Lifelong Learning Programme

It All Starts With a Question

2013-2015

IT ALL STARTS WITH A QUESTION (2013-2015)

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A GUIDE OF GOOD PRACTICES ON CREATIVE APPROACHES TO SCIENCE EDUCATION

Partners:

Kindergarten der Volkshilfe Rosental a.d.K., AUSTRIA

Szkoła Podstawowa Nr 2 w Siewierzu, Siewierz, POLAND

Ecole Maternelle Jean Jaures, FRANCE

Happy Kids Kindergarten, ROMANIA

J.UZM.ÇVŞ. Şehit Ahmet Güngör Anaokulu, TURKEY

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A GUIDE OF GOOD PRACTICES ON
CREATIVE APPROACHES TO SCIENCE EDUCATION

About this guide

What is It All Starts With a Question?

It All Starts with a Question is a Comenius multilateral partnership developed and implemented between 2013-2015. The project aims at fostering creativity at early ages through science-based, hands-on activities. The main goal of the project is to discover as many creative ways as possible to teach and to learn about the world. Two of the most important means to achieve our goal are the cross-curricular approach and the use of the inquiry-based method.

Who are the partners?

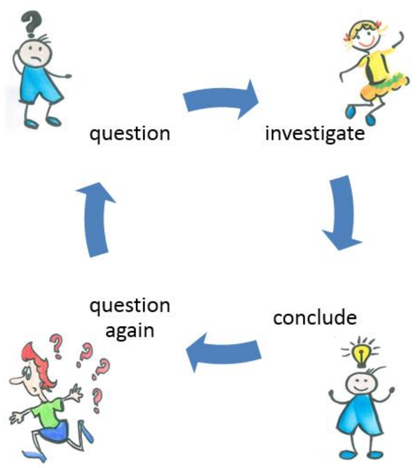
The participating schools to this project are Kindergarten der Volkshilfe Rosental a.d.K., (AUSTRIA), Ecole Maternelle Jean Jaures (FRANCE), Szkoła Podstawowa Nr 2 w Siewierzu, Siewierz (POLAND), J.UZM.ÇVŞ. Şehit Ahmet Güngör Anaokulu (TURKEY), Happy Kids Kindergarten (ROMANIA), the last preschool being the coordinator of the project.

Each of these partners came along with its experience and specific profile. Thus, this project seed was nourished with everything each school had the best: Austria had a lot of experience in Inquiry-based education and advanced educational technology, the Polish partners stood out for their child-centered vision and fresh thinking, the French added an artistic touch, the Tukish partners combined tradition with innovative ideas. The Romanian preschool benefited from the active participation of its school partner (Discovery Kids Primary School) and came along with a large spectrum of activities implemented to children 2-7 years old.

This healthy diversity is reflected in the richness of ideas and perspectives with which each theme was approached. The children involved in the partnership participated to hands-on activities, solved problems in creative ways, found imaginative solutions to questions, constructed models, searched for information. The teachers learnt to think out of the box, became experts in Inquiry-based science education, promoted innovation and discovery and, with their best ideas, wrote the present guide of good practices.

What exactly is this Guide of good practices?

This guide is a comprehensive resource of creative approaches to science teaching and learning. It takes the form of inquiry-based lesson plans following the stages of the IBSE method:



However, these are not simple lesson plans: each activity comes with its own learning story of how the children responded intellectually and emotionally to the experience as well as their questions and reactions. Each plan also includes the conclusions drawn after the activity was performed and further investigation possibilities suggested by the teachers. Photos taken during the activities offer details and "talk" about the children's' hands-on and minds-on attitude.

The examples provided in the Guide range from 20 minutes inquiry-based lesson plans to 3 weeks projects. They also address children aged 2-7 and most activities can be performed with students up to 10.

Each activity followed the next guideline structure:

Title

Introduction:

Background:

Purpose:

Aims:

The children will:

- **................................**

Vocabulary/Key words:

Process skills:

Time/Duration:

Materials and resources:

Question(s):

Hypothesis:

Procedure:

A. Preparation

B. Exploration

C. Discussion questions

D. Conclusions

E. Assessment

Further investigations:

Inquiry and creativity elements:

Teacher's notes:

*** Photographs**

This guide addresses preschool teachers but it can be used with success by primary school teachers, too. Science club teachers and even parents may find lots of useful ideas to put into practice with their children.

INQUIRY-BASED SCIENCE EDUCATION AND CREATIVITY AT EARLY AGES

"The man who has no imagination has no wings".

Muhammad Ali

Historically, **creativity** has been seen as a mystical and agonizing process, the realm of geniuses, artists and eccentrics. Nowadays, the meaning of creativity has shifted form the traditional link with geniuses to finder of new paths or problem-solver. Today, creativity is recognized as a *practical skill*, "one which can be taught and which everyone can achieve. It is a way of thinking in which we look at familiar things with a fresh eye, examine a problem with an open mind about how it might be solved and use our imagination rather than our knowledge, to explore new possibilities rather than established approaches".

(Wynne Harlen, Inquiry in Science Education, www.fibonacci-project.eu)

We believe that children are born with natural creativity, the reason why they can come up with fantastic solutions to problems, invent imaginative stories and think the make-believe is real. It is us, adults that unfortunately cut their wings to "bring their feet to the ground". Unfortunately, this might make them better cope with some aspects of the real world like discipline but inhibits otherwise natural creative impulses. Children are born problem seekers and solvers, and creativity is an integrant part of their playful exploration.

Inquiry based science education is the method where children can build their own knowledge and understanding through mental and physical activity. They observe, question, predict, collect data, reason, conclude on evidence and discuss results.

Creativity seems to be so much in the "air" whereas Inquiry Based Science Education is well grounded in observation and understanding of real data. What is the connection?

Both inquiry-based science education (IBSE) and creative approaches (CA) are pedagogically associated with child-centered philosophies; the child is a curious thinker, an active doer and he naturally wants to get the meaning of what is happening around. He really wants to understand the world and he is getting there through experiential learning. The common synergies of IBSE and CA are:

- *Playful exploration and experimentation* -the essence of IBSE and CA
- *Motivation and emotional involvement*-emotional responses are triggered by motivation to find the solutions to a problem-situation.
- *Collaborative learning and dialogue*–the children share their points of view and develop their thinking-skill by listening to peers.
- *Problem finding, problem solving*-providing children with meaningful problem situations can therefore trigger their creative thinking in problem solving and also gives them opportunities to develop their own questions and ideas.
- *Questioning and curiosity*-young children are very curious and seek to explore the world by all means. The educational process can inhibit, stifle their curiosity. Teachers who use a lot of questions achieve high levels of student involvement and promote learning; on the other hand, creative students enhance their teacher's creative thinking.
- *Reflection/reasoning*–This is a metacognitive process when everything that happens or is thought is filtered through evidence and compared to earlier experience. It is often a moment of truth and illumination because reasoning or reflection leads to "I've got it".
- *The teacher is a facilitator*-who ensures the proper environment for learning, makes sure the child has all he needs for his quest. Many times the children make mistakes. Fortunately, we learn more from our mistakes than from being told the correct thing. Let them try and do and think. Important is not the result but the way to get there.

To develop and encourage creative thinking, the following *techniques* apply to a science classroom:

- Give examples of creative thinking and show them examples of creativity and its influence upon our world. While science activities are in development, come up with creative ideas along with your students. As a teacher always be creative and ready for adventure!
- Repeatedly encourage students to come up with new, independent ideas—generating new ideas should become a daily process used in all aspects of your activity. A positive, free of criticism environment always helps!

- Make cross-references. Phenomena do not care about biology, math, chemistry or physics. They are a combination of all these. Avoid being subject-bound; students' creative ideas and insights often result from integrating material across subject areas.
- Encourage question-making–every time a child comes up with a question he is eager to find the answer to it. Asking the right questions is much more important than just learning facts because it develops thinking-skills and motivates you to find an answer.
- Enlarge your viewpoints—try to find connections between ideas / objects/phenomena that apparently have nothing in common, try to find creative ways to use objects and new ways to prove your ideas, include as many viewpoints as the subject allows.
- Build self-confidence in creative capacities—all students have the ability to create and to experience the joy of having new ideas, but they must be helped to believe in their own capacity to be creative. It's the power of *I believe…so I can!*

When dealing with young children many forms of creativity come out from necessity. We must find the best way to encourage kids to learn or to understand; we have to discover as many ways as possible to pass on skills and knowledge.

A good teacher is able to think outside the box and find creative ways to motivate children to start their quest. A good teacher is able to find what really works and he/she is willing to try different techniques until he/she discovers the best solution to help children learn. **Teach creatively and teach for creativity!**

(Sources: Ron Clark, The Excellent 11, Ed. Hyperion, New York, 2004
Wynne Harlen, Inquiry in Science Education, www.fibonacci-project.eu,
Enabling Creativity through Science and Mathematics In Preschool
and First Years of Primary Education, www.creative-little-scientists.eu)

What is Inquiry- Based Science Education (IBSE)?

"I have no special talents. I am only a passionately curious".

Albert Einstein

Inquiry is a term used both within education and in daily life to refer to seeking knowledge or information by asking questions. Inquiry means research, investigation, "search for truth". Inquiry can be used in all subjects such as arts, history, geography, language, science and technology.

Inquiry–based education means students progressively develop their knowledge and understanding of the world through their own mind and physical activity.

The first reason for using inquiry-based education in It All Starts With a Question project is that it facilitates understanding. Learning with understanding is different from remembering simple and plain facts such as the names of the planets in the Solar System, the scientific names of plants or bugs, or the Newton's theory of gravitation. Facts are important but they are insufficient for developing understanding. Information needs to be organized in puzzle-like pieces brought together to form principles and concepts which can be used in making sense of new events and phenomena. The important thing is for students to understand *why* the sky is blue and *why* some objects are attracted by the magnets and others not. Also, the inquiry-based education *skills* such as: critical thinking, collaborative working, consideration of alternatives, effective communication. The last reason, but maybe the most important one, is that inquiry-based education provides *joy and satisfaction* in finding out for themselves something new or answering a question.

The theories, the concepts cannot be directly transmitted to the learners especially to the younger ones; they must be (re)created and adapted by the learner's own thinking. When students encounter something new to them, they attempt to make sense of it using ideas formed from earlier experiences. These ideas become the foundation on which students can develop explanations for the new experiences. That's the reason why it is very important for students *to have experiences* which enable them to make sense of different aspects of the world. First hand experiences are important for all learners, but crucial for the young students in particular. The kids need to develop the skills used in testing ideas: questioning, predicting, observing, interpreting, communicating and reflecting.

Scientific inquiry starts from an object or phenomenon. Students observe something and ask a question. This question leads to speculations (possible explanations) about what might explain it. Usually the speculations are based on what the students already know about it (existing ideas). An "educated speculation" is a hypotheses (a prediction) which leads to investigation, experimentation, collecting and interpreting data, drawing conclusions and formulating new questions. This is the process of building understanding through gathering evidence; children test the hypotheses and the ideas behind them in a scientific manner. This is what we call learning through scientific-inquiry.

Teaching science (or something else) through inquiry involves teachers in a range of pedagogical decisions:

- How to *organize the classroom* - if students engage in hands-on investigations in groups, the classrooms must be set up to make this possible.
- Encourage the *collaborative work* - students work together, trying things out, coming up and sharing new ideas, learning from each other.
- How *to ask productive questions* - "A good question is a stimulating question, which is an invitation to a closer look, a new experiment or a fresh exercise". (Harlen, W. 2001, p. 34) "Productive" questions stimulate productive activities.
- How *to use students' prior experiences and ideas* - at the beginning all the students are introducing their ideas based on what they already encounter in their day-to-day lives. Some of these ideas could be wrong; it is the teacher's task to offer alternative ideas and not to impose the "right answer".
- How to *help students to develop and use inquiry skills* - for the development of all inquiry skills the most important factors are: the students have the opportunities to use them and discuss their function.

- How to *stimulate discussions among students* - discussions among students take place throughout the inquiry process in pairs, in small groups and as a whole class. Each type of discussion has its own meaning, purpose and importance.
- How *to guide student recording* - a record of science activity (text, drawings, graphs, posters) is an essential part of working scientifically. The young students need guidance in recording their ideas, observations, data and conclusions. The teacher can use these records in many ways (for a new investigation, for assessment).
- How *to use the assessment (formative assessment) to help learning* - the formative use of assessment is a cyclic process in which information about students' ideas and skills informs teachers and helps learner's active engagement in learning.

Learning through inquiry is important because it leads to understanding, not only of fundamental scientific ideas but how these ideas are developed, provides enjoyment and satisfaction to discover something by your own, having made sense of something that was not previously understood. It also develops fundamental skills widely recognized as needed by everyone in the 21st century.

(Source: Harlen Wynne, *Inquiry in Science Education,*

Artigue Michele, Dillon Justin , Pierre Lena, *Learning Through Inquiry)*

A SAMPLE OF SCIENTIFIC RESEARCH

FOR PRESCHOOL EDUCATION

"Drowned" gummy candies

Preschoolers are wonderful explorers. They are curious, anxious to experiment, to discover new things. When we guide their path in science quest we simply provide them some useful tools in developing process skills: observe, measure, collect data, interpret data, communicate, form a hypothesis, draw conclusions.

Catch their attention:

Everybody likes candies and gummy candies. Sour-sweet combination, vivid colors, amazing shapes (worms, spiders, bears, fruits) they are a great temptation. But gummy candies could be a scientific research subject, too.

Step 1. Make observations

Pass around some gummy candies. Ask children to notice how the gummy candies look, smell, feel, taste. They can observe that gummy-bears:

- come in different shapes: bears, spiders, fruits, worms
- smell like fruit juice
- feel soft and fine, sometimes sticky
- taste sweet and sour

Step 2. Ask a question

What will happen if I leave gummy candies in water overnight? The question is a consequence of a simple fact happened earlier in the class-room: a glass of water split over some gummy candies.

Step 3. Predictions and hypotheses

Predictions:

- **If** I leave a gummy candy in water overnight **then** the gummy candy will get larger.
- **If** I leave a gummy candy in water overnight **then** it will get smaller.
- **If** I leave a gummy candy in water overnight **then** it will stay the same size.

In a prediction the key words are: **if**….and **then**…..A prediction is a statement that talks about an outcome. What about **hypotheses**? Well, a hypothesis is a prediction with an explanation. Hypotheses are written using **if…… then……because…….. .** Hypotheses are logical, educated guesses. Both predictions and hypotheses are based on prior knowledge and past experiences. Examples:

- **If** I leave a gummy candy in water overnight **then** the gummy candy will get larger **because** the gummy soaks water like a paper tissue.
- **If** I leave a gummy candy in water overnight **then** the gummy candy will get smaller **because** water dissolves the sugar from inside (like a sugar cube)
- **If** I leave a gummy candy in water overnight **then** the gummy candy will stay the same size because gummy and water don't interact. There is no reaction between them.

Step 4. Conduct an experiment to test the hypothesis. Record data.

- So, chose a hypothesis and test it.
- First, use a ruler (or a paper strip) to measure the length of the gummy candy (the longest side). Record the result on a data sheet.
- Leave the gummy candy in water over night. Use a small paper cup or a plastic cup.
- Use the ruler to measure the same side again. Record the result.
- Children can simply draw the candy before and after it is be left in water.

