Food - Where does bread come from ?

Author : Françoise Hurtrelle, Ecole du Canteloup, Honfleur- Calvados, France

Summary : Some ears of wheat brought to school by one of the children led to the experimental discovery by pupils of all the steps needed to make bread, from the germinating of the wheat grains up t the final baking of the dough.

Programme content : living things – learning to be healthy - Importance of rules of hygiene (food)...

Issues approached : food-digestion, plants.

Award-winning project : prix *La main à la pâte* 2000

Initiating scenario :

A spray of wheat ears brought to the class by Ridwan.

Breakfast at school with serving of cereals.

Use of and interest in a book entitled " Little Red Hen " by Byron BARTON (" La petite poule rousse " L'Ecole des Loisirs): the pupils' wish to reproduce the story's action in chronological order.

Objectives :

Discovery of a plant: wheat.

Matter : flour in human and animal food.

Survey : in which food is flour visible ? Recipes and discovery of other cereals.

In technology

Turning wheat into flour – Study of the different methods : grinding and sifting.

Discovery and use of different tools: flail, different mills, sieves (etc.) ; introducing the notion of adaptation to functional use.

Transforming through mechanical action.

In grammar

Type of situation with sequenced projects imparting the notion of time:

- what has been done,
- what remains to be done,
- what could have been done,
- what could be done.

Pupils naturally acquire skills in the use of verb mood and tenses .

Action chronology : one action per week.

In history

Introduction to the notion of History: methods used in the past, present day methods.

It was before ...

In past times by hand, scattering seeds, with a flail, a combine harvester, a scythe, using a mill ...

Now we use ...

Flashback : before we did this, afterwards we will ...

Describing and discovering features of the past by comparing action, tools and objects before and now; hence the idea of visiting a farm.

In biology

Introducing the notion of life: "What do we mean by a living being ?", "What is alive ?"

Observation of plants, in the classroom, in the garden, on a nature walk (bois du Breuil).

The lifecycle : nutrition, growth.

Teacher's comment:

This work was conducted by children "with learning difficulties".

Sequence 1 - From wheat to flour

Pupils prepared and then tested operating methods, compared different techniques, to obtain grains from wheat ears, to separate the grain from the chaff, to transform the grains into flour.

a- Discovering wheat : sowing seeds

Where does wheat come from ?

Initial scenario

After the Summer holidays, Ridwan brought a few wheat ears to school, but was unable to tell us what they were or where they came from.

None of the children could help since wheat was apparently unknown to them.

At a later stage, they did all recognize straw.

Observation and questioning

Wheat ears : Can they be eaten ?, Have you already eaten them ?

"They're grains. They're Kellog's cereals !"

One child bites into a grain: "it's hard, it's white inside."

Only Johnny thinks that the white part may perhaps be flour.

Final questioning

Where does it come from ?

Where does it grow?

Seeds

Objectives

To make children aware of plant life and move on to a deeper understanding of the basic notions of time, space and relationships, the concept of life (germination and growth).

What is living ? Are flowers, trees alive ? And things, like stones ?

Notions of history : in the past sowing was made by hand, nowadays a sowing machine is used.

Activities

Sowing of seeds just before the November holiday in the classroom and in the playground

One pot placed in the light in the classroom, the other in the dark (in a cupboard).

On 13 November: shoots a few centimetres high.

«They grow quicker in the classroom !»

General reaction : « It makes grass ! «

We had also sown some pumpkin seeds.

Axel makes a comparison between the wheat seeds and the pumpkin seeds: «Then these will give us orange grass ?»

«They'll give leaves.»

Problem encountered : In the classroom, the plant grew quickly but also withered quickly.

Documentation

« Toujours rien « Edition du Rouergue

« Quel radis dis donc ! « Didier Jeunesse Ecole des Loisirs

«Rosie plante un radis « Casterman

b- From ear to grain : wheat threshing

Objectives

Introduction to the historical aspect. Before " It was in the past "

In the past, a flail was used. Nowadays a combine harvester.

1 – Wheat threshing as per pupil suggestions.

Problem scenario

How can we separate the wheat grains ?

How can the wheat be threshed ? (The wheat is spread on the ground)

Charlotte : "You have to walk or jump on it ." (The children do not know the verb to trample.)

First test :

Observation : «Oh ! surprise. There are grains. We were right. The wheat grains have fallen on the ground .»

