing in. – Exchanging about the links between causes and effects.	– Differentiating and sorting instrument according to their effectiveness. – Establish a tie between the effects achieved using human breath and those achieved with instruments. – Recognise the similarity in effect of wind, breath and blowing instruments.
Going further Redeploy previous knowledge and know-how, stabilise lessons learned.	Redeploy previous vocabulary by making suggestions.	Transpose the proficiency developed by adjusting to new situations.
Materials In this sequence, the materials required are water pumps, fans, pieces of cardboard, scarves, straws, stiff tubes, flexible plastic tubes, inflators, bellows, clothespins, papers of varying thickness and shape (very large confetti, candy wrappers, tissue paper, etc.), feathers, recipients, small plats, flexible flasks, a water tank, model sailboats, paper windmills, tinsel, doll clothing, ribbons, paper filaments, raffia cloth... as well as, possibly, what the teacher deems suitable and beneficial.		

The Introduction Stage

By making use of the child's immediate environment and the activities carried out in different areas, the awareness-raising stage gradually prepares the children to broach topics in "learning about the world".

The Body as a Means of Action and Expression – "The Movers"

The children will move objects on the ground, through a set course.

Tennis balls, hockey pucks, rings, scarves and feathers are moved using hockey sticks, rackets and sticks, but also with straws, flexible or stiff tubes, fans and bellows.

This activity enables the students to:

– realise that there exist different ways of moving an object, some using the body and others not (hand, foot, breath, etc.);

– become aware that specific "tools" can be used to replace actions performed by the body, and that they can adjust in order to successfully move an object, by handling the "tools", and watching how they work;

– compare actions and effects, and action-effect relationships.

Blowing out, Breathing in and Observing the Effects Achieved

This activity helps guide the children toward differentiating between breathing in and breathing out; this will be discussed again later.

The activity consists of:

– breathing in, to attract small papers to the straw, or blow on them to move and scatter them around;

– breathing in water (drinking) and blowing into water (making bubbles).

Figure 1. Blowing ink as a drawing technique.

Later, the teacher may add inks, glitter, sand to divide up the colour stains, different materials, and scatter them around or mix them up. The movements, effects and precautionary measures required to remain on the backdrop will be mentioned in the assessment.

Note – Pay very close attention to safety; ink or other products that may be inhaled and thus swallowed shall not be given out unless it has been ascertained that the children have developed enough control over their breathing and movements; even then, measures shall be taken to ensure that the products provided to them are not hazardous. Possible materials include semolina, rice, sugar, salt, cloves, flour, powdered chocolate, alphabet pasta, etc., rather than sand, and syrups (mint, grenadine, etc.), rather than ink, even though the marks they leave, in this case, will not be as easy to discern.

Through this initial observation stage, the children will be able to see that the same effect can be the result of several different causes. Lessons may be enriched by reading picture books and documents.

The Active Discovery Stage

The active discovery stage will be structured around five workshops spanning several sessions, so that each student can take part in most of them, each participating in one workshop per session. One from session to the next, the workshops are nearly identical, but the teacher brings in new directions, in line with the objectives to be attained: the students enter the day's workshop with the lessons they personally learned in the previous workshops and the group learning resulting from classroom work. The teacher always guides the same workshop, from one session to the next.

The objective is to learn about different parameters (how to breathe, air direction, the ability to inhale), verify them and study their effects.

Each session can be organised in several stages:

– at the beginning, the students discuss what was done or observed in their immediate environment during an in-school activity. They attempt to take inventory of the materials offered and suggest ideas for actions to come;

– then, it is time for the activity itself. The teacher explains how the workshops will be organised, research launched, and hands-on activities adjusted to the lessons to be learned, experiments attempted and work instructions;

– group time is the opportunity to hear personal accounts, share impressions and report results;

– in conclusion, the records will be put together into a meaningful format, from drawings to photos, audio recordings, notes taken by the teacher (who will write and reword if necessary, with the children's agreement on the final wording), as a first draft of the final report.

Out of the five workshops, one is directed by the teacher, another is semi-independent (supervised by ATSEM), and three are independent. During the four sessions, the teacher guides the same workshop, making it possible for him to build over time, with all of the students and gradually, the stages through which the children will build their knowledge and know-how. The guided workshop is a special place for language learning, thinking and work on attitudes. In this sequence, Workshop 2 was chosen, as it brings the students to identify and put to work the full range of parameters. Interaction with the teacher is vital in helping them word and reword their suggestions.

Session 1: Producing Effects with Air in Motion

The French game "Flying Pigeon" introduces group questioning. That day, only objects in the immediate surroundings are listed: pencils, scissors, cotton balls, scarves, candy wrappers, rubber bags, gardener's hats, hair, etc.

The players list their choice, "can fly" or "cannot fly", acting out the take-off with their hands. Opinions diverge. Debate can begin.

The Workshops

The introduction is both "group time" and an announcement of who will participate in each workshop.

– Workshop 1. Breathing in with a straw to pick up light objects (semi-independent workshop):

Each child is given a straw. The teacher asks, "Can you say what the purpose of this straw is?" The answer comes immediately: "It's for drinking." Several students act out breathing in. The teacher asks for the word that describes the action just viewed; there are no answers yet. He then suggests that the children "act like they are drinking" to pick up the small pieces of papers placed on a plate; the papers can be of different sizes, materials, etc., in order to bring about an adjustment.

– Workshop 2.