Step 5. Judge the hypothesis. Draw conclusions

Using the information from the data sheet draw a conclusion:

- Yes, the data matched my hypothesis
- No, the data didn't match my hypothesis

Step 6. Reflection and new questions

- What kind of candies did we test? Will we get the same results if we use another kind of candies?
- How about the temperature of the water? What happens if we' use hot water instead of cold water to soak the candies?
- And how about the time? Overnight, just a couple of hours…



DISCOVERY KIDS SCIENCE CLUB

Activitatea: Bomboanelor le place apa?

Fisa de lucru

Numele ANDREI .... Data 17.09.2013

Tip de bomboana testat: SUGUS ....

Alte materiale: pahar de plastic, apa, rigla de hartie, creion, foarfeca, servetele de hartie

Ce ipoteza testam:

BOMBOANA SE MARESTE DEOARECE ABSOARBE APA	✓
BOMBOANA SE MICSOREAZA DEOARECE SE DIZOLVA IN APA	
BOMBOANA RAMANE LA FEL PENTRU CA APA NU ARE NICI UN EFECT ASUPRA EI.	

Am masurat lungimea bomboanei:

LUNGIMEA INITIALA	LUNGIMEA FINALA
	ANDREI

Rezultatul experimentului confIrma ipoteza? Incercuiti raspunsul corect:

DA **NU**

DISCOVERY KIDS SCIENCE CLUB

Activitatea: Bomboanelor le place apa?

Fisa de lucru

Numele RĂZVAN .... Data 17.09.2013

Tip de bomboana testat: SUGUS ....

Alte materiale: pahar de plastic, apa, rigla de hartie, creion, foarfeca, servetele de hartie

Ce ipoteza testam:

BOMBOANA SE MARESTE DEOARECE ABSOARBE APA	✓
BOMBOANA SE MICSOREAZA DEOARECE SE DIZOLVA IN APA	
BOMBOANA RAMANE LA FEL PENTRU CA APA NU ARE NICI UN EFECT ASUPRA EI.	

Am masurat lungimea bomboanei:

LUNGIMEA INITIALA	LUNGIMEA FINALA
	RĂZVAN

Rezultatul experimentului confIrma ipoteza? Incercuiti raspunsul corect:

DA **NU**

DETAILED CONTENT OF THEMATIC LIST

1.	**How does my body work?**	What bones consist of Playing with bones Our internal organs With every beat of my heart Playing with senses Which is your favorite Optical illusions Feeding and growth
2.	**Falling into winter**	Falling into winter The weather forecast Fog-detectives: Let's create clouds and fog! Studying the leaves How long is a leaf? How can a flower stay beautiful for a longer period of time? Naturally colored play dough Outdoor is great! My fireplace
3.	**Kitchen chemistry in Santa's Worshop**	Kitchen chemistry in Santa's workshop My own volcano What makes cake so light and soft? Why does the bread dough rise? A friendly and useful bacteria
4.	**It starts with a drop of water**	Does a snowman in a coat melt faster? How does it rain? It starts with a drop of water Dancing raisins Sink of float Water experiments How can we break the ice? Water cycle models

5. Science in a fairy-tale

Playing with mirrors

Bob – the magnetic dog

Nasreddin Hodja and fermentation of yoghurt

The three little pigs

The Gruffalo's child

Egg power

The knight's weapons

Making a boat

Solving problems: the goat, the wolf and the cabbage

6. Can I play on that?

Sound – experiments and recycling

Making musical instruments for the Carnival

Musical bottles

Green musical instruments

Ring the bells and beat the drums

7. Eggs-periments

Eggs-periments

What can I do with an egg?

The birth of a chick

Jumping eggs – bouncing eggs

Eggs-periments

Egg shell on test

Growing crystals on egg shells

8. If I were

Dinosaur steps

Earthworm investigation

If I were a…

If I were…

The potato logbook

Take a look at my kindergarten. Storks – an aerial view of the area!

9. Creative superheroes

Plastic Man, the superhero

Solar detective are on the way

Making robots

The avengers saving the Earth

	I am the environmental hero of my future
	A water treatment plant
10. Science in a box	Turn on the light bulb!
	The green earth breathes out clean water
	About magical heads & dancing stars
	My box of magnets
11. Family herald	My class coat of arms
	A family coat of arms
	Family links
	The little detectives
	Discovering my family
	Who lives in my house?
	How old is my family?
12. Science in grandpa's backyard	Playing with a balance scale
	Playing with nails and hammers
	Let's play with clay!
	Our "traditional" science
	Seeds
	Grandpa's tools: up and down with the pulley
	What drives a car? – The PET Bottle Rocket
	Watermills
13. Santa is a scientist	BeeBot visits Santa Claus in the Advent City
	Toilet paper tube snake
	Winter wonderland in a jar
	The inclined plane
	Kaleidoscope: the shape and color
	It's time for charity
	Christmas toys
14. Get sporty	Inclined plande in sports and life
	Cardiologist
	Balance – Figures – Everything's balanced!
	How far can you get in the long jump?

	Sport activities at school
	Let’s move!
	Perfect footwear
15. History in a nutshell	Build knowledge by building houses!
	Transportation then and now
	Paper airplane
	Fly away, my paper airplane!
	A string phone
	Life cycles
	How was my chocolate produced? The bursting chocolate marshmallows
16. Earth Day is every day	How do mountains form? Why does the earth sometimes quake?
	Craters on the Moon
	Little ants on Earth Day
	Terraformation
	Treasures of the Earth
	I’m an alien
	Our life sources: water and soil
	Save the trees – make recycled handmade paper!
	Selective sorting and recycling
17. Spring detectives	Where is spring?
	Bees and flowers
	Bug detectives
	Plant detectives
	Spring flower investigation
	The journal of spring signs
	Our weather is crazy, isn’t it?
	Trees and flowers are living beings
18. The legend of the flower	A bouquet of floral thoughts
	Dandelion – The legend of a flower
	From seed to leaf
	The tiny seed

The legend of a rose

The legend of Peony

Watch our Amaryllis grow

The legend of a flower

How Does My Body Work – Lesson Plan Synopsis

Lesson plans	Partner Country	Synopsis
What bones consist of	Austria	An activity which gives a closer look at the structure, functions and different types of human bones.
Playing with bones	Poland	Bones of all kinds analyzed with the help of real x-rays.
Our internal organs	Turkey	An activity that makes the connection between human internal organs and fruits and vegetables.
With every beat of my heart	Romania	In this lesson, children try a model of a heart to better understand its pumping function.
Playing with senses	Romania	Children work in small groups focused on the five senses.
Which is your favorite	Romania	This project's goal is to have children use as many senses as possible and chart their preferences.
Optical illusions	Romania	With this activity the children investigate the sense of sight with the help of optical illusions.
Feeding and growth	France	Food can be sorted into groups and a balanced diet includes food from all these groups.

School/Kindergarten: Kindergarten der Volkshilfe Rosental a. d. K., Austria
Subject: Integrated Science and Health, Age group: 3-6 years-old
Teacher: Sabine Hirschmugl-Gaisch

How to keep an upright posture – or – What bones consist of…

Introduction:

This activity is part of the theme **How does my body work?**

It was an actually unpleasant accident that led us to our decision to have a closer look at human bones. When a colleague`s son appeared in our kindergarten with a broken hand, immediately after the initial treatment in the local hospital, we got the chance to see some X-ray images. Astonished at the opportunity to view such pictures, we also got an idea of how fragile children`s bones can be.

Background:

The bones of our skeleton can be felt all the time, but mostly cannot be seen. We came up with more and more questions concerning these parts of our body and we recognized that we were hardly able to answer all of them: What do our bones consist of? How many different bones are there in our body? Which tasks and functions do they have? What makes our skeleton flexible and what gives us the ability to stand firm on the ground?

Purpose:

After we had heard the question, if the broken hand will ever get well again, we finally decided to have a closer look at the structure, the function and the different types of human bones. Moreover we wanted to improve the personal body perception of our children by working on the different parts of our skeleton as well as on the ability to sense several bone types on our own body.

Aims:

- Getting to know different types of bones and joints of our body
- Having a closer look at and learn about the spine and its functions
- Getting to know light board-panels and X-ray photographs
- Developing an imagination of the internal side of our body
- Raising the awareness for the necessity of treating our bodies carefully
- Emphasizing the importance of certain nutrients in order to stay healthy and fit, with a special focus on regular physical exercise and the mineral nutrient of calcium (presentation of some food products, which contain it)
- Introducing first-aid methods in case of certain injuries
- Explaining the illness of osteoporosis – "When the bones fell sick…"

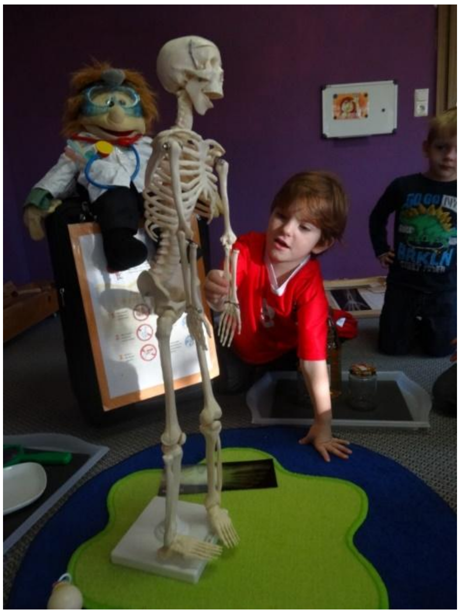
The children will:

The children are given the opportunity to experience and to explore the human skeleton with its numerous bones on their own bodies as well as with the help of certain models.

Vocabulary/Key words: skeleton, spine, bones, joints, hollow bones, flat- fixed - small - vertebral bones, vertebrae, spinal cord, intervertebral discs, nerve tracts, spinal process, finger-bone, toe-bone, ball joint, prop joint, egg joint, rib, skull, cranial bone, bone density, cartilage.

Process skills:

Observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.



Time/Duration:

The experiments were done in small groups of approximately eight children and each of them took about 45 minutes.

Materials and resources: lightboards, X-ray photographs, a skeleton, self-made models of bones and bone structures, wooden blocks, sponges, real chicken and pig bones, vinegar, water, glass with screw caps.

Questions:

- ***What are our bones and the whole skeleton build up of?***
- ***What makes a bone heavy or lightweight?***
- ***What is a cartilage?***
- ***How is the spine structured?***
- ***What allows us to be moveable?***
- ***What is a joint?***
- ***Why do bones need calcium?***

Procedure:

A. Preparation

After we had looked at the X-ray images and the injured hand of the child in a larger group, we continued working on the skeleton models and the names of the different bones in smaller teams.

Next, we made spine models out of small wooden blocks, sponges and special Aluflex-tubes, so that we were able to demonstrate the mobility and the functionality of the spine and the intervertebral discs in a graphic way.

B. Exploration:

In order to emphasize the importance of calcium for our bones, have a look at several pig and chicken bones, which differ in their dimensions. For this task use magnifying glass and mini-microscopes as well as our light board-panels and the different X-ray photographs.

For the following experiment use two jars with screw caps - one were filled with water, the other one with white vinegar. In each glass place two chicken bones of equal sizes and leave them in the liquids for seven days. Every day observe closely and identify any changes to the bones.

C. Discussion questions:

"What do you think will happen to the bones in the two different liquids?"

"How could this process be influenced by the calcium?"

D. Conclusions:

After seven days, both bones were removed from the liquids and we got the interesting result of our experiment. The bone from the glass of water had preserved its stiffness while the bone out of the vinegar was flexible like rubber.

Therefore we could conclude that the bones are stiff as long as they contain a special substance, named calcium. An acid like vinegar extracts the calcium from the bones and makes them rubber-like flexible.

We discovered that people could neither stand nor move without calcium in the bones of our body.

E. Assessment:

What does a bone need to heal again after a sickness or a fracture? (rest, protection, support like plaster, proper nutrition, etc.)

Further investigations:

With the help of photographs and self-made models, different types of joints should be discussed. Which kinds of food contain calcium and which are "calcium-robbers"?

Inquiry and creativity elements:

During our research on the human body, we used equipment like magnifying glass, light board panels and mini-microscopes for the very first time.

Moreover some of the approaches could be integrated into activity games, which are regularly used in the context of physical education (sports). On the basis of our results, we also decided to offer more healthy snacks in our institution.

Teacher's notes:

Models of skeletons and spine, real bones of animals, but also X-ray images lost their daunting effect and were soon observed from the researcher`s point of view and no longer regarded as funny "Halloween"- equipment.

School: Szkoła Podstawowa Nr 2 in Siewierz, Poland
Subject: Integrated Science, Anatomy and Art, Age group: 3-4 years old
Teachers: Dagmara Malota-Machura

"Playing" with bones

Introduction:

These activities are part of the theme **How does my body work?**

The stable frame of our body consists of bones. They support our bodies when we stand, sit, run or jump. The bones also protect our organs inside and we can't forget that it is very important to keep them strong and healthy.

Sometimes children seem to be afraid of bones mostly because they associate them with scary skeletons, angry pirates or other ghosts. But today Mr. Bony will prove that bones are nothing to be afraid of.

Background:

Humans and many other animals have a skeletal system made up of hard pieces called bones. Bones help to support the body and to protect its organs. Bones store important nutrients and minerals, too. Bones also make blood cells. The human body has more than 200 bones.

(source: http://kids.britannica.com/elementary/article-390656/bone)

Purpose:

In this lesson, the children will gain basic knowledge of the skeletal system.

Aims:

The children will:

- Watch x-rays of bones and guess their names
- Know how our bones work
- Know that every human being has the same number of bones
- Know that the backbone is the most supportive structure of the human body

- Describe the skeletal system

Vocabulary / Key words:

Bones, skeletal system, x-rays, skeleton, movement, backbone, knee, elbow, light, bending, fingers, walking, sitting

Process skills:

Observe, analyze and describe, conduct an experiment, gather information, draw conclusions communicate observations, information and conclusions.

Time / Duration:

45 min

Materials and resources:

X-rays of different parts of the body, anatomical skeleton model, black stiff paper, glue, cotton buds

Question:

What would happen if we didn't have bones?

Procedure:

A. Preparation

Introduce Mr. Bony to the children. Tell them Mr. Bony is nothing to be afraid of. Place the x-rays on the window panes.

B. Exploration:

Let the children guess the parts of the body presented in x-rays. Now ask them to indicate these body parts on Mr Bony. After that compare the number of toe bones in x-ray with the number of toe bones 'in' Mr Bony. Try to take out the backbone from the skeleton and show the children what happens. You can also use a rag-doll to demonstrate what will happen if we don't have bones.

Is it a hand?

Watch out! He is falling down!

C. Discussion questions

What would happen if we didn't have bones? This is what would happen if we didn't have bones!

D. Conclusions:

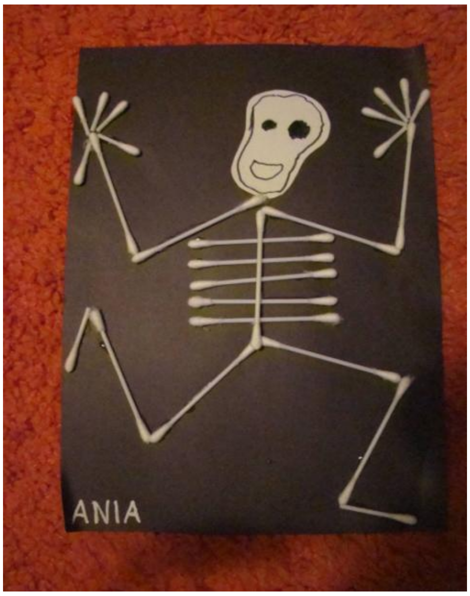
The children noticed that each bone is very important, especially our backbone because without it we wouldn't be able to sit or stand. What is more, they have discovered that our bones are quite thin, some of them are long, some of them are short. Moreover, they learnt that every human being has the same number of bones and that X-rays pass through our body parts.