Johnny : «We could beat with a stick.»

« What happens if you beat straw ? « ... «Nothing»

The difficulty lies in beating the ears hard.

Johnny uses the stick like a pestle.

Other suggestions : «We could beat like this (holding flat), like with a flail.»

Shake the ears (the verb to shake is unknown to the children). They show the movement.

Beat with our hands

Rub with our hands

Shell the ears («Peel» says Charles)

The class picks up the wheat grains mixed with the chaff.

Observation : it's quicker using your feet. The wheat grains fall with the small flakes (the chaff).

Lucie shakes the bowl containing the wheat to remove the chaff.

Remarks : It is found that some ears are well beaten, others rather less well, and others not at all.

Nowadays it is a combine harvester which threshes the wheat. It threshes all the ears.

2 – Threshing the wheat with a flail

Motivation

" We are going to beat the wheat with the flail, as they did before, like they did in the past ."

The activity is conducted in the playground to have more room.

Presentation of the tools used: a fork and a flail.

Observation - Analysis

Description of **the fork**. The word is known by Axel.

Jason : "It looks like a hand, like fingers ."

Charly : "It's made of wood."

Use : " What is a fork used for ? "

Margaux : "To separate the grains and the straw."

Charly : "It's for pushing. It's for picking up the straw ."

Description of **the flail**. The children remembered the name and its use from the documents they had brought to school .

Charly : "It's got a big wooden stick and a little stick."

Johnny : "It's got a handle."

Benjamin : "There are two pieces of wood."

Davy : "Thick string."

Axel : "A rope."

Why has it got one long stick ?

Charlotte : "'Cos it's a handle."

Which stick is used to thresh the wheat ? "The big one !"

Introduction of a new word " a bat".

Use

Why is wheat threshed ?

Jason : "To get wheat, to get grains."

Technical functioning: How does it work ?

Experimental test : "You have to beat with the end bit." "First we must lift the bat." "You must beat the ears."

Problem: it's difficult as it is not a tool intended for children.

«It's for grown-ups.» «You must beat hard.» «You must lift it up high.»

We nonetheless obtained grains and saw many grains falling from the ears.

Separating the grain from the chaff

Initial scenario

What must we do to separate the grains from the chaff ?

Tests

Lucie shook the bowl containing the wheat grains and the chaff .

" What happens to the grains ? " " What happens to the chaff ? "

"It flies away . But the grains also fall."

" You have to use your hands to sort them . It's long and there are lots."

"We could tap the bowl. We could shake gently."

How ?

"From top to bottom. From left to right. Backwards and forwards."

"The grains move together, the chaff moves to the other side. But it takes too long."

Using sieves

«The grains don't go through the holes.»

«If we shake hard, everything spills, everything jumps overboard.»

In the past, a big basket was used: A WINNOWING BASKET.

Machines too were used

And nowadays ?

Sample of wheat from a farm, harvested with a combine harvester. "Now, the combine harvester does everything." Charles

c- From grain to flour

Initial scenario

How can the wheat be crushed to obtain flour ?

Johnny : "With your teeth. It works but it's hard"

Margaux : "With your hands."

Sarah : "With a stone."

Dylan : "With your foot. It doesn't work, the grain is too small, it sticks inside the soles."

Sarah : With a hammer."

The others : "With a big stone, with a brick."

Axel : "With the vegetable mill when we've made the pumpkin soup."

Material to be prepared

Objects for grinding, crushing, spreading .. : vegetable mill, old-style coffer grinder and an electric coffee grinder, pestle, mortar, rolling pin, pebbles...

After suggesting initial solutions, and with the instruments supplied by the teacher, the children are divided into different workshops. (The children are given various items meeting this functional use : vegetable mill, manual coffee grinder, electric coffee grinder, pestle, mortar....).

Workshop sessions

Workshops:

pebble workshop

electric coffee grinder workshop (with adult assistance for safety)

vegetable mill workshop

manual coffee grinder workshop

rolling pin, pestle and mortar workshop

On completion of the first tests, the class pools its findings: what happens when each of these tools are used ? Is it easy ? Why ? Is it difficult ?

With the rolling pin: "it doesn't work, the wheat is too hard."

With the pestle and mortar: "It's too hard."

With the vegetable mill: "It doesn't work. It doesn't crush anything."