Blowing out to move objects as though in a gym (guided workshop): the teacher uses the song "Blow Wind Blow" and states that the children must try to reproduce the effects of the wind on a number of small objects set at a starting line at one end of the table. The experiment involves moving the objects to the starting line without touching them.

The teachers refers back to the games played in the gym: "Remember when we pretended we were movers."

Several of the children blow into their hands, while others test instruments to produce air.

Figure 2. Teacher demonstrating how to blow.

– Workshop 3. Blowing out to move model sailboats over water: the teacher states that the boats are not to be touched with the hands: "Use your breath or instruments to move them along".

– Workshop 4. Moving lightweight materials without touching them: the teacher suggest lightweight materials, like crepe, ribbons, paper filaments, tinsel and even pinned up dolls clothing "which are drying for pretend"... "As though all of the objects were outside, in the wind!"

– Workshop 5. Blowing out to make paper windmills turn: several windmill shapes are available to the students.

Student Observations

In the independent workshops, activity begins immediately. In the two others, the adult briefly reviews the introduction, then guides the actions, triggering reactions of all kinds: hesitation, clumsiness, curiosity, hurriedness, dodging, new experiences, progress, etc.

In Workshop 1, the lack of proficiency is an issue: the children do not have an easy time blowing out and breathing in at will. Coordination is unstable and there are some surprises. Some children are unable to change the direction of their breath without a great deal of hesitation and repeated failure. There are unintentional movements, and children blow when they are supposed to inhale, and vice versa.

In Workshop 2, several children have trouble. They have poor control over their breathing. They "splatter" saliva. The feathers remain stuck to the table (maintained there by the children's breath or weighed down by saliva). One student is particularly comfortable. He tests the various instruments and objects, repeats his tests, chooses and object and practices using each instrument. His actions carry him away form the game itself, yet in the end, he states that all of the objects can "stay the course". The other children discard instruments that seem ineffective and repeat their experimentation several times with those that "work".

In Workshop 3, the boats move, turn around and sail forward. Rather than staying with the boats, by walking around the tank with them, the children pull the objects back toward them, then blow again to push them away. By using the straw, then the flexible tube, one child breathes into the water, under the boat. The effect is awesome and immediately copied by the others.

In Workshops 4 and 5, after blowing out through the mouth, the children move objects around by taking them either by one end (materials) or by the handle (objects). They achieve comparable effects, except with the paper windmills. With the latter, one student attempts to blow through the end of the handle.

Group Time

The independent workshops are summed up through demonstrations before the entire class.

A number of experiments are repeated. The teacher comments on the movements used and calls on the group of students in the matching workshop to complete the report.

Once the session has ended, it sometimes happens that the target concepts (varying the intensity and direction of air) have not been formally named.

The students generally discard the ineffective instruments. They still see the process more as a game than a form of research, though this does not prevent them from experimenting or testing.

To enter the field of science, the teacher can ask what the students observed in relation with the initial objectives: breathing in, blowing out, taking action on objects.

Figure 3. Moving objects in different ways.

Student observations

Example, in Workshop 2. Blowing out to move objects as if in the gymnasium.

The teacher: What did you use to move the feather?

The student: The cardboard, then the hand pump, too...

The teacher: How did you use the pump?

Another student: I pressed very hard on it and the feather flew up.

By asking questions about how an object is used, the teacher guides the student toward fine-tuning his expression.

The aim is that the children express cause-effect relationships. Their vocabulary is increasingly precise. A student states that he inhaled. Another adds that he can blow. Another states that "all of the objects move forward, but only with the straw".

The teacher-assisted workshop gives rise to a written statement, displayed on a poster. The experiment account is repeated orally, with the most descriptive statements transcribed very legibly by the teacher, in front of the whole class.

The title of the workshop, date and authors' names are listed. The documents will be used in the following session.

Session 2: Moving Objects by Controlling One's Breath

The session begins with a reprise of the children's song, "Blow Wind Blow". Then, a straw is handed to each student. The action is repeated. This is the time for a vocabulary review: breathing in, blowing out.

The Workshops

– Workshop 1. Breathing in through a straw to move lightweight objects: the text produced as an assessment of the previous session is read and the purpose of the activity is now to control breathing in order to hold the papers for a relatively long time.

The usual recommendations apply here, namely that everyone needs to abide by basic safety and hygiene rules.

Comments are made by the children regarding the straw's relative fragility.

A student shows how he managed during the previous session.

The more hesitant children are encouraged to take part, hands-on: "We pretended to drink... we sucked up the object..."

Figure 4. breathing in to move objects.

– Workshop 2. Blowing out to move objects on a table, taking into account the results from the previous session: new participants will repeat, more or less, the same experiments to confirm the effectiveness of the various instruments. The chart listing the information dictated during the first session is shown and read out loud, and the student who wrote the text confirms the information. He gives further information about his "finds" in terms of how to direct breathing. Some children ask to "race".

– Workshop 3. Blowing out to move model sailboats without sinking them: the teacher asks, "How can we make sure the boats continue to move forward without sinking?" and adds: "I am counting on you to find ideas. The models are fragile."

– Workshop 4. Moving lightweight materials using only breath: most of the objects suggested are the same as those from the previous session. The children are asked not to move them around and to use only their breath.

– Workshop 5. Make the windmills turn by controlling breath direction and intensity: the instructions will be more specific, to invite the students to focus on the desired parameters.