E. Assessment:

The children really liked the classes. They enjoyed carrying out an experiment with x-rays and the anatomical skeleton model. It was quite easy for the teacher to observe children working. They enjoyed communicating with each other and shared their observations spontaneously. The teacher appreciated the children's involvement, creativity and curiosity.

Inquiry and creativity elements:

Do you know how to make a cotton bud skeleton? We do!



School: Ş. Jan. Uzm. Çvş. Ahmet Güngör Anaokulu, Tarsus-Mersin, Türkiye
Subject: Biology, nutrition, health, human anatomy, Age group: 5-6 years old
Teacher: Nilüfer Keskin, Hülya Sümer

Our internal organs

Introduction:

This activity was held under the topic of **How does my body work?**

Background:

The human body consists of internal and external organs. While we can see our external organs and activate our senses with others (ear, nose, eyes, skin, tongue), there are other systems inside our body which help us carry out our daily life and run systematically.

Purpose:

- Getting to know and telling the names of our internal organs
- Teaching the functions of our internal organs
- Realizing the similarities of vegetables and organs. This way, children can be made aware of their benefit to our health.

Aims:

At the end of this lesson, our students will be able to:

- Be familiar with our internal organs
- Know about the systems that work in our body
- Tell the names and functions of our internal organs
- Know which fruit or vegetable is good for which part of our body

Key words:

Human body, internal organs, functions, fruit and vegetables, internal systems, human biology.

Process Skills:

- Observation, communication, drawing conclusions
- Children will be able to tell the names of our internal organs
- They will be able to talk about the benefits of fruits and vegetables for our body and health.

Time:

45 mins.

Materials:

- A model of human body which shows our internal organs
- Cucumber, eggplant, leak, caulflower, Jerusalem artichoke and pear
- Colour pencils
- Pasteboard
- Scissors

Questions:

- ***How does my body work?***
- ***How do my internal organs work?***
- ***What about my lungs? How does air get into my lungs?***
- ***What if I couldn't breath?***

Procedure:

A. Preparation:

The teacher brought a model of a human body which shows our internal organs. Besides, she brought some fruit and vegetables: cucumber, eggplant, leak, cauliflower, Jerusalem artichoke and pear.

B. Exploration:

After introducing our internal organs and their functions on the model, children sat on the floor making a semi-circle. Teacher explained the functions of internal organs and some of the systems inside our body. She mentioned how they work and what their use is for our body. Then, she asked students some questions and they answered according to what they learned. They also learned about the benefits of vegetables and fruits for our body. All the materials were in the middle. One of the children lied on the pasteboard and the shape of his/her body was drawn. The vegetables were put in the correct places according to their similarities to the organs. They were also informed about the benefits of those vegetables and fruits for our health.

C. Discussion questions:

How do our internal organs work? Which fruits and vegetables are useful for our health and inner organs?

D. Conclusions:

Children were introduced in a fun way to the theme of our internal organs and their functions in our body. They now know that there are some systems in our body which are linked one another.

Assessment:

They were asked to make drawings about our body and answer the questions regarding the functions of our inner organs: *What are lungs for? How does the heart work?...*etc.

Further investigations:

Children can be taught all the inner systems in our body. Many fruits and vegetables can be a material of this lesson to teach their usefulness for our health.

Inquiry and creativity elements:

It was very enjoyable and interesting for them to work on a human body model and make connections with fruits and vegetables around us. They know that there are systems inside our body that work systematically.

Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Age group: 5-6 years old
Teachers: Cristina Vacaru, Popescu Laura

With every beat of my heart!

Introduction:

This activity is part of the theme **How does my body work?**, which introduces children to different body parts. They can also learn how these function together for our benefit. Our 5 year-olds had the opportunity to gain knowledge on some of the most important *internal* body organs, too, understand how these work and how we keep them safe.

Background:

The heart is one of the most important organs in the human body, in many cultures being synonym with life. It is a muscle that is located usually in the left part of our chest and protected by the rib cage. It continuously pumps blood through blood vessels in all our body. The human heart is made up of four chambers: left and right atrium and left and right ventricle. There are also four valves that, by opening and closing, make sure that the blood flows in the right direction. The blood that leaves the heart is carried by arteries, the blood that comes back to the heart is carried by veins. Blood vessels are usually represented in red and blue. When our heart beats, it contracts and makes the chambers smaller, the blood is pumped into the blood vessels thus ensuring our body gets the nutrients, the oxygen or carbon dioxide that it needs in order to function properly.

Cardio mean heart, that is why the study of the heart is called cardiology and the specialist is named cardiologist.

Purpose:

The purpose of the lesson was to help children visualize and thus understand the main function of the heart - pumping blood in our body.

Aims:

The children will:

- Build a functional model of the heart
- Observe, analyze and describe how the beats of the heart are directly connected to the pumping of the blood in our body
- Illustrate the circulatory system in a collage of the internal body parts
- Conduct an experiment to increase understanding of the relationship between the rate of the heart beats and effort making.

Vocabulary/Key words:

Heart, internal organ, pump, blood, veins, artery, heart beat, circulatory system.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

45 minutes

Materials and resources:

Red balloon, straws, red paint / red food coloring, rubber band, water, cardboard cut in the shape of a human body, pictures of internal organs, toilet paper rolls, tissues, rubber band, large bowl.

Question:

How does my heart work and what is its function in the human body?

Hypothesis:

The heart pumps blood in our body. The more effort we put in, the faster the heartbeats are.

Procedure:

A. Preparation:

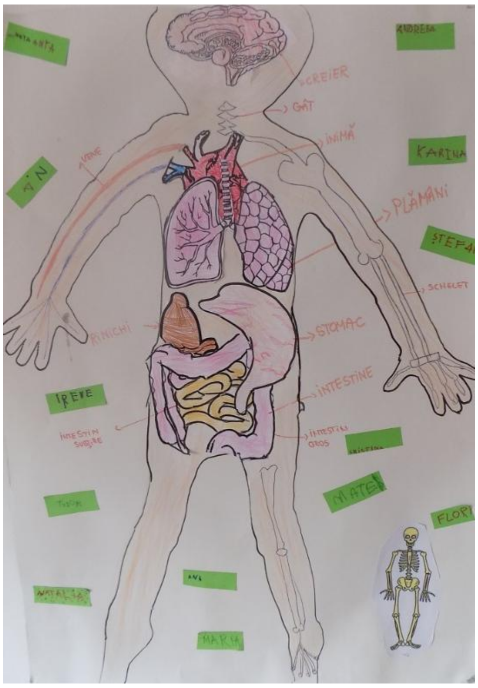
Ask the children to get into pairs and give each child a toilet paper roll. Instruct students to use the paper roll to listen to noises that our internal organs make. They will move the roll around and before long, one of them will surely identify the sounds of the heart beating. Ask this student to move the roll until he hears the sound the best and ask him to describe what exactly he hears and where this sound is coming from. Then, the other students move the toilet paper roll on their partner's body till they find the heart. Ask students to describe where the heart is positioned in our body. Explain that the sound they hear is called a heart-beat. The heart is a muscle that contracts regularly. But why? This is a question that the children should try to answer.

B. Exploration:

Get the children together and ask one of them to fill the red balloon with a mixture of water and red paint / red food coloring. Ask children what they think the balloon and the mixture represent. Use a funnel of necessary. Ask another student to introduce two straws, preferably a red and a blue one. Tie the end with a rubber band. Ask the children to imagine how the heart moves inside our body. If one of them says "pumping", ask this kid to squeeze gently on the balloon and describe what happens. Because this procedure is quite messy, I suggest placing a large bowl under the heart model. Having tissues or a cloth at hand is also a useful idea.

Ask more children to help pumping the blood in the body! I usually ask them to describe what they want to do, to make sure they understand the process. Ask the children to tell you why they think pumping the blood in our body is so important. (The heart pumps blood throughout our body to bring supplies and nourishment that gives us energy to live, move, fight diseases etc.). Explain that the blood is carried through the veins, arteries and capillaries and explain that all of them together make the circulatory or the cardiovascular system. Blood vessels that carry fresh blood or blood with oxygen are usually represented with red, blood vessels like veins that carry blood that had already been used are represented with blue. Project a representation of the circular system on the smartboard and ask the children to point at the heart the size of a fist and at the veins, arteries, and capillars. Explain that the arteris carry the blood away from the heart to reach the furthest part of the body. The veins lead the blood from the extremities back to the heart. The capillaries can be represented as small dashed red and blue lines that connect arteries and veins.

Next have the children draw a life-size outline of one of the children's body on large cardboard sheet by tracing around the student's body with a marker. This outline will be used to represent the position of the heart and the circulatory system during this lesson. Later on, we add other internal parts of the body to finally get the first collage of the internal human organs.



Ask them to make pairs again, and listen to the partner's heart. Then the partner should jump and run and move as fast as he could. Listen to the heart again. What do you notice? How is the rate of the heart beat different? Why do you think it beats faster? What happens if your partner lays still for a minute and then you listen to the heart again? Now switch roles with your partner.

C. Discussion questions:

What does the red balloon represent? How about the mixture of water and paint? How do you contract your arm muscles? What happens when you press the balloon? What do you think the staws stand for? Why do you think it is important for the blood to reach every "corner" in our body? How big is the heart? Where can you find it in our body? What happens if you start running?

D. Conclusions:

When we press the balloon it is like a contracting heart and the "blood" comes out of the it. The harder you press, the more "blood" comes out. It is important for the blood to reach every point of our body as it carries nutrients that give us energy. The heart is protected by ribs.

E. Assessment:

The children were very interested to see how the heart model worked. They built on their previous knowledge and drew conclusions by themselves, thus reaching a new level of understanding. For many of them, the heart had been just a symbol of love and life but now they better understood the functioning of this very important organ. They worked with great enthusiasm on the poster, too, and completed it in the days to come as you can see in the picture.

Further investigations:

The success of this lesson made us build other fuctional models like that of lungs.

Inquiry and creativity elements:

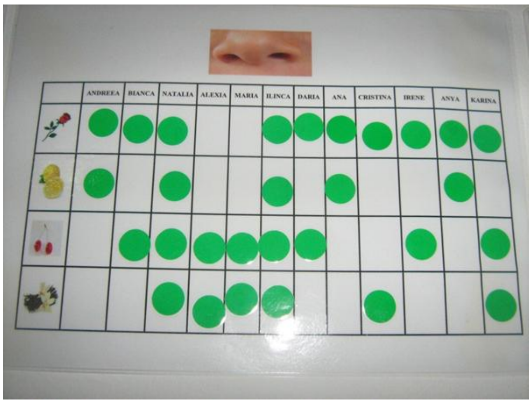
The children liked the open questions and used earlier information to further build knowledge. They were eager to try out the heart model and they proved their understanding of the process.

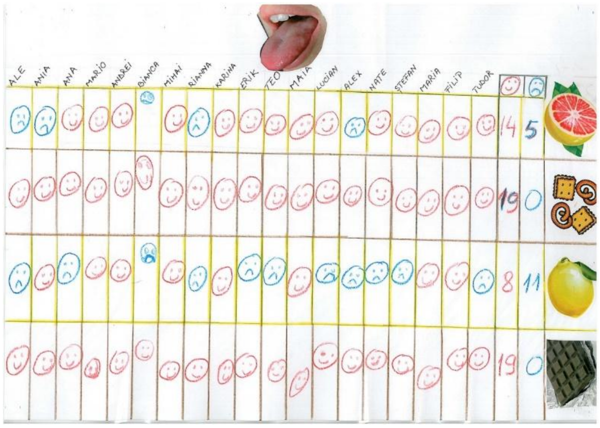
Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Math, Language development and Art
Age group: 5-6 years old
Teachers: Cristina Vacaru, Stefania Roman, Laura Popescu

Playing with senses

Introduction:

These activities are part of an assessment day on "Senses" included in the theme **How does my body work?** There are few themes as fascinating as "senses" for young learners. They enjoy learning interesting facts about their body parts and have a real feeling of discovery when they mostly use one of their senses. We usually study senses for one week: on Monday we introduce the theme, then we focus on one or two senses every day. Children have fun conducting questionnaires on their classmates' favourite smells, noises, sights and introducing their findings in charts like the ones beneath.





Background:

We perceive and understand the world around with our 5 senses: the sense of smell, sight, hearing, touch, taste. The body parts that help us do that (eyes, nose, ears, skin, mouth / tongue) called also sensory organs respond to particular physical occurrences. They get the information and send it to a certain part of the brain, where it is compared to our earlier experience and interpreted. Finally, our brain sends a response signal that will determine our behaviour.

There are photoreceptors in the retina of our eye that respond to light and colour by sending an electrical nerve impulse to the brain. Vibrations of the sound are detected by tiny bones and hair-like fibres in our inner ear and turned into electrical nerve pulses that the brain can interpret. Our skin has neural receptors such as hair follicles while the taste buds located on our tongue can detect tastes like sweet, salty, bitter or sour. The olfactory receptors in our nose not only help us smell things but they are also important for feeling the taste of the food we are eating. Compared to the animal world, our senses are quite weak but we are lucky to have the most developed brain on the Earth. Our senses help us see the beauty of a rainbow, feel the warmth of the sun in spring, calm down when we hear our mommy singing softly, enjoy a vanilla ice-cream in the hot summer that is….live our life.

Source: Science Kids Fun Science and Technology of Kids
(http://www.sciencekids.co.nz/sciencefacts/humanbody/senses.html)

Purpose:

Assess knowledge acquired on the senses theme.

Aims:

The children will:

- Understand how each of our five senses works independently and together to perceive the world
- Create, analyse and describe colour combinations
- Observe and describe soft noises
- Identify smells while developing reading and writing skills

Vocabulary/Key words:

Sense, touch, smell, sight, taste, hearing, eyes, nose, mouth, tongue, ear, skin, signal, brain.

Process skills: observe, analyse and describe, compare, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

50 minutes

Materials and resources:

Posters, a large variety of objects and images grouped in bags, pom-pons, pincers, labelled wheel chart, worksheet, spinners and tops, coloured pencils, story, seed, different containers, spoons, funnels

Question:

How can we make an understanding of the world with our senses?

Hypothesis:

Senses work individually or together to help us perceive and understand the world.

Procedure:

A. Preparation:

Begin with a story of the children going together in the park. Here they should describe what they see, hear, smell what they would like to taste, what they feel if they trip and fall. Come to the conclusion that senses are very important to help us understand the world around us. Then give such examples as the *sun, song, blancket*. We can see the *sun* but we can also feel it. A *song* we can hear while a *blanket* we can see and feel.

Next tell the children that in groups, they will glue objects and pictures to the senses poster in the column with the sense that is predominant when perceiving that thing.

B. Exploration:

Children get into three groups, have a feed-back on what they have to do. It's time to glue the objects and the images in the right column on the senses poster.

Let the children discuss within their groups their choices. When they finish, ask them to present to their classmates what they have done. The others can make observations and suggestions once the presentation for every group is over.

Next invite the children to explore senses in a fun way. They can choose among a colour mixing center, smell identifying center or a shaky-shaker center.