With the pebbles : "It works but it takes too long." Some pupils crush the grains without beating. Others rub the pebbles together. Many children prefer to bang the pebbles together, a pretext for making a noise, but notice that those who crush the grains with the pebbles succeed better in obtaining flour.

With the hammer: «It works.»

With the manual coffee grinder, the children turn the handle in the right direction , it is very difficult. Some strength is needed but they manage to crush the grains. To see the flour falling into the drawer gives them great pleasure and they are most satisfied.

With the electric coffee grinder : "It's easy. It's quick. It's properly crushed. The flour is soft."

Comparison of the grindings obtained in each workshop.

The children notice the difference between the flours.

Each tool used has crushed and ground differently.

Pooling of results: white flour, whole flour, bran.

d- Sifting

Introduction

Recall

Recall of the different ways of crushing and grinding.

Comparison of the grindings obtained

Comparison between the different grindings obtained during the previous session.

"Some are white. Some are yellow."

"The white ones are flour. The yellow ones are bran. It's the wheat's skin."

The class obtained :

coarse grains from the wheat crushed with the pebbles,

fairly fine grains from the wheat ground with the old coffee grinder,

very fine grains from the wheat ground with the electric coffee grinder.

"Why are the grains finer with the electric coffee grinder ?"

Comparison of the grindings with flour bought from a shop

What must we do to have white flour ?

"Take away the yellow. Take away the bran."

How can we take it away ? How can it be separated from the white ?

"With your hands" "It would take too long."

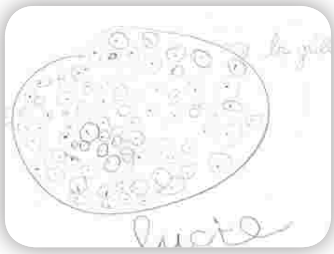
The teacher: " We are going to sift the flour using an instrument ".

Charlotte remembers the instrument with holes but cannot remember the name. You have to shake it like we did with the wheat.

Sieves, strainers, colanders brought in by pupils

Workshop session

Pupils are divided into thee workshops with the various instruments



Comparison between the different flours obtained :

But some bran still remains, especially in the «colander» workshop.

The whitest flour is found in the «sieve» workshop.

Which is the softest flour ?

On feeling, all the children designated the sifted flour.

Why is some flour finer ?

«Some have big holes. Some have small holes.»

Benjamin : "The bran can come through the big holes."

Comparison and observation of the holes of the sieves.

The mesh of the two sieves is different. One is even finer.

With this sieve the bran has been left behind. Why ?

"The flour can pass through, but not the bran."

The flours obtained are weighed.

Dylan : What does to weigh mean ?

Margaux : We can weigh ourselves like this, standing up.

With I kg of flour, much is lost through handling.

Attempted summary

The bran does not pass through the mesh.

Which sieve must be chosen to obtain white flour if it contains bran ?

The finest sieve must be used.

Sifting mill

Objective

Having understood the principle of sifting, will the children be able to able to find out for themselves the use of a sifting mill ?

Initial scenario

The class is presented with a sifting mill.

What was this object used for ?

The class scrutinizes, observes, thinks.

"There's a handle. It turns." "It's for grinding wheat. It's for crushing it." " There's a sieve. It's for sifting."

Tests

The children try to make it work. They remove its different parts. Try to make an analysis.

«It turns. It doesn't crush the wheat ." " It's the handle which makes the wooden bit turn ." "It can be turned quickly." "It's the blade which shakes the flour."

They make a deduction

«It's like the sieve. The flour falls. The bran stays inside, it's too big.»

They try it out. Comparisons are made. And it is concluded:

«It must be for sifting." "Instead of shaking, it is turned, there's a blade, it turns, then it's a mill."

Lots of bran is left in the sieve.

It is a fine sieve.

So the bran cannot pass through.

The flour in the bottom is almost white. It is soft.

Charles: "For the flour to be white you have to sieve 'til there's no more bran."

Ridwan : "You have to sieve all day."

e- Assessment

Understanding sequence of action

What tool has to be used to grind, to sift ...

Explanation and overview of results obtained.

Argumentation

"The grain is too coarsely crushed, why ?"

"The flour has lots of bran, why ?"

"Which tool should be chosen to obtain almost white flour ? Why ?"

Workshop sessions

In small groups of four, specific workshops are organized to transform the wheat grains into flour .

The wheat has to be beaten or shelled.