Group Time

Once the activities are completed, personal accounts, remarks and descriptions help bring out conclusions: for example, one student confirms that the straw and plastic tube "work bests in the race, because all of the objects move with them".

The two texts produced the previous time are brought out again and enhanced based on the newly-gained knowledge. A summary of the session offers the opportunity to confirm that the children are well on their way to controlling how they breathe out and in, and direct air.

Figure 5. Making use of the written records.

Session 3: Transporting or Moving

By singing the song, "Gently, Little Boat", the teacher launches questions about the effects of wind. The discussion closes with the cause-effect relationship summarised hereafter: "To move forward, a sailboat needs wind, just as our models need air".

The Workshops

The instructions from the previous Workshop 1 have changed. Now, the aim is to transport papers cut out and placed in a dish. "By breathing in, you will transport the papers into the flask".

Additional materials (for instance, an inflator, bellows, etc.) are presented all at the same time. Later, they will be made available for Workshop 2.

Student Observations

Teacher: What is this?

The teacher holds up a soft inflator designed to inflate mattresses.

A student: It is used to make wind.

Another student: It is used to inflate bicycle or car wheels.

Teacher: How is it used? Show me, then pass it on to your neighbour.

The object is passed from person to person.

It is important to emphasise that the relationship that the children establish themselves between breath and the wind. The idea is to ensure that it is imparted to the entire group, with the benefit of sharing in the large group.

There is a change in Workshop 4. The teacher suggests materials such as glitter, sand and confetti. The aim, this time, is to catch the materials on a spot of glue. This will offer the students the opportunity to experiment with their new skills, by varying the direction and intensity of their breath.

– Workshop 1. Breathing in to transport lightweight objects from one recipient to another.

– Workshop 2. Blowing out to move objects from one end of the table to the other; new materials (guided workshop).

– Workshop 3. Moving the model sailboats without their bumping into one another.

– Workshop 4. Blowing on glitter or sand to catch it on a glue stain.

– Workshop 5. Blowing to help windmills turn very quickly, then slowly.

The children develop independence, and the workshops become increasingly long. The children become committed to continuing the endeavour in each workshop, taking ownership of the progress made by the previous groups. Photos are taken.

Group Time

The final statement on the session is an observation on how breath is produced. The students are capable of characterising and describing the act of blowing and breathing in. Based on their explanation of the issues encountered, the teacher guides the children toward substantiating their choice of a movement or tool in terms of effectiveness, making it possible for everyone involved to go farther in expressing problems and perceiving how air moves.

Session 4: Choosing the Right "Blowers"

The purpose of this session is to extend the use of instruments that some people have already handled. At the end of the sequence, a number of objects will be selected for their effectiveness.

The Workshops

In addition to the instructions that applied during the previous session, a number of requirements relating to effectiveness, sparking further efforts to identify cause-effect relations.

– Workshop 1. Breathing in as a means of separating the lightweight objects in several recipient, in order to sort

through them.

– Workshop 2. Choosing the most effective means and the quickest path for moving objects to the edge of the table (guided workshop).

– Workshop 3. Moving model sailboats as quickly as possible (the regatta).

Figure 6. Introducing an inflator.

– Workshop 4. Rounding out and enhancing the work performed the previous week by directing the path taken by the glitter: choosing the right instrument.

– Workshop 5. Blowing to make the windmills or mobiles turn using a variety of blowing instruments.

Student Observations

– Workshop 1: the progress achieved by some students encourages the others to persevere. They change straws, adjust the type of paper to be transported and adjust their breathing. Their approach is to imitate the person who succeeds. The adult oversees their movements, naming what they do precisely and working through the transitions to help those least comfortable. This is where coordination is gained, as the repeated movements yield results. The children are ready to adjust the experiment conditions. They fine-tune the set-up, working on the fundamental parameters (instrument position with respect to the object to be transported, transport optimisation, breath control in terms of intensity and direction).

Figure 7. Object sorting.

– Workshop 2: the imitation introduced by the object race pushes the students to mobilise their skills to succeed. They confirm that the bellows and the inflator are not effective, compared to the straw, which is the most appropriate tool in their eyes. They optimise the straw's position with regard to the object to "go straight ahead".

Figure 8. The Object Race.

– Workshop 3: during the regatta, the aim is to move quickly and prevent collisions. The children combine the techniques and give priority to using the flexible, directional tube, which is longer and more effective than the straw. Its fragility is taken into account.

Figure 9. The Regatta.

– Workshop 4: to catch the various materials on the glue stain, the students test a variety of blowing instruments and eliminate those that are not suitable. This section develops from the records established during the previous session, using their newfound proficiency to abide by the rules learned.

Figure 10. Moving glitter.

– Workshop 5: mobiles and windmills come to life when touched by human breath. To expend less effort, the students give priority to using a number of instruments. They wave cardboard, fans and use the bellows and the inflator.

Figure 11. Making mobiles and windmills turn.

Going Further: Making a Costume

Organised during a party, a costume production activity is organised, using materials that can fly away when exposed to wind. Initially, the children are asked to sort through strips of different materials. The materials selected will have the property of flying away in windy or drafty conditions. Later, the children will attach one end of the strips to a belt and/or a crown and/or a stick. They will be provided with strips of different sizes and materials (paper, textiles, plastics, oilcloth, raffia pile cloth, cork, linoleum, etc.). When a material is considered, testing ensues. The children expose it to drafts, machine and instrument wind, and human breath, before attaching it (glue, staples, tape). In so doing, they redeploy the lessons learned in the previous sessions.