At the *colour mixing center*, children will check in a practical way what they get by mixing two colours. In order to do this, they will use spinners, top discs that were divided into half, each half being coloured in another colour and a worksheet. On the worksheet, children first draw the colour that they think will come out of the mixture of two colours, then they check this using the spinning top with the corresponding colour combinations. They compare their assumption with their findings.

For the smell-identifying center, the teacher will offer the kids small boxes with pom-pons previously deepened into scents like: vanilla, orange, lemon, cinnamon, rose. The children will extract one pom-pon with pincers, smell it and glue it on a wheel chart. Finally they write the name of the smell they are sensing.

At the shaky-shaker center, children will make shakers with different types of seeds or mixtures of these. They will then discuss how the sound is different if we use a bigger / smaller container, a plastic or a wooden container, small seeds or big seeds etc. It is also useful to identify and name of the seeds and talk about the fruit it comes from.

C. Discussion questions:

When you walk in the park what can you see? Now close your eyes. What can you hear? Which are the smells that you would expect to sense in the park? If the sun is very hot, how does this make you feel? If you fall and hurt your leg why are you sad? What parts of the body help you perceive and understand the world? Which are the 5 corresponding senses? Do you think they work independently or together? Can we discuss examples? What colour will you see if you spin the spinner fast? What is the sound that you hear if you put the seeds from this small shaker into a bigger shaker? How does the shaker sound different if instead of these small seeds you use the same amount of bigger seeds? When you smell the pom-pon does your brain send you the image of an orange? Why do you think this happens?

D. Conclusions:

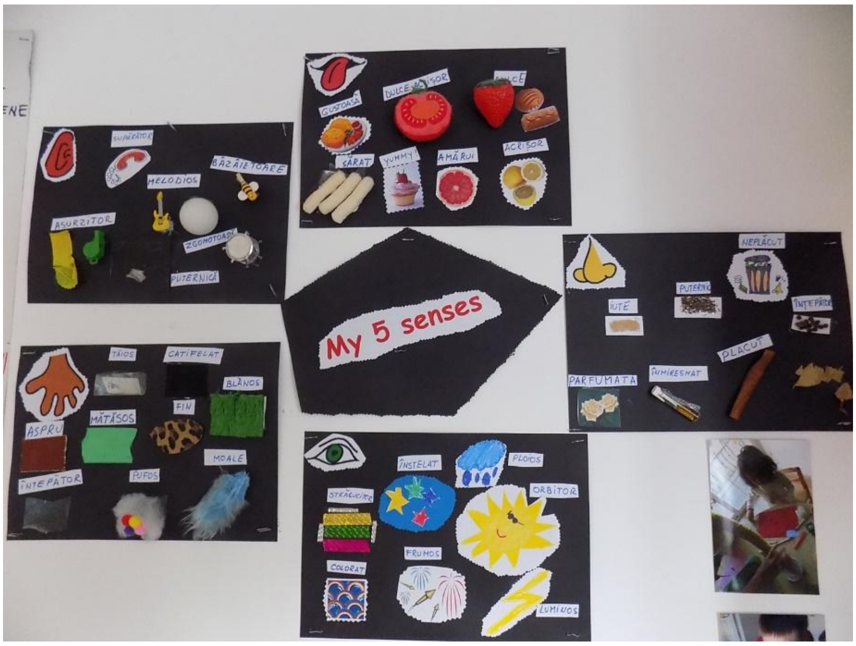
Senses can work independently but most of the time we get information from combining the imputs that we get from various receptors.

E. Assessment:

The teacher observed the children at work. They happily engaged in all the activities and their involvement and commitment was highly appreciated. They were creative especially when combining the seeds and demonstrated a flexible thinking when making the senses poster. They could use the knowledge acquired earlier in the year and integrate it into new understanding.

Further investigations:

The same objects can be glued to a poster and label with adjectives corresponding to every sense like smooth, fluffy, furry, silky, sharp, stingy for the sense of touch or starry, shiny, sparkling, beautiful, bright for the sense of sight.



Inquiry and creativity elements:

The children were happy to work with the given materials. They found it very useful to try out and come with their own conclusions. Yes, they made mistakes but children are more likely to learn from their mistakes than from presented information. After each activity they could assess their performance and think over what they did well and the parts where they can improve.

Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Math and Sensory, Age group: 3-4 years old
Teachers: Cristina Preduca, Irina Prejbianu

Which is your favorite?

Introduction:

Which is your favorite? is part of the **How does my body work?** project. One of the first projects that are done at the beginning of each school year is the one regarding the human body. With the help of many interactive activities the children find out more about the way the human body works, thus making them more aware of their capabilities, strengths and weaknesses.

The topic about the five senses is one of the most appreciated by the children because we live in a colorful, interesting world and what better way to learn about it than through our senses?

Through our sense of vision, we can see the world. We see our family. We see colors. We look at the grass, trees and animals. Through our sense of smell, we can smell yummy food or dangerous substances like smoke. Our ears allow us to hear music or our moms calling us for dinner. Our sense of taste lets us taste that delicious chocolate birthday cake. Finally, our sense of touch lets us pet a soft kitten or decide if the bathwater is warm enough.

Background:

Senses are a collection of sensory organs or cells in the body that respond to particular physical occurrences. Senses send information collected to various parts of the brain where the data is interpreted and an appropriate response signal returned.

The exact number of senses humans have is disputed due to the various definitions of what a "*sense*" is. However, it is widely agreed that there are five main human senses: sight, hearing, taste, touch and smell. The five main sense organs are our eyes, ears, nose, tongue and skin.

Sight or vision is the ability of the eye to detect and focus on images of visible light with photoreceptors found in the retina of the eye. Electrical nerve impulses are generated for different colors, hues and brightness. The two types of photoreceptors are rods and cones. Rods are sensitive to light, while cones identify different colors. It is generally agreed that these two receptors are two senses, one sense for color and one for brightness, which together make up the overall sense of sight.

Hearing is a sense that detects the vibrations of sound. Mechanoreceptors in the inner ear in the form of tiny bones and hair-like fibers turn motion or sound waves from the air into electrical nerve pulses that the brain can then interpret.

The sense of touch is activated by neural receptors such as hair follicles found in the skin, but also pressure receptors on the tongue and throat.

The taste of food is detected by sensory cells called taste buds located on top of the tongue. There are five basic tastes: sweet, bitter, sour, salty and savory.

Smell, like taste, is deemed to be a chemical sense. There are hundreds of olfactory receptors or sensory cells in our nasal passage, each of which will bind itself to a different molecular smell feature. Around 80% of what we think is taste is actually smell. Flavor, is a combination of taste and smell perception. Test this yourself by holding your nose closed the next time you eat something, can you taste it very well? Chances are you can't.

Other perceived human senses are debatable but generally include, the ability to detect temperature, pain, balance and kinesthetic (which is the relative positions of our body parts - test this sense by closing your eyes and touching your nose with a finger). There are many internal body stimuli that may be perceived as senses, too. For example: chemoreceptors for detecting salt and carbon dioxide concentrations in the blood and stretch receptors in the lungs which control our breathing rate. Compared to animals, humans have a quite weak sense of smell.

(source: Science Kids http://www.sciencekids.co.nz/sciencefacts/humanbody/senses.html)

Purpose:

The children will try to use as many senses as possible in order to describe the characteristics of five different types of fabrics. In the end, each child will have to choose which where the two most liked fabrics of all and stick one smiley sticker below each of the chosen materials.

Aims:

The goal of this project is to make a chart based on what the children selected and analyze their choises.

The children will:

- Observe, touch, smell, and compare different fabrics
- Observe the colors of the materials
- Observe the similarities and differences between the fabrics
- Analyze and describe the sensory feeling when touching the fabrics
- Recognize the shape of the fabrics
- Choose two favorite fabrics
- Put smiley stickers under the two selected fabrics
- Say which of the fabrics they disliked the most
- Give reasons for their choices

Vocabulary/Key words:

Human body, five senses, touch, see, hear, smell, taste, fabric, material, rectangular, hard, soft, small, big, shiny, fluffy, rough, delicate, color, chart, favorite, least favorite.

Process skills: observe, analyze and describe, conduct an experiment, gather information, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

15 minutes for activity

Materials and resources:

Five different types of fabrics glued one next to other on a cardboard, chart, stickers, and markers.

Question:

Which is your favorite fabric?

Hypothesis:

Most of the children will choose the shiny fabric because they will tend to only use one of their senses – the sight.

Procedure:

A. Preparation:

Give the children a short introductory presentation of the human body and the five senses. Remind them that in order to study the characteristics of an object, we can use more than one sense or even all five of them at the same time. Thus our analysis will be more thorough.

B. Exploration:

Each child will have a couple of minutes to observe and analyze the five fabrics. The children will have to observe and name the color and shape of each fabric. They will have to say which senses they will use in order to analyze the materials and say what they fill. They will also have to choose two favorite fabrics, put under each fabric one sticker in a chart and say why they have made that choice. They can discuss with their colleagues and do not agree with other choices, but everyone has to give reasons for hers or his choices.

C. Discussion questions:

Which fabrics do you like the best? Why? What senses can we use in order to better study these five fabrics? What senses do you use in order to determine the color of the materials? What senses do you use in order to find out the shape of the fabrics? How does it feel to softly touch the fabrics? Can you find similar fabrics in our classroom? Do you have similar fabrics in your home? What does touching this fabric (velvet, card board, wall paper, wall sticker and sand paper) make you think of? Can you say without counting which fabric is your favorite? Can you say without counting which fabric is your least favorite? Can you count how many stickers each of the fabrics got? Which is the most prefered fabric based on the number of stickers? Which is the least liked material based on the number of stickers?

D. Conclusions:

Three of the fabrics got similar numbers of stickers: velvet, card board and wall sticker, whilst the other two gathered small numbers of stickers: wall paper and sand paper. Most of the children selected as their favorite the fluffy, shiny and soft materials. Most of the children do not like rough and hard to touch materials.

E. Assessment:

At first the children used only the sight in order to determine the characteristics of the fabrics. After a couple of turns they started thinking using the other senses as well. They worked independently but they enjoyed communicating to one another and sharing with enthusiasm the new discoveries. It was quite easy for the teacher to observe the children working and appreciate their involvement, curiosity and creativity. They used all their senses and waited patiently for their turn. The children liked that they were free to choose two fabrics if they wished. Most of the children listened attentively to their colleagues when they talked about the reasons behind their choices of fabrics.

Further investigations:

Similar charts can be done for each sense used to analyze the same fabrics so that the children can make comparisons between results.

Inquiry and creativity elements:

Different other activities can be developed in order to emphasize the importance of senses. The children can be asked to find in their classroom objects that can be studied using all five senses. Another time the teacher can bring objects that are liked by the children when they use only one of the senses (like for example the sight) to discover them, but are seriously disliked when they use other senses in order to discover more characteristics of the same objects.

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science and Art, Age group: 5-6 years old
Teacher: Mihaela Balint

Optical Illusions

Introduction:

This activity is part of the theme **How does my body work.**

Which part of our body helps us read the rules of a game on the back of the box, watch our favorite cartoon, catch a rainbow, and see a ball heading our way? Which part lets us cry when we are sad and makes tears to protect itself? Which part has muscles that adjust to let us focus on things that are close up or far away? If you guessed the eye, you're right! Our eyes are pretty amazing. Yet, they do not have super powers. Our vision has some limitations. Our eyes can be tricked. Let's see together how!

Background:

Although we can function without the sense of sight, we rely heavily on vision to live our everyday lives.

Our eyes are at work from the moment we wake up to the moment we close them to go to sleep. They take in tons of information about the world around us: shapes, colors, movements. Then they send the information to our brain for processing so the brain knows what's going on outside of our body every moment. The eyes are our "open windows" to the world.

Optical Illusions can use color, light and patterns to create images that can be deceptive or misleading to our brains. The information gathered by the eye is processed by the brain, creating a perception that in reality, does not always match the true image. Perception refers to the interpretation of what we take in through our eyes. Optical illusions occur because our brain is trying to interpret what we see and make sense of the world around us. Optical illusions simply trick our brains into seeing things which may or may not be real.

Purpose:

To discover some limitations of our sense of sight - visual field and optical illusions.

Aims:

The children will:

- investigate the sense of sight
- identify some optical illusions
- create simple crafts or toys based on an optical illusion

Vocabulary/Key words:

Eyes, retina, iris, sense, sight, blind, vision, brain, optical illusion, visual field, left/right, light, color, disk, circle, oval, disappear/appear.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, draw conclusions, communicate observations, information and conclusions, design an optical illusion craft or simple toy.

Time/Duration:

60 minutes

Materials and resources:

White cardboard, scissors, brightly coloured felt pens, sharpened pencils, a toilet paper tube (or a paper towel tube).

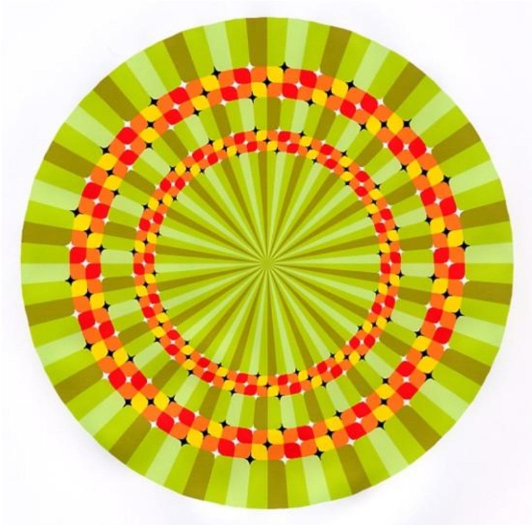
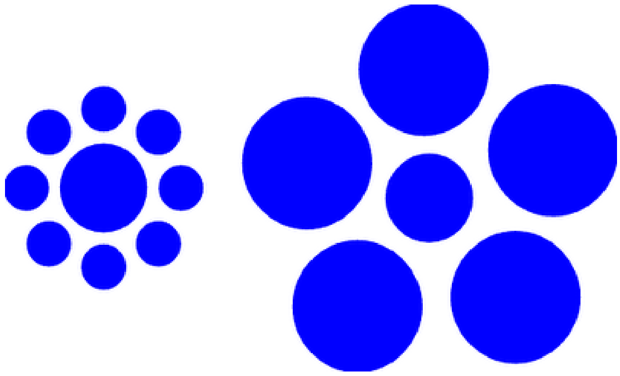
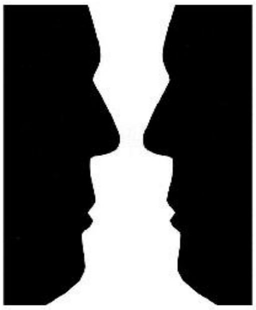
Questions:

- ***We shall see one or two colors? Colorful dots or a colorful circle?***
- ***How much can you see? Two eyes are better than one eye?***
- ***What is that circle (oval) between my forefingers?***
- ***Do I have a hole in my hand?***

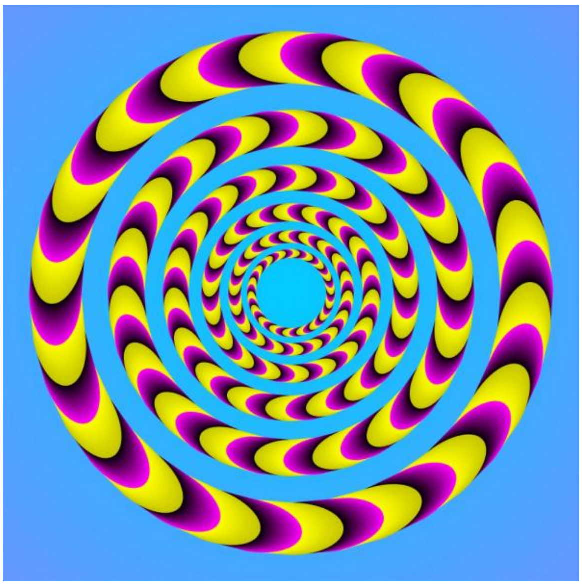
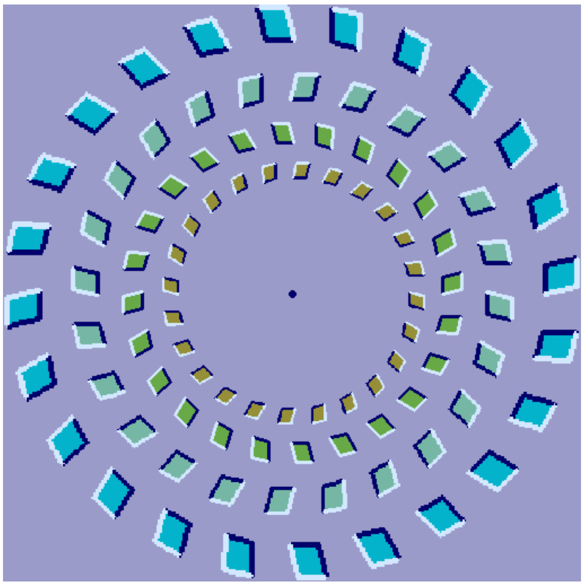
Procedure:

A. Preparation

<u>Test your eyes and brains</u> with these wonderful but tricky images:

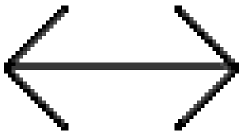
	
A. Focus on the dot in the center and move your head forwards and backwards. What happens?	B. Is one center dot bigger than the other?
	