Separate the grains from the chaff.

Grind the wheat.

Sift the flour.

1 – The grains are removed

2 – Sorting is made by hand

The sieve is used to separate the chaff from the grains. If you blow, the chaff flies away,

The grains go here, the chaff goes there.

You shake from left to right like this and up and down. The grains do not fly away.

3 – Crushing with the pestle, with the hammer, with the mill

With which tool is it easiest?

4 – Sifting, that is to say to separating the bran from the flour.

The different actions were conducted in proper sequence.

The only confusion made concerned the use of the sifting mill.

f- Visit to a watermill: le moulin d'Ablon

Mr and Mrs. Sénécal, the owners of the watermill, set the mill back in operation for us. (drawing)

Analysis of the mechanism

Drawing a parallel with the simple actions conducted by the children:

crushing the wheat in different ways (the children),

crushing the wheat between millstones by a watermill.

Children's reactions to the watermill

We had better not put our fingers in the big millstone. Charlotte.

It's impossible; it has wood all around. Sarah.

The one underneath isn't turning. Johnny.

Watermills only existed in the past. Yohann.

It isn't the wheel which pushes the water, it's the water which pushes the wheel. Axel.

It's the miller who turns the "things" (gates) to make the water stronger. For the wheel to turn quicker. Jason.

They're mechanisms. Ridwan.

The wheel behind the wall is very big, it makes the mechanisms turn.

There's a middle-sized wheel and a small one too. Charles.

The wheel makes the mechanisms turn, the mechanisms make the millstone turn. Margaux.

The bag of wheat is hung by a chain. Charlotte.

The planks up above (trap door) are opened. Benjamin.

The bag goes up, then the wheat falls into a big box (hopper), the wheat falls, some is shaken. Alexis.

The wheat grains fall between the millstones.

They crush.

And the flour falls down into a pipe. It's whole flour. Dylan.

After the visit to the mill, the children asked the following questions :

What crushes in the mill ?

What is it which crushes ?

Yohann : The mechanisms, the handle makes the mechanisms turn. Look inside, the drawer has to be taken out.

Davy : I know why it crushes ... 'cos there's teeth.

Sequence 2 - From flour to bread

In class, pupils made their own bread. After this work, they visited a bakery to discover how bread is made in large quantities.

Programme content : living things – learning to be healthy - Importance of rules of hygiene (food…)

Issues approached: food-digestion, plants.

a- Breadmaking in class

The following are mixed together:

flour : 500 g

warm water: 30 cl

yeast: 10 g

salt: 10 g

The dough is kneaded and left to stand for 20 minutes :

The dough is shaped into a loaf,

cuts are made in the top surface,

the dough is left to rise for 3 hours and 30 minutes.

The bread is baked for 45 minutes,

and is ready for eating !

Scientific approach

Analysis - comparison

The dough has risen.

Why ?

Formulating a hypothesis

It's the yeast which makes the dough puff up.

Experiment

Make bread WITH yeast.

Make bread WITHOUT yeast.

Conclusion

Yeast makes the bread rise.

Other experiments to compare taste, texture, colour

1: Making bread with whole flour.

Making bread with sifted flour.

2: Making bread with salt

Making salt-free bread

Observation of changes in consistency, colour, taste before and after baking : heat and time.

Observation of time left to rise and baking time compared with recreation time, breakfast time, or lunch at the canteen.

b- Visit to the bakery

Objectives

To discover the baker's shop and bakery.

Discovering the bakery

Discovering how bread is made

Who works in the bakery ?

What is the baker doing ?

What is the apprentice doing ?

Which machines are used to make bread ?

Kneading machine, oven, cutting machine.

Presenting the baker's shop

Who works in the baker's shop ?

What is the baker's wife doing ?

What is the shop assistant doing ?

The children visited a bakery after completing the "from flour to bread" activities. They were well familiar with the recipe for bread, the order of sequences for its preparation, and with the tools and machines used..

This visit gave them the opportunity to test their knowledge and appreciate the quality of a professional person's know-how.

We asked for advice on kneading and baking

Sequence 3 - Project Appraisal & Open Day

On an Open Day, pupils were delighted to show their families all their knowledge on the subject, inviting the adults in their turn to "put their finger in the pie ".

Programme content: living things – learning to be healthy – Importance of rules of hygiene (food...)

Issues approached: food-digestion, plants.

a- Project appraisal

Acquisition of know-how.