Lessons Learned at Sequence End

– The children now know that they can trigger object movement by moving air (either by blowing air, or using blowing instruments) and use appropriate vocabulary. They establish the relationship between object movement and air movement.

– They control their breathing (in and out) and use "blower" instruments.

– They are capable of transposing and aligning their know-how to solve new problems.

Wind, Air in Motion (ages 3- 4)

The sessions will be organised depending in large part on weather conditions: some activities may take place with the entire class, while others will need to involve smaller teams.

With students aged 3-4, the primary aim will be to help the children explore the sensations resulting from the existence of wind and integrating them into the other significations that they elaborate about the world around them. To do this, it is important to identify what results from the wind, by comparing "the wind" to "lack of wind", and by helping the children explain how the wind's effects can be compared to those achieved through direct action or action using objects.

Some of the instructions provided will make it possible to adapt activities to students aged 4-5.

Possible Sequence Procedure			
Sessions	Activities carried out with students	Language activities	Knowledge and knowledge in play
Session 1. Perceiving, expressing, exploring	In this section, the aim is to play in and with the wind, and feel its presence.	Words (from the students and the teacher) help support actions and express emotions. The teacher reads out picture books.	Designate and describe objects, sensations and actions.
Session 2. How can you tell whether it is windy?	Explore the wind using the senses: hearing, seeing.	– Participate in group exchange. – Use vocabulary suggested by the teacher to be better understood. – State what one observes.	– Recount experiences. – Observe, identify and name reality. – Recognises components of the aural world. – Explicitly distinguish between what is heard and what is seen.
Session 3. How does wind affect scarves, balloons, etc.?	Observation, description and comparison of effects of wind on various objects: balloons, scarves, ribbon, etc.	– Name actions and effects achieved. – Tell of observations made or explain what was done under certain conditions. – State what one intends to do. – Identify, compare and organise depictions (pictures, pictograms) of actions attempted to make wind.	– Observe and describe situations. – Keep a record of similarities and differences between effects observed.

Session 4. How can one make objects move like the wind does?	– Put together the lack of wind and immobility of objects already handled. – Look for solutions to set objects in motion, as wind does.		– Establish relationship between cause (wind) and effect (movements observed). – Associate effects of wind and those produced by other actions.
Session 5. How can one have the same effect as the wind in the classroom?	– Observe limits of previous answers on smaller objects. – Look for other actions allowed in the classroom to "make wind".		– First realisation that air is present even when it is not perceived as such. – Adaptation of actions to qualities of objects. – Exploration of technical objects that make wind.
Session 6. Redeployment	Redeploy properties of materials.	– Substantiate one's choices. – Recall experiments, lessons learned.	Mobilise knowledge and know-how gained in other situations.
Materials The bulk of the materials is made up of objects or materials often already present in the classroom: scarves, ribbon, tissue paper…or easily found (including in stores): straws, heavy-paper fans, rubber bags, feathers, cranks (possibly made by 6-year-old children), plastic or light-weight fabric bags, etc. Special attention is required on the adults' part, particularly when activities are performed using plastic bags.			

Session 1. Perceive, Feel, Explore

This session is, first and foremost, designed to build up an experience shared by the entire class, and give the children reasons and language tools that will lead them to express and control their feelings, describe, share, compare and question…

It is probably best if the teacher can take advantage of two or three windy days in a row (strong wind, if possible), so that all of the children have the opportunity to engage in dialogue with the adult.

This stage, during which the child becomes familiar with wind as a phenomenon, is an opportunity to extend one's vocabulary in the specific situation, and through reading a picture book where the children will recognise what they felt. They will also be encouraged to bring object from outside the classroom, or objects they have the opportunity to handle, so that they can look at how the said objects behave in the wind. This will provide fodder for predictions in more structured sessions. The children speak out: "wind stings the eyes"; "it is cold"; "it's tiring"; "it pushes me"…

Session 2. How To Tell Whether It is Windy

Introduction to Session, on a Windy Day

Before going outside, the teacher, if appropriate, taking advantage of the ritual weather forecast, asks the children whether it is windy today and how they know: "you can see the trees moving", "you can hear the wind".

Exchange will be encouraged on this common language construct. Is that really the wind you hear? Or rather the effects of the wind on objects set in motion. By listening to and observing a variety of situations, the children should come to the realisation that the sounds come from objects set in motion by the wind and are, thus, only effects. Listening times will be arranged in order to distinguish between the many noises heard and to designate

them more precisely: "it whistles", "it makes the shutters bang", "you can hear it in the leaves", etc.

Recordings of the most characteristic noises will help review and go into greater depth with the above aural perception activities, by making them a part of other classroom listening times: noises, music, voices, instruments, etc. To initiate the activity, the teacher asks the children, once in the courtyard, to identify everything that moves when it is windy, so that he can take pictures of them.

Possible Observation Exercises and Summing Up

In small groups, the students observe their immediate or more remote environment (plants, objects, clothing, hair, etc.), and choose what is to be photographed by their teacher.

Then, they are brought together for a time of exchange and observation. The teacher helps them convey what they saw and felt, rewording the initial questions and supplying more accurate words to describe certain effects: leaning over, flying away, lifting up... It is also at this time that a distinction is made between the words describing what one hears and those describing what one sees (and has photographed).