C. How many pictures can you see?	D. A black vase or …

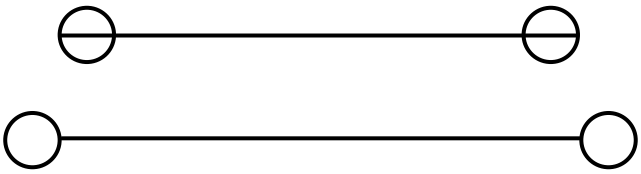
Sometimes our eyes can play tricks on us. The way our brain works can make it see thing that are not real.

	
E. Look in the center of the image. The circles appears to turn in opposite directions. By the way are you seeing a few circles or a whorl?	F. Focus on the dot in the center and move your head forward and back. The circles are moving in different directions!

G. Now a very simple one.
Are the line segments of different lengths?

How about these?





Answers and Explanations

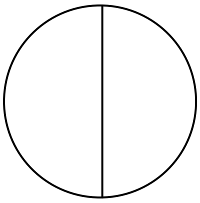
B.The center dots are the same. Our brains judge the size of an object in relation to the objects around it, the left center dot seems to be larger than the left one.

C and **D.** You can see a vase or two faces.

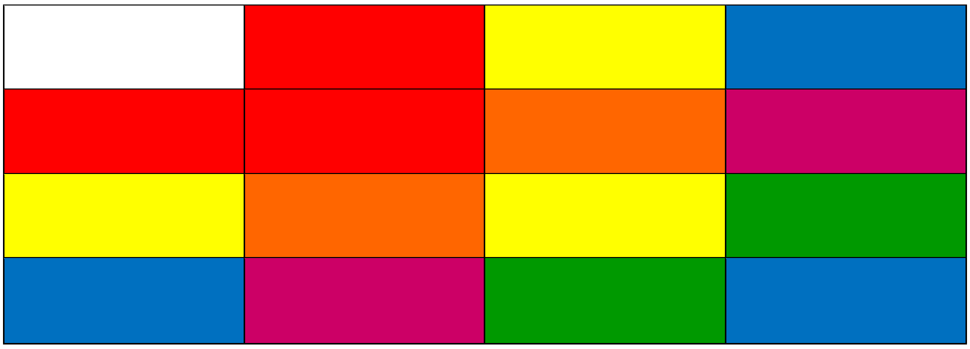
G. The line segments are the same.

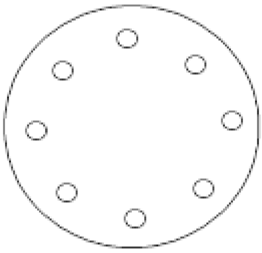
B. Exploration.

1. We shall see one or two colors? Colorful dots or a colorful circle?

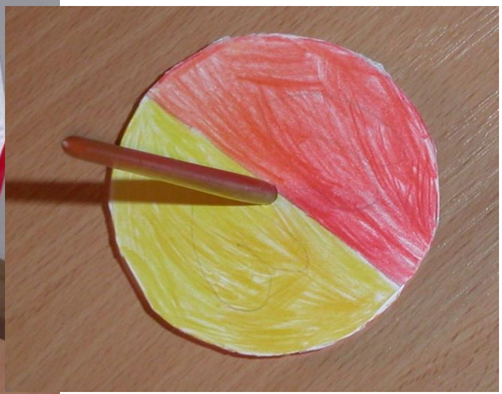


- Cut a circle about 7 cm in diameter from white cardboard and color it half yelow, half red (yellow and blue, or red and blue) with bright coloured felt pens.
- Push a pencil through the circle and allow it to spin. The colours dissapear and the disk appears orange (green or purple).





- Now, what will happen if you rotate a circle coloured with all three primary colours? How about all the seven colours of the rainbow?
- On a white circle draw a circle of colorful dots (any colour). Spin the circle. What did you see? Did you see colorful dots or a colorful circle?



2. How much you can see? Two eyes are better than one eye?

- Cover your left eye with your left hand. Raise your right forefinger and move it in front of you until the finger is stil visible. Don't move your head. Just follow the finger with the eye. Repet with your right eye and left forefinger.
- This is our visual field. If we don't move our head this is all we can see. We don't have *eyes* in our back! But obviously two eyes are better than one.

3. What is that circle (oval) between my forefingers?

- Hold your forefingers so that they are touching at about 10 cm in front of your nose. Look over your forefingers away to the opposite wall. On doing this you can see a strange oval or ball which is apparently fixed between the fingertips. Move slowly your forefingers back and forth and play with the ghostly little finger.
- When we look over our fingers our eyes are focussed on the wall. The fingers are projected on the retina in such a way that the images are not combined in

our brain. We see the tips of our fingers doubled. Finally, this combination gives us the illusion of a round or oval image.

- It's not a ghost finger here around. Just us and our beautiful eyes.

4. Do I have a hole in my hand?

- Roll a piece of writing paper into a tube (or you can use a cardboard tube from the paper towels). Look through it with your left eye. Hold your right hand open on the right next to the paper.
- Surprise! You will discover a hole, which apparently goes through the middle of the palm of your right hand. Repeat with the right eye and the left hand. What causes this illusion? In normal vision the images which are received by each eye, are combined to give a composite image in the brain. We can see in the same time the hole and the hand. It works particularly well because the image from inside the tube is in perspective.

C. Discussion questions:

What colors can you see on this disk? What colors did you see when you spin the disk? What colors shall we see if the disk is half white, half black?

Can we see in the back if we don't turn around?

Did our eyes perceive exactly the same image? (Each eye perceives its own image. The images are merged and adapted by the brain.)

Two eyes' visual field is larger or smaller than the visual field of a single eye?

What do you know about the sense of sight of some animals? Are there animals who can see better/worse than humans? Are there blind animals or almost blind?

Who are the partners of the eyes? (the brain, the other senses)

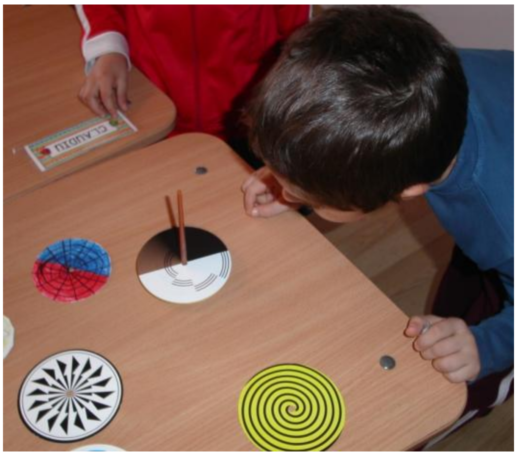
Draw some patterns or lines on a white disk. Spin it. Can we still see the patterns?

D. Conclusions:

- On rotation our eyes perceive two individual colours for a very short time. They merge and are transmitted to the brain as a third colour.
- The colors on the disk are primary colours (red, yellow, blue). When two primary colours merge the result is a secondary colour (orange, green and purple).
- When we spin the disk with colorful dots our eyes can't recognize each dot. We'll see just a colorful circle line. Any other patterns, drawings and colors will merge.
- We can count on our eyes. The sense of sight is the most important sense of all for the human beings. All our five senses including eyes help us to interpret and understand the world around us. They allow us to see, feel, hear, taste and smell and transfer the meanings of those senses to the brain. The brain will show us how to react to stimuli.
- The way our brain works can make us see things that aren't real. We call these things ***optical illusions.***

E. Assessment:

Playing, the children better understand how our eyes work and to what extent the partnership between the eyes and the brain is efficient. Starting the activity with some awesome tricks (optical illusions) the children have been easily involved in investigation. They made a lot of disks with many combinations of colors and patterns and they were anxious to discover new ways to spin the disk. The limitations of our vision were accepted as a fact which can be investigated and they



were amazed to discover that eyes can work differently from person to person.

The teacher's appreciation was focused on children's involvement in investigation, team work, science inquiry skills progress and use of the proper vocabulary.

Further investigations:

- On a white cardboard circle draw some lines, shapes or any other small figures. Spin the circle. Do you see the same picture?
- Find new creative ways to spin the circles.

Inquiry and creativity elements:

Optical illusions always have always artistic side. The mixture of colors, patterns, lines and dots pleased our eyes but also tricked them. The children enjoyed the optical illusions introduced by the teacher but they were far more excited to make their own.

Teacher's notes:

During the investigations for *Let's Play Science International Symposium and Science Fair 2015,* we used new patterns for the circles and we discovered new ways to spin the circles like: spinning top toys, electric circuits with a small wheel, an old electric toothbrush, a small propeller fan.

School/Kindergarden: Ecole Maternelle J.JAURES Brignoles, France
Subject: Integrated Science, Maths, Art, Age group: 5-6 years old
Teacher: Emilie Quelo

Feeding and growth

Introduction:

This activity is part of the project **How does my body work?**

Background :

At present new findings are made on unbalanced child diet especially with overconsumption of sugars which results in overweight and obesity. A healthy lifestyle needs a balanced diet and to be conscious from an early age that we must have a balanced diet. This can lead to reducing these events that disturb the health of children.

How does my body work? Why and how do I grow? What does my body need to grow well?

Purpose:

- To teach children how to balance their diet.
- To identify different types of food and how to eat.
- To sensitize them to have a healthy lifestyle with a balanced diet.

Aims / The children will:

- Discover what food is: they will cut photos of food in prospectus.
- Discover the families of food and sort them: sugars, fats, dairy products, fruit, vegetables, drinks, cereals

- Making a scientific sorting following the food classification.
- Make up a balanced meal using food from each family.

Vocabulary/Key words: food, balance, starch, dairy products, protein, sugar products, fruit and vegetables, drinks, fats.

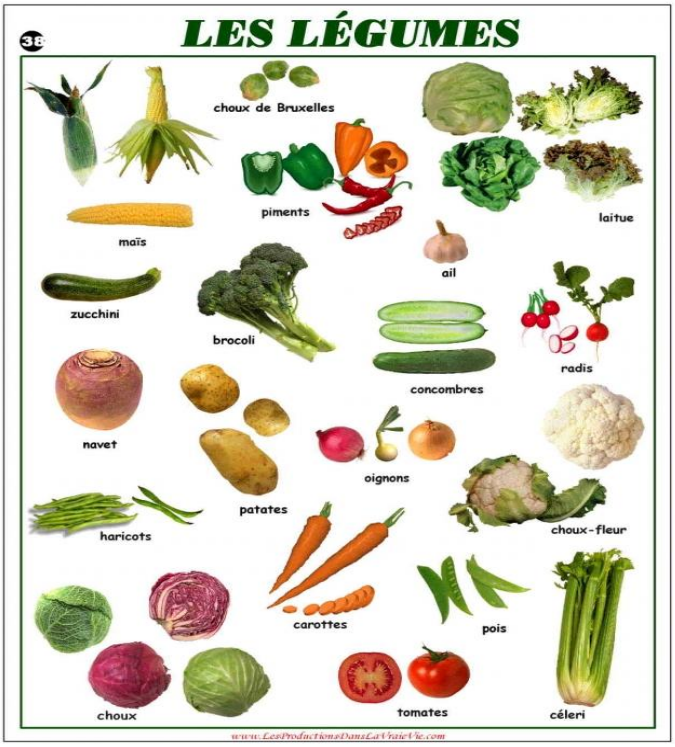
Process skills: observe, analyze and describe, sort in cathegories, gather information, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

4 sessions of 30 minutes

Materials and resources:

- Magazines
- Coloured pictures (posters)
- Scissors and glue



Question:

How can I have a balanced diet?

Procedure:

A. Preparation:

1. What is food? What should I eat?

Giving his first idea of what is food. Try to define food with their own words and give the name of different types of preferred food. Make a first classification of food that can be good for health or not. What's the point of eating? Cut food pictures from magazines.

B. Exploration:

1. What is food? What should I eat?

2. How can I sort the different types of food?

The children will make a first selection of pictures of food they have cut from the magazines; the children will propose their own classification.

3: Thinking about this classification:

What types of food can be put together? Where does the food come from?

Propose a "scientific" classification and ask the children to speak about this ranking. Why some types of food are put together and not others? Complete the ranking. Develop their vocabulary and sorting and grouping skills.

4. Create a balanced meal using the scientific classification

The children will take the classification into consideration the classification to choose food and make meals for a day following a balanced diet (breakfast, lunch and dinner).

C. Discussion questions:

What is your favourite food? Which food is healthy and which food is not good for your health? Where does this type of food come from? How could you group these different types of food? What do you think a balanced diet means? Can you make a balanced diet for breakfast / lunch / dinner?

D. Conclusions:

Following these activities, the children understood that food can be sorted into groups and that a balanced diet includes food

from all groups. They also understood that there are groups of food and drinks that we should eat/drink more because it is healthy and groups of food and drinks that we should limit in order to keep fit.

Further investigations:

Interest for the first meal of the day: breakfast; organize a wholesome breakfast in the classroom with parents. Plant vegetables in the school vegetable garden or go shopping at the super market.