In action:

To remove the chaff from the grain

"It's easier to blow on it. It works quicker than by sorting."

To crush the wheat with the pebbles: adapting action to achieve a crushing function.

"You don't hit, you rub, you crush with the small pebble."

"You don't hit, you rub, you squash with the small pebble." (the top one)

In choice of instrument. Adapting to functional use.

Choice of the electric coffee grinder to obtain well crushed wheat.

Choice of the finest sieve to obtain whiter flour.

Acquisition of understanding and knowledge

Development of a critical mind.

Seeds: becoming aware that a seed gives birth to a plant, that the plant is born, lives and dies, hence the need to water it and place it in the light.

The wheat planted in dry ground did not germinate.

The wheat in the pot closed inside a cupboard germinated and grew. But the shoots were yellow instead of being green and they withered quickly. «Mustn't put it in the dark " Dylan

Mills

Johnny : "the millstones are like us with our pebbles, they crush."

Ridwan : "the one underneath doesn't move. The one on top turns"

Yohan : "it was in the past that people did like this." (during the visit to the mill)

Interest in documents: more consulting, searching;

Children compare action, tools used in former times with those used in class, those used at the present time. Charly shows a picture of work in the fields: "It's better with the combine harvester. Before it was very long. Before the men must have been very tired. "

Greater technological inquisitiveness and more questioning.

Before going to visit the mill and before starting work on the working mechanisms, the children had never wondered:

how a coffee grinder works.

how it crushed.

for them a coffee grinder crushed, and that's all, its actual working had not seemed of interest to them.

b- Possible extensions

Learning gear mechanisms based on the mill

Learning the use of scales by weighing wheat, flour, bread

Construction and experimenting with different types of scales.

Using magnifying glasses to observe the wheat, flour, bran and representative drawing.

Making a grain and seed cake to feed the birds in Winter.

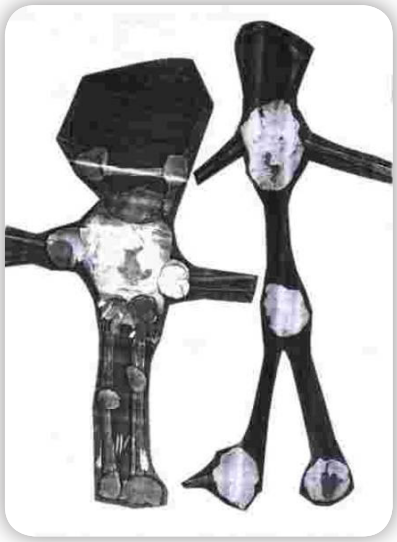
Making fat liquid by heating and solid by cooling.

Wheat as animal food and especially for the chicken we have in the playground.

Use of straw and bran.

Culinary activities: cakes, pancakes...

Art activities : various creations using straw, grains.



c- Open Day

Objectives

To prompt parents to take part in the project.

To show them their children's know-how.

Starting from an ear of wheat, children follow all the process stages needed to make flour. (Chronological anticipation)

To make bread from:

-whole flour (the flour produced at the water mill).

-sifted flour.

Organisation

According to their choice, the children are divided into different workshops.

1 - Workshop : from wheat to flour.

2 - Workshop: from flour to bread.

Material

Pebbles, various mills, various sieves, colanders, salad bowls, spoons, plates, cups.

Procedure:

Workshop one – from wheat to flour

Each child is given some wheat ears and changes section at his/her own rhythm and according to need.

Several activities have to be completed in proper sequence:

1 : Shell the wheat ear

2 : Separate the grain from the chaff: by blowing on it.

3 : Crush the wheat to obtain flour : using pebbles, manual or electric coffee grinders.

4 : Sift the flour obtained using the sieves, colanders, sifting mill.

As and when the children have produced their flour, they supply a modelling workshop for their parents with modelling dough made from flour, salt and water.

Workshop two: from flour to bread

Making whole bread using the flour produced by the water mill in Ablon. Making white bread.

Review of the Open Day

Difficulties : material installation must be well prepared so that all the children are busy at the same time with specific material.

Positive outcome:

The children fully completed their activities.

The children were pleased to see their parents' interest in their activities.

The parents "put a finger in the pie".

The parents appreciated the Open Day and its activities.

The sequence lasted more than one hour, all the children were most active in a very calm atmosphere