Through this process, each component in motion may be identified by the group and recorded by the teacher, so that a selection can be made later, depending on what was observed.

In second-year pre-school, pictograms or coded depictions of the main changes identified can also be set forth, possibly on the basis of the albums (which will also be reflected in writing). This will help establish a tie with the following session.

Session 3. How Wind Affects Scarves, Balloons and Other Items

Session Introduction

The pictures taken during the previous session are handed, with one or two going to each child. The teacher invites each student to post the pictures, adding their comments; he provides assistance in using the previously suggested vocabulary, and encourages children to group the photographs that have meaning.

The teacher then announces another outing, in the courtyard, with objects he will ask the students to name: scarves, ribbons, plastic bags (the children will need to handle them with particular care), rubber bags (inflated and attached to string), long-haired dolls, cranks, etc. He will have the children make projections. "What will happen to...?"

The children are divided into groups and seated, for instance, on as many long benches; they will be responsible for exploring one or two specific objects. The teacher will ensure that there are as many objects as there are children. Each child will be asked to observe "what the wind does to the objects".

Possible Observation Activities and Summing Up

The children handle the objects and are encouraged by the teacher to express themselves (with suggested precise wording) about what they see: the objects fly away, stand up, the bags inflate, hover, spin, etc.

The teacher takes pictures of the forms of movement observed. He also ensures that each child goes all the way in exploring/handling the objects and encourages mutual assistance between peers.

Figures 12 et 13. Observes the effects of wind on objects.

To bring the outdoor activity to an end, the teacher arranges a sharing time:

– each group shows and states, one after the other, the effects that wind had on its object;

– in second-year class, reference will be made to codes and previously-used statement written by the class.

The teacher helps the students express differences and common points: do all of the objects stand up, and fly away when let go? What do they do when the wind stops? The bags and scarves puff up with air, but what about the balloons? Do they puff up more? (This problem can be explored further at a later stage: "what would need to happen for them to puff up more?" Structuring will take place through the comparisons made between the various activity records (pictures, posters including all of the objects, etc.). The observation sessions will be arranged as a time for reorganising activity records (pictures, drawings, written accounts) around the verbs identifying the main effects of wind. This is a first step in categorising: the wind makes objects bend, fly away, spin, float, puff up, etc.

Session 4. How to Move Objects Like the Wind Does (when there is no wind in the courtyard)

For this session, records from the previous sessions showing the relationship between wind and movement are needed. It is not a vital part of the sequence itself, particularly for the students aged 3-4, and as such, can be skipped. If necessary, it can be carried out in a gym or similar facility.

Session Introduction, on a non-windy day

The teacher announces to the children that, today, they will go into the courtyard to see if the objects move like they did the last time; he will ask them to predict whether the objects will fly away, puff up, etc., as during the previous session.

The teacher does not, initially, call the children's attention to the presence of wind outside. Once in the courtyard, he invites the children to observe the objects and gradually has them realise that they are not "moving".

The class will then proceed, as a group, to determine why, with the teacher reawakening memories of previous observations, on objects of course, but also trees and clothing.

Some children are not immediately able to suggest the lack of wind as a possible explanation. Some offer rationale that can be explored for the benefit of the class, revealing what they have grasped up to that point: for instance, "the objects do not move because the wind is not leaning over". To make the smoke's position a consequence of the wind, and thereby overcome any possible confusion between the smoke on a day when the wind's direction has changed, the children will note that the smoke is not going into the trees, but that the trees are nonetheless

moving.

Note – this occurrence is more difficult to make use of then it might seem. Even when the wind is lacking, a puff of smoke can end up spreading out horizontally.

A New Start, New Directions

The teacher asks the children to move the scarves, bags and balloons, along with other objects in the courtyard observed in Session 3, like the wind does. Once the objects are divided up, the children handle them as they wish. The teacher identifies the various actions suggested and helps the students express them precisely: running, jumping, shaking, throwing, etc. Those with bags and scarves have more trouble finding an answer.

Some start running, along a path or in circles, and manage to lift their objects slightly. Others kick dead leaves...

The teacher encourages mutual assistance between the children, in particular to encourage them to tell others about what they have done.

Summing Up

During sharing time, each group suggests the answers it found for its object; the teacher asks the students in other groups to repeat the actions presented and tell whether they produce the same effects on their objects. Based on pictures of the actions carried out and effects yielded, the children will be able to discuss what they did and observed: pushing with one hand, pulling, blowing, shaking, running with...

This will make it possible for them to compare the results achieved through the various actions with those observed as a result of the wind.

The pictograms can be put to use with second-year students, in particular to organise how objects or object portrayals are grouped together.

Figures 14 and 15. Examples of pictograms.

Session 5. How to Make Wind in the Classroom

Session Introduction

Based in the classroom, where the children are not used to being allowed to run or jump, this session aims at reproducing the effects of the wind on lighter, smaller materials: feathers, pieces of paper, strips of silk or fabrics, etc.

The students explore new ways of "making wind", in particular by blowing, as the objects involved are not generally conducive to such a solution.

Initially, the same materials (scarves, bags, balloons) can be used to convey the idea that "indoor wind" is the same as "outdoor wind".

As the children are handling smaller and thus more "mobile" objects, it is important that ruckus be kept to a

minimum.

Even if the influence of uncontrolled movements can make it possible to observe interesting effects (air set in motion by a child passing nearby, a draft, etc.), it nonetheless appears preferable to hold the session in workshop format (not all focusing on the same topic), so as to foster relative independence in the children and enabling the teacher to guide and observe the inquiries carried out on various ways of "making wind".