Inquiry and creativity elements:

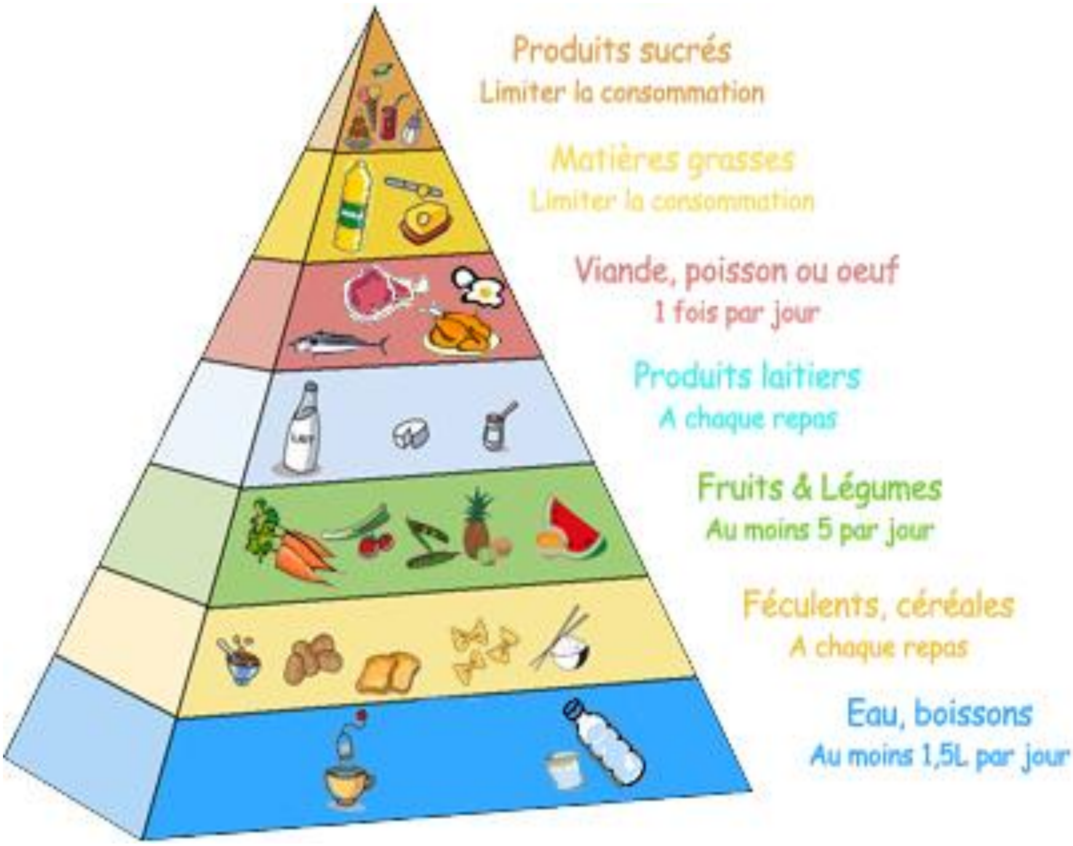
Working in visual arts around the food making artistic productions following the painter Arcimboldo.

Teacher's notes:

The children were very interested in the richness and variety of food, in the preparation of breakfast and they have realized that we must eat healthy to grow well.

The food pyramid

Advice for a balanced diet for a day:



Falling into winter – Lesson Plan Synopsis

Lesson plans	Partner Country	Synopsis
Falling into winter	Poland	A quick experiment to learn why leaves turn yellow, orange or red during fall.
The weather forecast	Romania	Behind the weather forecast there is a lot of science based on records and measurements.
Fog-detectives: Let's create clouds and fog!	Austria	Starting from a fog machine, children can learn more about the phenomenon and create their own fog.
Studying the leaves	Romania	A fun activity that gives children the chance to sort real leaves by size, color and shape.
How long is a leaf?	Romania	A mathematical approach to study autumn leaves.
The colours of the leaves	Romania	Discovering the real colours in the autumn leaves through chromatography
How can a flower stay beautiful for a longer period of time?	Romania	We all know the essential elements a plant needs. But how about a cut flower?
Naturally colored play dough	Romania	This project's goal is to make a connection between veggies/fruit and natural dye.
Outdoor is great!	Romania	A guideline to a successful outdoor activity as changes in nature are better observed during such outings.
My fireplace	Turkey	A creative and eco-friendly activity which analyses types of central heating.

School: Szkoła Podstawowa Nr 2 in Siewierz, Poland
Subject: Integrated Science, Age group: 5-6 years old
Teacher: Joanna Gornisievicz

Falling into winter...

Introduction:

These activities are part of the theme **Falling into winter**. Autumn is the most beautiful season of the year. The world is full of autumn golden colours. Colourful leaves dance in the air and autumn gifts appear in our baskets. Slowly... day after day we can notice changes around us and with small steps we're falling into winter!

Background:

During autumn walks we can observe that the leaves are no longer green but going yellow. Why does it happen? To answer this question we did an experiment in our kindergarten. It helped us to understand why the leaves are so colourful in the autumn.

Purpose:

The children discover why the leaves change colours in autumn.

Aims:

The children will:

- observe leaves during regular walks
- learn new words: chlorophyll and beta-caronete
- understand why the leaves change their colours

Vocabulary/Key words:

Autumn, leaves, colours changes, nature, salicylic alcohol, dyes, chlorophyll, beta-caronete

Process skills: observe, analyze and describe, conduct an experiment, gather information, draw conclusions, communicate observations, information and conclusions.

Time / Duration:

45 min

Materials and resources:

Green grass, cutting boards, knives, 2 bowls, water, salicylic alcohol, white chalk.

Question:

Why do the leaves change their colours?

Procedure:

A. Preparation

Take the children for a walk. Let them observe autumn changes and discuss it together. Now it's time for an experiment. Prepare bowls, knives, cutting boards, water, salicylic alcohol, white chalk and grass. Ask children to cut the grass into small pieces and put it into the bowls. Then pour some water into one of the bowls and some salicylic alcohol to the other one. If you are ready put some chalk into each of them.

We cut the grass into small pieces.

We put the grass into the bowls.

We add water and salicylic alcohol

Now let's see what happens…

B. Exploration:

At the beginning the pieces of chalk soak with the liquids (water and salicylic alcohol) and become wetter and wetter. But the grass in the water bowl is still green and the chalk is white with a green border.

Whereas, the grass in the second bowl went dark brown, the liquid went green and the chalk gained two colours: green and pink yellowish.

C. Discussion questions:

What happened to the grass?

Why the leaves change their colours?

D. Conclusions

The children noticed that the chalk changed its colour. Explain that water doesn't dissolve the grass dye but the salicylic alcohol does and it conveys it to the chalk with water. That's why the chalk went green and pink yellowish.

In the case of leaves, they contain two natural dyes – green and yellow (which is present, for example, in a carrot). When the weather becomes colder, trees absorb the green dye from their leaves to gain energy. Only the yellow dye is left in the leaves and it makes them become yellow, orange or red. It means that autumn leaves do not gain yellow colour. They lose their green dye and stay yellow. Now we can explain the 'autumn magic'.

E. Assessment

The children really liked the classes. They enjoyed carrying out an autumn experiment. Children couldn't believe their eyes! It was quite easy for the teacher to observe children working. They enjoyed communicating with each other and shared their observations spontaneously. The teacher appreciated children's involvement, creativity and curiosity.

Inquiry and creativity elements:

We used the autumn colourful leaves to make funny animals.

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Math and Language, Age group: 6-7 years old
Teacher: Mihaela Balint

The weather forecast

Introduction:

These activities are part of the theme **Falling into winter.**

These activities were planned to provide children with opportunities to explore, observe, measure air temperature, record, compare and show data and analyze changes in the weather over time. The activities were also designed to develop a range of inquiry skills: observing, asking questions, record and analyze data, measure air temperatures, making predictions, communicating data and conclusions. The children become familiar with the concept and processes of temperature, the measuring of the temperature, energy, heat, wind, weather, weather forecast, meteorology.

Background:

How can we find our *temperature*? How do we measure the temperature of the air or water? We use a *thermometer*. Thermometers are tools that help us measure the temperature. An object's temperature describes how much heat it has. Look at a thermometer. There is a colored liquid inside a bulb and a glass tube. The liquid moves up when it gets warm and moves down when it gets cold. The marks next to the glass tube form the *temperature scale*. They show us the value of the temperature. Scientists usually use the *Celsius scale* to measure temperature. Celsius scale is based on two major water properties: the water boils at 100^{o}C and freezes at 0^{o}C.

When we do a science experiment we collect data. Graphs are great tools. They help us organize and compare data. Picture graphs and bar graphs are easy to use. A picture graph shows data with pictures. Daily weather records, for example, show us how many sunny days were last week. The bar graphs help us analyze and compare data like the values of the temperature.

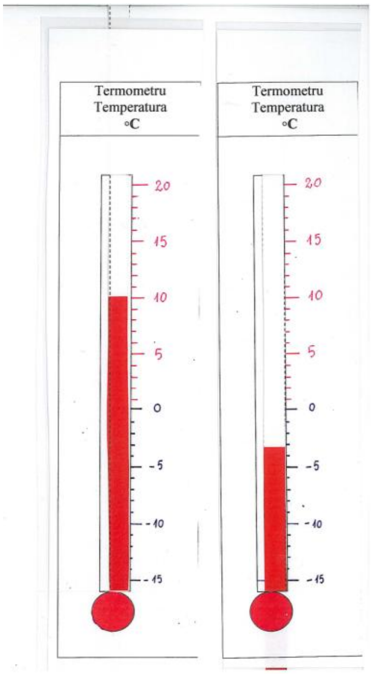
Purpose:

Collect, measure, record, organize, analyze and show data related to the calendar and weather conditions. Make predictions about the weather evolution.

Aims:

The children will:

- Keep daily records of the date and the weather conditions for 4 weeks
- Become familiar with thermometers and the Celsius Scale of temperature
- Read the temperatures using thermometer models, thermometers and Celsius Scale
- Compare data and find the maxima and the minima
- Calculate the differences between different values of the air temperature
- Detect the presence of the wind and discover the wind direction using a windsock and a wind wheel
- Organize, compare and show data using picture graphs and bar graphs
- Identify and control the variables
- Make prediction related to weather evolution- short term weather forecast



Vocabulary/Key words:

Sun energy, heat, temperature, cold/warm, colder/warmer/hot, air, atmosphere, rain, snow, fog, clouds, weather, weather forecast, thermometer, wind, wind-wheel, wind-sock, Celsius temperature scale, bigger/smaller value of the temperature, minima/maxima, increase/decrease, windy, snowy, rainy, sunny, foggy, cloudy, partly cloudy.

Process skills: observe, analyze and describe, measure temperature of the air, collect data, organize and show data, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

10-15 minutes daily /4 weeks

Materials and resources:

Thermometers, children-made thermometers, windsock and wind-wheel, datasheets, worksheets, weather flashcards, calendars, computer, internet connection, printer, books and encyclopedias, fiber pens or colored pencils.

Question: ***What is a weather forecast? What is a meteorologist?***

Procedure:

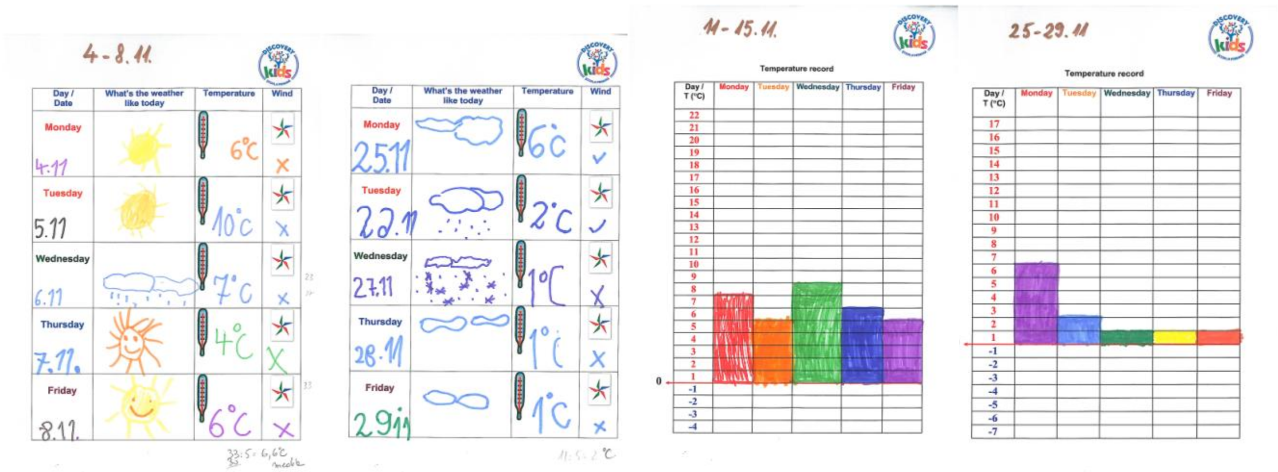
A. Preparation:

- Using weather flashcards (computer programs, books, encyclopedias) introduce basic information or reinforce children's knowledge about weather, weather symbols and weather vocabulary, temperature, thermometer, windsock and wind wheel.
- During some art activities children have already made thermometer models, a windsock and a wind wheel.
- Introduce the concept of temperature, the thermometer and the Celsius Scale of temperature.
- Practice temperature readings on the models. Practice temperature readings on real thermometers.
- Put the windsock and the wind wheel to work outside. Make sure that children can see them easily through the window. Let them explore the air motion and discover the wind direction.
- Explain children that during the next weeks they become little meteorologists. Their important job is to keep an eye on weather, to measure, record and analyze data and show all of the information in a special presentation called weather forecast.
- Each week they will use models to practice temperature readings. Also they read the value of the air temperature every day, at the same time: 10 o'clock
- Using a wind-wheel and a windsock the children detect and observe air motion and indicate the wind direction.

B. Exploration:

- The children observe and record the weather conditions on a daily bases. These activities take place each day at the same time (10 o'clock, am). Drawing symbols or using various flashcards and a calendar, they record on a datasheet the date and the weather conditions (sunny, rainy, cloudy, partly cloudy, foggy, snowy).

- Using a thermometer kids measure the value of the temperature of the air and record that value on the datasheet (enclosure 1). The children have the opportunity to calculate the daily variations of the temperature, compare a value with a previous one, find the biggest or the smallest value of the week (minima and maxima).
- Every morning *the meteorologist of the day* presents the weather report (both in Romanian and English).
- At the end of the week, based on all these observations and records, children are able to make predictions - a weather forecast for the week-end. On Monday the predictions are verified and compared with the real records.
- Sometimes these predictions don't come true. After a sunny week with a high temperature average the prediction was oriented to a sunny sky and a pleasant temperature for the weekend. In fact, during that weekend, the sky was cloudy and the temperature decreased by five degrees. These kinds of situations are not seen as mistakes, are accepted as facts and



treated as learning opportunities.
- During these activities the children become familiar with the concept of atmosphere, air motions (wind), the speed of the wind, make connections between the Sun energy, the heat and the weather changes based on their own observations.

- Once in a while, the children work on their worksheets to color a few thermometers to a certain value of the temperature or to write the indicated temperature.

C. Discussion questions:

What's the weather like today? What symbols shall we use for the weather conditions? What tool are we using for temperature measurements? What is the value of the air temperature? Is it a bigger or a smaller value than yesterday? Is it warmer or colder? Is it windy? How many windy days were this week? What was the biggest/smallest value of the air temperature? What was the warmest/coldest day of the week? Make a prediction for the next weekend. What value will have the air temperature on Saturday? How about next Sunday?