The teacher can ask the children to predict what would happen if feathers or paper were put in the wind. Often-heard answers include, "they would fly away", or "they would move", etc.

The problem is then raised by the teacher: "Inside the classroom, how can we make wind so that the feathers and pieces of paper move?"

Group Work

The teacher guides the children toward discussing solutions found in the courtyard, when wind is lacking, so that they can experience the effect with the same materials: the children observe that the feathers and tissue paper move a bit if shaken or if someone runs around carrying them, but less so than the scarves and balloons.

Other solutions quickly emerge: throwing them up in the air (here, however, it can be pointed out to the children that, rather than "flying away", or being lifted into the air, the object "fly" as they fall), or blowing on them.

It is important, at this point, to let the children experiment with the solutions they have come up with, as well as with others that will emerge during their activity.

Figure 16. Brainstorming time.

In response to the teacher's questions about what comes out of one's mouth when one blows, the children may undistinguishingly respond "wind" or "air". At this point in the inquiry process, the teacher recalls the previous sessions and helps the children realise that breathing is taking in air – bringing it into the body, then pushing it out. In other words, when a person blows very hard, he makes air rush out and "it's like wind", or "he makes wind".

Likewise, when asked "where the air brought into the body goes", the first step can be to point out that air is all around us, even if we cannot see it.

The children do not necessarily think to set the air in motion by shaking a leaf or their hand: this is why fans are made available to them, with questions raised as to their purpose; this will help the children understand that it is possible for them to "make wind" or "make air" in groups.

The benefit of introducing other technical objects that make wind will be all the more beneficial if the children have had an opportunity to achieve a degree of familiarity with the objects. Otherwise, it is preferable to keep that aspect for the 6-year-old children.

Summing Up

These hands-on activities help the students understand that, when there is no wind, they can still make some. "I can make wind in the classroom, with the same effects as the wind in the courtyard".

When working with 3- to 4-year olds, it is difficult to reach the more general and structured observation that it is possible to "make wind" by moving air or moving in the air.

Session 6: Possible Redeployment

To redeploy and go into greater depth on the previous conclusions and know-how, the teacher can hold mobile-making workshops, during which the children can handle objects and materials that readily move in the wind.

All of the experiments carried out during the previous sessions will serve as reference points to come up with as many solutions as possible for creating (choosing materials, formats and arrangements) and moving mobiles.

Moreover, using photos taken during the various sessions, the teacher can ask the children, individually or in small groups, to classify their actions to "make wind" (blowing, running, shaking, etc.), perform research, in picture books or documentaries, or make illustrations, take pictures or produce pictograms…depicting the wind or options for making wind – such activities will be as many opportunities to re-use vocabulary and review the experiments.

Figure 17.

Figures 18 and 19.

Wind, Air in Motion, – ages 4-5

The implementation plans suggested after Sessions 1 and 2 are not provided in chronological order: they open paths for investigation by going over the questions that may have emerged after the first observations and experiments.

Depending on what the 3- to 4-year-olds will have done, the introductory sessions intended to familiarise the students with wind and wind-related occurrences may be skipped.

Possible Sequence Procedure			
Sessions	Activities carried out with students	Language Activities	Knowledge and Know-How in Play
Familiarisation. How to tell, or how to see that it is windy	– Sensory explorations. – Observation of effects of wind in the immediate environment.	– Using more specific vocabulary. – Coming up with precise statements.	– Designating and observing reality. – Stating one's experience and comparing it with that of others.
Session 1. How wind affects various objects	Observing, describing and comparing the visible effects of wind on objects.	– Participate in group exchange – Use vocabulary suggested by teacher to convey ideas more clearly.	– Observing and describing situations. – Exchanging about the possible reasons behind the occurrences observed.
Session 2. How to Make Wind in the Classroom How to Make Objects Move without Touching Them	– Identifying ways to set fabrics, balloons, sailboats, cranks, etc., in motion – Describing actions carried out and movements observed. – Showing, for the first time, how air is set in motion. – Bringing out other questions, guided by the teacher.	– Naming one's actions, the resulting effects and the mechanisms involved. – Anticipating actions and their effects. – Telling of the observations made or explaining what was done and the surrounding conditions. – Classifying portrayals (pictograms, photos) of the actions performed. – Dictating a text to an adult.	– Predict the results of one's actions. – Trying to understand how an object is used. – Connecting cause and effect. – Trying to explain the result of one's actions. – Raising questions. – Organising objects according to a variety of criteria.

"Blowing" Session What happens when air is blown out? Where does the air that comes out of the mouth start from?	– Observing and analysing how the body moves during breathing. – Varying the "power" of the breath or air set in motion. – Using and observing how hair-dryers, pumps, bellows, inflators, etc., work...		– Observing how the body works and naming certain body parts. – Identifying conditions that enable breathing. – Expressing cause-effect relationships. – Classifying objects according to their use.
"Fanning" Session Choosing the most appropriate wind source	– Using and observing how fans work. – Holding sailboat races.		Comparing technical objects and stating the most appropriate use.
Going further. Making Objects	– Making small cranks based on written instructions and testing them (possible with 5-year-olds). – Making a an that moves and shakes depending on the level of "wind power" (preferably with 5-year-olds).	– Using writing to take action. – Link between picture books and tales: reading and production.	– Folding, cutting and assembling. – Completing a production. – Reconnecting with the effects previously observed using cranks provided. – Redeploying the properties of materials and objects as part of a graphic arts and sound creation project.
Materials We wish to call teachers' attention to the safety conditions required for handling plastic bags as technical tools. The safety regulations associated with the use of electrical appliances will be set out and enforced by the teacher. The required materials in this session include: cranks, dorade vents, fans (easy to make), boats and buoys (bath) and any object with a sail, anemometers (weathercocks – see elementary school teachers), rubber bags, pumps, hair dyers and ventilator (to be operated with the teacher present). As for the objects to be produced, wooden sticks, thin cardboard, beads (for cranks), cardboard structures, materials of various colours and sizes (for fan), scissors, glue, etc., will be needed.			

Familiarisation Session

In the event that the students are broaching the topic of wind and/or air for the first time, their initial conceptions can be gathered during group-class activity, through verbal exchange.

Examples of student responses when asked: "What is wind? How can you tell whether it is windy?"

– Wind is when the trees move.

– It's when it is cold outside.

– The wind pushes the leaves.

– Wind makes trees move.

– When the wind comes, the leaves fall.

– Air is wind. »

Working from those statements, the teacher can bring out a variety of questions and approaches in relation to the curriculum objectives:

– a sensory exploration of wind;

– showing wind as air in motion;

– set objects in motion in the wind, thereby making it possible to establish a shared reference base (knowledge and know-how) on which subsequent inquiries can be based.

Sensory exploration of wind on oneself or on others, and on objects that can be observed around oneself or in the distance is a necessary step. It can be useful to refer to sequences intended more for 3- to 4-year-olds, for suggestions that can be implemented more quickly than with older students.

Session 1. How Wind Affects Various Objects

The objects can be part of the students' everyday environment, but the teacher should feel free to bring in new objects for the familiarisation session, in particular objects usually set in motion by the wind: cranks, sailboats (in tanks filled with water), dorade vents, anemometers, etc. can all be the foundation for research carried out by the students. The technical objects produced by students from elementary school 3 can be tested at this time.

Anticipating Possible Effects

The children predict, as a group, then individually, the wind's possible effects on each of the objects.

The teacher guides the sharing process, providing the vocabulary needed to name, in particular, less familiar components (see anemometer, dorade vents), makes note (for instance, one small card per object) of the suggestions by summarising, to the greatest extent possible, the observations to be implemented and, thereby, make the hypotheses "understandable" to the children when testing time comes.

Experimenting with and Organising Observations

In the wind, outdoors, the children work in small groups, observing how their object reacts and preparing the most precise statements possible to describe what they saw in front of the group. The teacher helps them use their new vocabulary appropriately.

Each group of students must be able to observe several objects.

Back in the classroom, each group tries to categorise the objects according to the movements seen:

– those that fly or fly away (leaves, fabrics, feathers);

– those that spin (crank, anemometer);

– those that puff up (bags, dorade vents);

– those that move forward, either floating or rolling (ping-pong balls, sailboats, sand yachts), for instance by grouping them together on posters.

Figure 20. testing objects produced.

Summing Up

The observations made are compared with one another and with the predictions made based on previously produced written statements.

As this takes place inside the classroom, the transition to the next session is very natural, possibly at the students' request, to check an assertion or dispel disagreement.

Session 2. How to Make Wind in the Classroom. How to Make Objects Move Without Touching Them.

Predicting Solutions

The teacher helps the students spell out the actions to be carried out. There too, he can write all of the suggestions on a small card (one per object).

Suggested student proposals in response to the question: "How can these objects be moved without touching them?":

– the windmill: "you have to run and blow for it to turn"

– the boat: "to move the boat, you have to blow, turn the mill, run around the boat to make air and make it move forward, shake a leaf, shake your hand and spin your hand".

– the dorade vent: "we will blow on it and shake it".

– the anemometer: "you have to run and blow".

Testing the Suggested Solutions

The class shall be divided into as many groups as there are different objects to test (one object being available per student), provided that the activities are introduced with the following instructions:

– the groups shall exchange their objects when asked to do so by the teacher (making it possible for each child to touch all the objects);

– that each child chooses one of the options and tests it. At the same time, the teacher will ensure even unplanned suggestions, arising during the session, have the opportunity to be tested.

While the children handle the objects, the teacher encourages them and helps them express what they are doing and observe the results achieved. He also takes pictures of the actions carried out and the resulting effects.

Exchanging

The first group time immediately following the hands-on phase will offer the students the opportunity to:

– verbally express the result observed, shown as much as necessary through hands-on demonstration;

– compare their observations both amongst themselves and with respect to their hypotheses, and discuss, so as to possibly reach new suggestions or questions to be implemented during further experimentation.

Figures 21 and 22. "Making wind", with a pump or windmill.

Observations made by the children

Dorade vent:

– We ran around and the dorade vent stood up very straight.

– When you blow very hard, it moves a little bit.

– When you shake it very hard, it lies down horizontally.

Anemometer:

– When you blow on it, the anemometer spins around.

– When you run around, it does not turn.

Windmill:

– We ran around and it turned.

– We blew on the front of the windmill and it did not turn.

– We blew on the side and it turned.

– We held it outdoors and it turned (there was a little bit of wind).

The sailboat:

– I blew on it and the boat moved forward a bit.

– I blew very hard on the boat and I won the race.