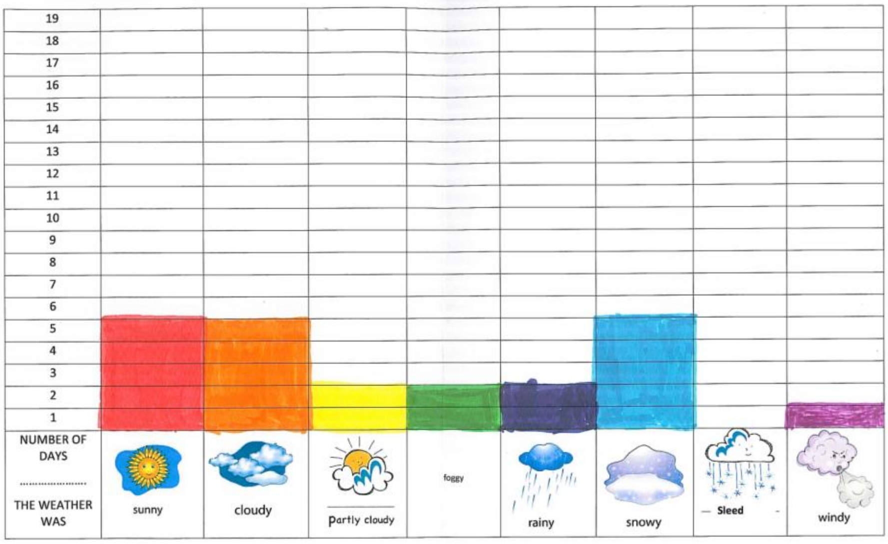
D. Conclusions:

Behind the weather forecast is a lot of science. A meteorologist records the weather conditions, makes a lot of measurements using different tools and instruments, analyzes and compares data. Based on these data the meteorologist must organize and show the information to the public. It is a difficult and important task. The weather forecast is very valuable for many people: farmers, constructors, drivers, tourists.

E. Assessment:

The teacher took into consideration each child's activity as a whole: presentations, measurement techniques, records on datasheets, worksheets, communication skills, the accuracy of the observations and conclusions. The teacher appreciated the group/team effort and individual work.

The children created a weather records database and a graphic representation of this database for a longer period of time (1st-30th of November, 2014). The teacher could evaluate the children's knowledge and skills during their work on this database.



Further investigations:

- The children will create a new weather records database in January 2014 and they will learn how to read, record and compare negative values of temperatures (Enclosure 2).
- For the next theme, ***It starts with a drop of water***, children will also learn to use different kinds of thermometers, read and record the temperature of the water, ice, different liquids during the experiments. This way, the children will understand much better the Celsius Temperature Scale based on values 0^0 C and 100^0 C.
- Also, a linear graphical representation of the values of the temperatures will be introduced.

Inquiry and creativity elements:

The children had the opportunity to use their own drawings as symbols for the weather state and to design weather cards. Also, the children manufactured paper thermometer models and used them in a variety of math activities.

Conversations between children and children-teacher fostered their curiosity, encouraged explorations, questioning and communication. The children were encouraged to make connections between their prior knowledge and experience, to extend observations and articulate explanations.

The presentation of the weather forecast or/and report support the development of the communication skills.

Moreover, features of creative teaching could be noticed during these activities in the efforts made to enhance children's positive attitudes to mathematics by connecting mathematical knowledge to everyday life.

The teacher promoted understanding about what inquiry means through reflection on children's measurements and observations. The skills of reflection and reasoning are very important to IBSE.

Teacher's notes:

The children love role play. The *little meteorologist* become one of their favorite parts. Step by step they transformed these presentations in a real show. Dance steps, umbrellas, raincoats, funny weather symbols and… *It's show time!* Yet, behind the show there is a lot of great stuff: math, language and SCIENCE!

Enclosure 1: Weekly weather record sheet

Day / Date	What's the weather like today	Temperature	Wind
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			

Enclosure 2: Temperature records

Day / T (°C)	Monday	Tuesday	Wednesday	Thursday	Friday
22					
21					
20					
19					
18					
17					
16					
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14					
13					
12					
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-8					

School/Kindergarten: Kindergarten der Volkshilfe Rosental a. d. K., Austria
Subject: Integrated Science, Nature, Types of Weather and Physics, Age group: 3-6 years old
Teacher: Sabine Hirschmugl-Gaisch

Fog-detectives – Let's create clouds & fog!

Introduction:

This activity is part of the theme **Falling into winter.**

In order to observe the different types of weather at the beginning of the winter season, we created a weather calendar in which we recorded our daily weather observations.

It was especially notable that there were many days, on which we could observe incredibly thick and heavy fog.

That led us to our research questions: *How does fog form?* respectively *What does fog actually consist of?*

Background:

Fog is considered a low cloud that is either close to ground level or in contact with it. As such, it is made up of water droplets that are in the air like a cloud.

Fog forms when water evaporates from a surface or is added to the air. This evaporation can be from the ocean or another body of water or moist ground like a marsh or a farm field, depending on the type and location of the fog. Water vapor can also be added to the air via winds, rainfalls and daytime heating.

As water begins to evaporate from these sources and turn into water vapor it rises into the air. As the water vapor rises, it bonds with small dust particles in the air to form water droplets. These droplets then condense (to condense: to change something from a gas to a liquid or solid state) and form fog when the process occurs close to the ground.

Purpose:

Due to the set of experiments children can experience why nature turns into white color in wintertime and how phenomena like fog, dew and hoarfrost are formed.

Aims:

- Explanation of the weather phenomenon "fog"
- Providing a basic physical explanation concerning the process of fog-forming
- Close observation and documentation of daily weather conditions
- Expansion of vocabulary
- Practicing the safe handling of matches
- Promotion of active-research-learning methods
- Exploring the invisible water vapor after it has developed into a condensed form (water droplets, hoarfrost, fog, dew, etc.)

The children will:

- be given the opportunity to produce fog on their own.

Vocabulary/Key words:

Fog, ground fog, stratus, clouds, dew, ice, water drop, water vapor, condensation, to compress, to liquefy, particles, soot, dust, invisible, steam, to cool

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

The experiments were performed in small groups of approximately six children and each of them took about 50 minutes.

Materials and resources:

A fog machine, a preserving jar (large jar of honey), warm water, black paper, tapes, matches, a pack of ice (plastic bags filled with ice cubes).

Question:

What does it need to form fog? Which conditions must be fulfilled, that the formation of fog is possible?

Procedure:

A. Preparation:

In order to get in touch with the different types of weather at the beginning of the winter season, we first created a weather calendar in which we recorded our daily weather observations.

Due to so many foggy days at this time of the year, we dealt with the question: "How does this particular phenomenon form and what does fog actually consist of?"

A special fog machine from a friend gave the children the chance to produce their "own", artificial fog.

After that first experience, we left several baking sheets outdoors overnight so that we could see the dewdrops on them in the morning. It was even possible to make drawings with our fingers and the dewdrops on the sheets.

A similar phenomenon we could observe on a glass bottle filled with water, which we left in the refrigerator for several hours. After taking the bottle out again and leaving it in a warm room for some time, we could observe the formation of tiny water droplets on the bottle`s surface.

B. Exploration:

After we had equipped the background of the honey jars with black carton, the children filled them with warm water. Then a match was lit and we let the flame burn for a few moments.

After three to four seconds, the match could be blown out and we quickly threw it into the water filled honey jar.

Then the glass was immediately covered with the bag of ice cubes. Water vapor, which itself is not visible, rose up and condensed on the smoke particles of the match. A spreading cloud of smoke came into sight and within a short time, the whole glass was filled with smoke respectively with our first “homemade” fog.

C. Discussion questions:

What do you think where real fog-particles (smallest water droplets) appear, so that we can see and feel them as "fog"?

D. Conclusions:

Finally, we provided the children with jars, crushed ice and salt, so that they were able to produce their own frost and ice phenomena on the surface of the glass independently.

E. Assessment:

What would happen, if it starts raining under these conditions? What is the reason that it comes to the condensation (compression, liquefaction) of water vapor?

Further investigations:

I could provide the children with a DVD (German title: „Das Wetter", part of the series „was ist was", published by Tessloff) dealing with weather phenomena as a suitable follow-up activity. Children really liked watching the short documentary and I had the feeling that they got more and more interested in this topic.

Inquiry and creativity elements:

Modern media (for example a laptop in order to watch the DVD), simple domestic materials (baking sheets, jars, matches, etc.) and reference books were used to explain the phenomenon of fog. Furthermore, we tried to deal with the topic in a very creative approach (for example by painting with water droplets on surfaces like windows and baking trays, producing fog pictures or creating snow crystals with paper strips).

Teacher's notes:

Observation and documentation of the weather conditions for quite a long time as well as the subsequent "production" of fog could impress the children deeply and sensitized them in their perception of everyday weather phenomena.

School/Kindergarten: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Mathematics and Art, Age group: 2-3 years old
Teacher: Georgiana Boaza

Studying the leaves

Introduction:

This activity is part of the theme **Falling into winter.**

The variety to be found among the leaves of plants is enormous. There are large leaves, small leaves, slender leaves and wide ones. Leaves can be soft, prickly, hairy, and hard. But leaves all have one thing in common: they change sunlight into energy through photosynthesis. The leaves absorb carbon dioxide from the air and with water that comes through the roots of the plant, combines these elements and releases the oxygen into the air. By this exchange, plants maintain a level of oxygen in the air that benefits all living things.

(Source: http://lessonplanspage.com/scienceleafobservations-htm/)

Background:

Autumn is one of the four temperate seasons along with spring, summer and winter. Some people call autumn, "fall," which probably refers to the leaves falling off the trees during this season. The falling of the leaves begins when the leaves change colors and go from being green, to burning red, golden yellow and vivid orange. Then as autumn continues, the leaves begin to rain from the tree branches signifying the end of the harvest time.

In this lesson there are so many parts that are important for all children to know. This week's lesson will give a wonderful learning experience in the different aspects of the fall season. The children in the classroom will feel comfortable with talking about the characteristics of autumn.

Purpose:

Playing with and studying the color, form and size of the leaves and branches during fall.

Aims:

- Discovering what a leaf looks like.
- Observing and feeling the blade and the veins of a leaf
- Discovering the colors of leaves in fall
- Comparing the various sizes of leaves
- Match the leaves with the right shape
- Development of vocabulary.

The children will:

- Be given the opportunity to study the leaves by touching them and by playing interesting games.

Vocabulary/Key words:

Clouds, rain, leaf, big, small, middle, big, red, orange, brown, green, soft, prickly, hairy, vein, blade, branches, fall.

Process skills: observe, analyze and describe, plan, gather information, collect data, interpret data, communicate observations, information and conclusions.

Time/Duration:

20 minutes

Materials and resources:

Branches, leaves, plasticized leaves, paper, black marker.

Question:

What does a leaf look like? What colors are the leaves in fall?

Procedure:

A. Preparation:

In order to get familiar with the different types of leaves, make a collection of as many different kinds of leaves as you can find in nature. Then, let the kids study the leaves in hands-on activities. As they observe attributes, they can group the leaves according to these attributes and considered any patterns they see emerge. In addition, they can communicate what they learn about leaves in quantitative terms. Begin a discussion about the seasons by asking kids if they think leaves always look the same. Ask them what they think these leaves looked like if they had collected them at a different time of the year. The activities in this lesson challenge kids to notice the colors, sizes of a leaf influenced by the season.

B. Exploration:

After you learned about leaves we played some interesting game to refresh and to strengthen knowledge.

The first game was to order the leaves by size so I collected many different leaves in different sizes and then the children placed the leaves in order from smallest to largest.

Another group played *maching game* with sets of real leaves. We placed pairs of leaves coming in different sizes, shapes and colors and the children found the matching pair for each leaf.

For the last game, trace leaves shape onto a piece of paper. We placed the leaves on the carpet next to the paper and the kids placed the appropriate leaf over the tracing.

C. Discussion questions:

Where do you see leaves? What do you notice about the leaves? Do all the leaves have the same size, color or form? Which leaf is smaller/bigger or larger? Which leaf is soft / prickly? Can you show me a hairy leaf? Rub with your hand slowly the blade of the leaf, can you feel the veins?

D. Conclusions:

Finally, the kids learnt about what a leaf looks like. The children understood how the seasons affect the changes of leaves. They learnt how to sort leaves by size, color and shape.

E. Assessment:

First the children worked independently but they enjoyed to communicate to one another and share with enthusiasm the new discoveries. It was quite easy for the teacher to observe children working. The teacher appreciated their involvement, curiosity and creativity. At the end of the activity they glued all the leaves and the branches on a blue paper and made a beautiful tree.

Further investigations:

The kids can create a journal with autumn leaves of different sizes, color and forms and another one during spring with the same leaves. This journal will help them compare and recognize the changes that leaves suffer during different seasons.

Inquiry and creativity elements:

Modern media, simple materials (leaves, branches etc.) and reference books were used to explain the influence of fall in nature. Furthermore, we tried to deal with the topic in a very creative approach (for example by playing with leaves different games).

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Language and Mathematics, Age group: 6-7 years old
Teacher: Mihaela Balint

How long is this leaf?

Introduction:

This two parts activity is included in the theme **Falling into Winter - "The story of the leaves".**

Background:

Through measuring leaves children become familiar with a range of non-standardized length-measuring units. Additionally, the teacher introduced the following concepts:

• measuring means <u>comparing the quantity to be measured with a small quantity considered as "unit";</u>

• the number of units associated to a quantity to be measured depend on the ratio between the quantity to be measured and the unit value;

• in various measuring situations appropriate units have to be used.

The children learned how to measure the length of the leaves in different ways through the use of different tools such as paper rulers or math grid paper. The teacher also guided the children how to use correctly the grid, positioning 0 – the start point of the scale exactly at the end of the object to be measured, the leaf in this case.

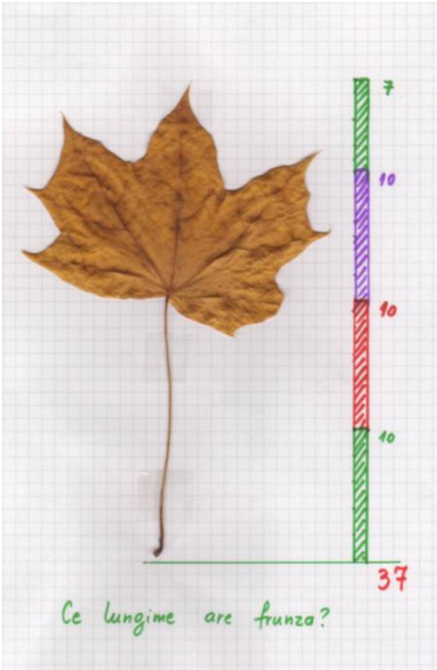
Purpose:

The children observed, compared and sorted out leaves according to their shapes, color, type (simple or compound) and size (big, large, small, thin, thick, long, short). Also, they learned how to measure the length of the leaves in different ways through the use of different tools such as liners, paper rulers or math grid paper.

Aims:

The children will:

- Observe, compare and sort out leaves according to one or two criteria: shape, color, type, size
- Measure the length of the leaves using a math grid paper
- Measure the length of the leaves using a paper ruler
- Make use of approximation values
- Measure the length of the leaves using a liner (ruler) and standard metric system
- Record, compare, organize the results of the measurements
- Draw conclusions
- Communicate information and conclusions using the new vocabulary/key words



Vocabulary/Key words:

Some plants and tree names (lime tree, oak tree, ash tree, chestnut tree, apple tree, rose, chrysanthemum, pear tree, plum tree, grape vine, fir tree), simple leaf, compound leaf, leaflets, the edge of the leaf, palmate, lobed edges, sinuated edges, toothed edges, smooth edges, the veins of the leaf, the petiole, the blade, large, big, thin, thick, small, long, short, longer, shorter, larger, smaller, smallest, longest, biggest, same, similar, identical, different.