– I shook my hand and the boat moved forward a bit.

– I blew and the boat got stuck (at the edge).

– I made the windmill spin (with my hand), but the boat did not move.

Summing Up

In summary, this session offers the opportunity to:

– returning to the observations made previously, based this time on the photos taken which, more than an illustration, can serve as a foundation for grouping objects together according to the actions performed (blowing, running, wind) or effects produced (turning, moving forward, lifting);

– interpreting the results observed: when the child moves his hand, the boat moves forward. Based on that observation, the teacher can trigger discussion asking, "Why? What makes it move? With your hand, you make wind. Where does the wind come from? From the courtyard", but everything is closed. "From my hand", but when the child stops moving it, he can no longer feel the air. "- why can air be felt on your face when you move your hand?" Because the hand moves the air and makes wind".

Additional experimentation can be planned based on these conclusions, with an object to be chosen by each student, and for which he will observe that "it's the same" ("wind can come from this") when air is moved and when one moves in the air".

– raising new issues, some of which are listed hereafter, for the following sessions, in two directions: blowing and fanning.

"Blowing" Session

Reflections and Observations on Breath

During Session 2 in particular, the children played with their breathing.

Reflections and observations can be made about breathing at that time:

– "What happens when you breathe? You make air with your mouth and this moves boats, windmills, etc."

– "Where does the air in your mouth come from? From your stomach". The children are referring here to breathing exercises done during their singing activity. This is an opportunity to breakdown the various operations and movements involved in breathing: air from the outside is taken into the stomach. The thorax lifts up ("where the lungs are") because air has entered the body, then it is pushed out when the child blows.

Reflections and Observations on "Breath Force" or Air in Motion

Questions are raised about the "breath force"3 or air in motion: "I blew very hard and the boat moved forward very quickly".

Reference can be made to the sequence, "Breath, Air in Motion" (ages 3-4 or 5-6) for situations to be adapted,

according to how much the students understand.

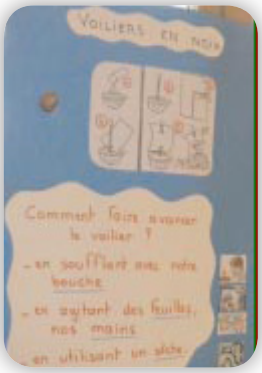
Other observations show the connection between how much breath is expended and the resulting effect: for instance, identical rubber bags, all well-inflated and connected at their opening, to pieces of tubing of differing diameter (small, medium, large) will make the sailboats move forward at differing speeds. Through observation and comparison with balls and tubes, the teacher can help the children establish a relationship (which will remain qualitative), as in: "The thicker the tube, the more air comes out and the harder it pushes the boat, which moves more quickly".

This supplementary activity can be introduced and implemented by the teacher or some children designated to "assist" the adult in the activities.

Reflections and Observations On Wind-Making Devices

Using the anemometer outside can help identify the various "wind forces". In handling the instrument in the classroom, the students will have noticed that, the harder they blow, the faster the anemometer spins and the higher it goes. The teacher can offer explanations about how the object is used and works, with the children testing them in the courtyard over the following days.

In addition, the topic of "breath force" or air in motion can bring the children to look for other ways to "make a lot of wind in the classroom", organising sailboat races, for instance.



Figures 23 and 24. How to make the boat move forward…

The children identify, in their immediate environment, objects or devices that can be used to blow very hard, looking through catalogues, pictures and objects provided by the teacher. This is the time to bring in less familiar technical objects: pumps, hairdryers, inflators, etc.

The objects selected will then be tested by the class, operated by the teacher where electrical devices are concerned (this is the opportunity to broach possible hazards) and by the students, in small groups responsible for comparing their "effectiveness" (in terms of speed). The items can be ranked on this basis, from that which makes the boat move the fastest (that which blows the hardest) to that which makes it move the slowest (which blows the softest).

"Fanning" Session

Other objects that do not blow nonetheless yielded the expected effect and "made wind" by making the air move. It is interesting to return to this in a short sequence and, there too, experiment the effects of all or some of the objects on those on which action has already been taken.

In studying how the devices work, the children can "make wind".

– either by agitating or moving the air (ventilator, fan);

– or by taking in the air and expelling it (pumps, breathing).

The children can be made to notice (or state) that the objects work above all because the air they "use" is all around us.

In so doing, the teacher will establish a connection with the sequence, "Is air matter?"

Possible Extension: Making Objects

Making Cranks (4-year-olds)

This is the opportunity to use written indications to make an individual object, which can be used to repeat a number of actions from previous sessions, play in the courtyard (with or without wind) and which everyone can take home.

Making Scarecrows (5-year-olds)

The role of the scarecrow will be explained in greater detail using tales, picture books, etc., but also pictures and reproductions of other works. The scarecrow should move at the slightest breath and produce visual and sound effects that differ depending on the "wind force". The objects or materials will be tested by students using devices that make wind. This will make it possible to integrate relatively large objects into the process, including an anemometer, bells or even metallic objects, etc., depending on what is locally available.

The scarecrows can be set up in the school courtyard or garden, or in plant beds, with the friendly approval of the municipal gardeners!

Figures 25 et 26. Windmills.

« Soufflez monsieur le vent
Faites danser les nuages
Et les cheveux des enfants sages

Soufflez monsieur le Vent
Emportez les papiers
Et le chapeau du jardinier
Fff ! »

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