Process skills: observe, describe, compare, group, measure, record data, interpret data, draw conclusions, communicate observations, information and conclusions

Time/Duration: 2x45 minutes

Materials and resources:

A mix of dry and fresh leaves (all colors, forms, shapes or size), small grid paper (math note-book), rulers (liners), pencils, colored pencils, fiber pens, sticky tape, worksheets.

Questions:

What type of leaf is it? How long is this leaf?

Procedure:

A. Preparation:

At this point the children already have a large collection of leaves from all kinds of plants (apple tree, plum tree, cherry tree, fir tree, larch, oak, ash tree, maple tree, walnut tree, roses, lemon, lime tree, willow tree and other bigger and smaller flowering plants. At the beginning of the activity, at the centers, the children working in small groups observe, compare and sort out the leaves. Each group has small paper trays and a bunch of leaves. They have to sort out the leaves following a single criterion (shape, color, type or size). After this introduction ask them to sort out some leaves by two criterions. For example: "*Sort out these leaves by putting the simple, green leaves in this box and compound, yellow leaves in the other box", "put the big brown leaves in this box and the small, purple leaves in the other box"*. Also, the children can sort out the leaves comparing the shape of the leaf with something familiar to them. Example: "*Can you find a leaf which looks like a heart/ blade/ needle?".*

B. Exploration:

Show the children a leaf. Name it and describe it. Use the key words as often as you can. Example: "*It is a simple, brown, oak leaf. It is a simple, not a compound one. Look, the leaf has a single blade fixed on the petiole. The oak leaf has sinuated edges."* Ask them to find a similar leaf and show it to you. Pick up another leaf and initiate a dialogue with the children. "*This is a lime leaf. It is a simple and heart shaped leaf. Do you know the lime tree? How about the edges of the leaf? Are they sinuated or toothed? What color is this leaf?*", "*Oh, look! This is a rose leaf. I love roses. Do you? How many leaflets are fixed on this petiole? Count them. Is it a simple or a compound leaf? Yes, it is a compound leaf. How about the edges? We can see fine cuts on the edges of the leaves. The rose leaf has toothed edges, fine toothed edges. Now, tell me the color…Can you show me another rose leaf/a similar leaf? Show me a simple leaf with palmate edges."*

Now, each team must chose a leaf, their favorite leaf or the one they recognize it well and describe it in front of the class. Children can fill the *Datasheet 1*, also.

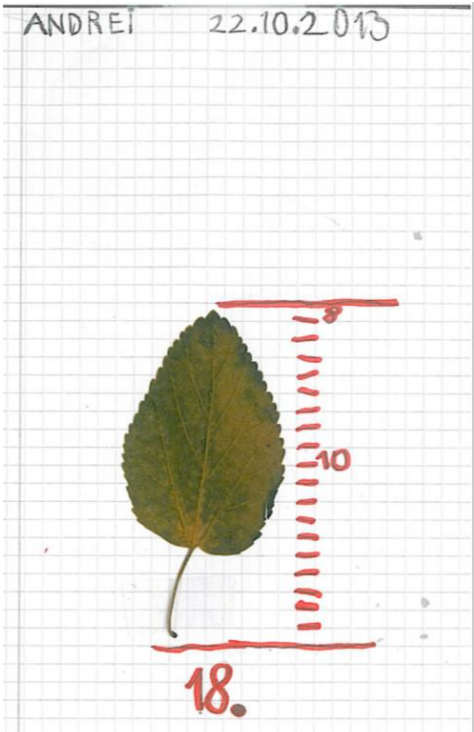
In the second part of the activity each child chose a leaf. With a small piece of sticky tape ask them to fix the leaf on the grid paper. The teacher helps them fix the petiole of the leaf exactly on a grid line. Also the teacher guides the children to position the leaf in such a manner that they can measure it. First, ask them to make a prediction: *How long is their leaf? And to* write that value on the *Datasheet 2*.

Then the children count the grids from 0 to 10 and add the results to a final answer. *Example: 10+10+4=24.* The children have the opportunity to approximate the length of their leaves and to verify their predictions. Ask them to fill in the ***Datasheet 2***.

This part is quite challenging; some of the kids will be very close to the real length with their estimations. Ask them to measure the length of leaf using a ruler. How many centimeters represent the length of the leaf? Is it the same value as the one recorded before? Why not?

Note. If you use the standard math grid notebook you will notice that 2 grids=1cm.

Repeat the measurements with a second and a third leaf. Which one is the longest/shortest?



In the next part of the activity the teacher reinforced the measurement technique using paper rulers with a worksheet. The children already worked on these kinds of worksheets; they found the length or the height of some animals, plants, different objects using a small ruler drawn next to the item.

The children wrote the numbers on the ruler or colored the number of units corresponding to the length or the height of the item. When they finished collecting all the data they organized these data in increasing or decreasing order. They can also represent the results using a graph. See *Worksheet 3* file.

In the end of the activity ask them to measure the length of the leaf with a ruler

C. Discussion questions:

What color is this leaf? Can you tell me the name of the plant? What does this leaf look like? What shape is it? (round, oval, heart, star, needle) can you find a similar/identical leaf? This leaf has toothed/ smooth edges. Can you find another leaf with toothed/ smooth edges? Show me a brown and yellow leaf. Now, can you show me a brown and yellow leaf with toothed edges?

How long is this leaf? Can you show me a leaf with the same length? Can you show me a longer/shorter leaf? Measure the length of this leaf using this paper liner and then using this ruler. Write the results here, on the whiteboard. Did you get the same results? Why? When you measure this leaf you notice that the leaf length is close to 9 units but not exactly on the ninth line. What value did you take into consideration: 8 or 9? Why?

D. Conclusions:

- We can compare the lengths of two leaves (objects) only if we use the same “unit” to measure. Different units give different results for the same leaf.
- An accurate measurement means that the start point of the scale is exactly at the end of the leaf to be measured.
- We can approximate the result. We will take into consideration the closest line. If the top of the leaf is somewhere between the 7th and 8th unit we choose the closest one.
- There are many types of leaves. Short, long, large or small, with toothed or lobed edges, simple or compound, the leaves are beautiful and important for plants and for us, too.

E. Assessment:

The teacher takes into consideration each child’s activity as a whole: active participation, records on datasheets, worksheet, communication skills, the accuracy of the observations and conclusions. The teacher appreciates team work and individual work, too.

These activities are a very good and useful introduction in the standard units measurements. The meter is the international unit for length measurement but for the children, the centimeter is more appropriate.

Further investigations:

The colors of the leaves is already a catchy issue. In autumn many plants usually green, turn into amazing mixtures of colors. Those awesome colors! Where do they come from? Are they already inside the leaves? Are they one of the effects of the fall? See ***What colour is the leaf?*** activity.

Inquiry and creativity elements:

Children must understand that to measure means to compare the quantity to be measured with a small quantity considered as "unit". We can compare the lengths of two leaves (objects) only if we are using the same "unit" to measure. They notice that the score for a longer leaf could be smaller than that of a shorter leaf if we use a different "unit" (a bigger grid).

"It isn't fair for the leaf", said one of the kids. "*It is longer but it is only 11 units long. The other leaf is 18 units long but it is obviously shorter"*. The child understood that using different units you can get "unfair" results.

The measurements provide children the opportunity of better understanding of the numbers bigger than 10 by simply adding to the first 10 units the rest of them. Also they can reinforce the counting by 10.

During these activities the children decided to keep the leaves in a special folder. They noticed the teacher's way to prepare and preserve the fresh leaves for study and chose to do the same with their favorite leaves. For a better preservation some of the pages were laminated. The folder proved to be very useful in many other activities. The children loved to add their notes about leaves or to talk about them.

Teacher's notes:

In books and encyclopedias the edges of the leaves are described using a great variety of terms. As an example, I attached here Wikipedia information. For 6 years old children I chose only: smooth edges, toothed edges, sinuated edges and palmate/lobed edges. For each type of edges I drew on the whiteboard some examples. The aim was to help the children easily connect the image with the term and to use the vocabulary in context, not to memorize it.

Wikipedia. Edge (margin)

- ***ciliate:*** fringed with hairs
- ***crenate:*** wavy-toothed; dentate with rounded teeth
- ***crenulate:*** finely or shallowly crenate
- ***dentate:*** toothed, such as *Castanea* (chestnut)
  - ***coarse-toothed*** or ***coarsely dentate:*** with large teeth
  - ***glandular toothed*** or ***glandularly dentate:*** with teeth that bear glands.
- ***denticulate:*** finely toothed
- ***doubly toothed:*** each tooth bearing smaller teeth, such as *Ulmus* (elm)
- ***entire***: even; with a smooth margin; without toothing
- ***linear***: parallel margins, elongated
- ***lobate:*** indented, with the indentations not reaching to the center, such as many *Quercus* (oaks)
  - ***palmately lobed:*** indented with the indentations reaching to the center, such as *Humulus* (hop).
- ***serrate:*** saw-toothed with asymmetrical teeth pointing forward, such as *Urtica* (nettle)
- ***serrulate:*** finely serrate
- ***sinuate:*** with deep, wave-like indentations; coarsely crenate, such as many *Rumex* (docks)
- ***spiny*** or ***pungent:*** with stiff, sharp points, such as some *Ilex* (hollies) and *Cirsium* (thistles).

Enclosure 1 Datasheet 1. What type of leaf is it? Example.

Name....................................Data............

Nr	Name of the plant	The leaf description							
		leaf type		leaf edges				I see the colors: draw colored circles	Special notes
		simple	compound	smooth	toothed	sinuate	palmate / lobed		
1	lime tree	√			√				heart shape
2	rose		√		√				fine spins on the petiole
3	walnut tree		√				√		we like walnuts
4	oak tree	√				√			squirrels love acorns

Enclosure 2

Datasheet 2. How long is the leaf?

Name……………………………………………………Date………………………………

Nr.	Leaf	I predict	I measure
1			
2			
3			

Conclusions:

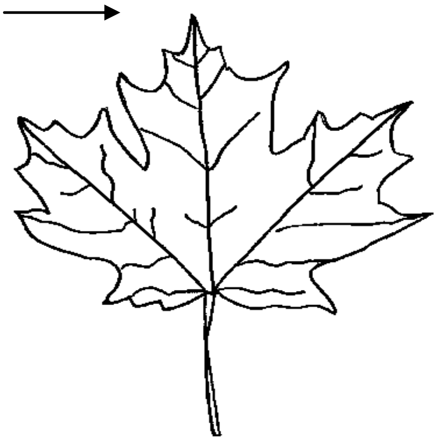
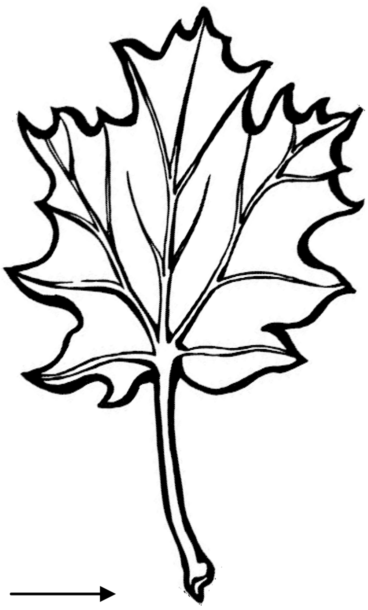
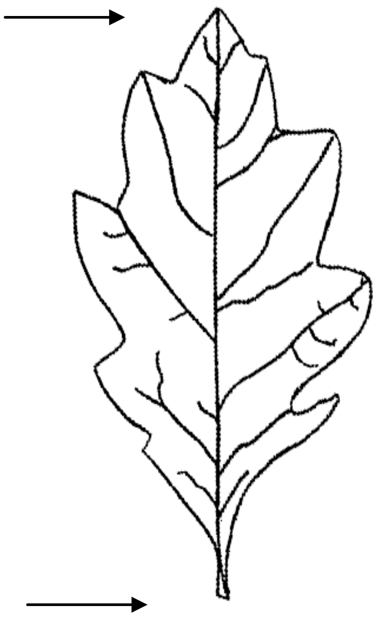
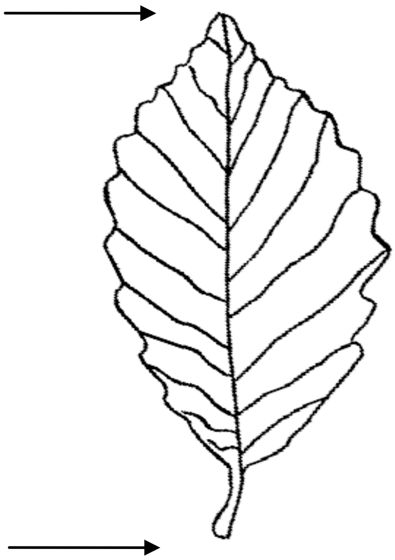
The longest leaf is……………………………………….It has…………………

The shortest leaf is………………………………………It has…………………

Enclosure 3 Worksheet 3.

Which one is the longest? Name................Date....................

Count and color the rulers. How many units does each leaf have? Write the number next to its name.
Color the longest leaf with green and the shortest one with yellow.

			
	The maple leaf		**The grape vine leaf**
			
	The oak leaf		**The ash tree leaf**

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Language and Art, Age group: 6-7 years old
Teacher: Mihaela Balint

The colors of the leaves

Introduction:

These two days activity is part of the theme **Falling Into Winter -**a series of lessons **The story of the leaves.** It involved children in exploring the natural environment and observing the changes in the world of the plants in tune with the seasonal changes. At this point the children already learnt about the processes which are taking place inside the plants: photosynthesis and respiration. The plants are producing their own food using water, air and energy from the sun. In photosynthesis the *master chefs* are the chlorophyll cells. Because the chlorophyll is green the plants are usually green, too. But not always. In fall the leaves show us a wonderful and amazing mix of colors. These "other colors but green" were there from the beginning but they were "hiding behind the chlorophyll".

Background:

Among all the natural processes around us, the annual changing of leaves from green to different shades of orange, yellow, brown and red is probably the most beautiful. Behind this show of colors there are important scientific processes. Nature knows very well how to protect herself by the winter's low temperatures and strong and icy winds.

Chlorophyll is a green compound present in the leaves. Other pigments (yellow, orange) are also present but they are overwhelmed by the chlorophyll. As fall approaches, the weather grows colder and the days are shorter. A thin layer of cells grows over the water tubes in the leaves and closes them up in preparation for the winter. No more water can get into the leaf! Without water, the green chlorophyll starts to disappear and the other colors in the leaves, the yellow pigment (xanthophyll) and the orange pigment (carotene), can finally be seen. The leaves don't really "turn" a certain color. They just lose their green. Why are some leaves red or purple in the autumn? When sugar (the food of plants) is trapped inside the leaf's tubes it makes leaves turn red or purple. What about brown? Well, when the water flow in the leaf stops, the leaf ceases to make food and begins to die. The green chlorophyll dies first, but the yellow and orange cells die, too. When all of the cells are gone, the leaves are dead and brown (dry and crunchy).

The mix of pigments in the leaf may be separated by the technique of *paper chromatography*. Sounds very *scientifically* but it's easy to do with a little help.

Purpose:

Creative investigation of the colors of the leaves:

- Discover the colors of different type of autumn leaves.
- Conduct an experiment following the instructions.
- Reproduce through an art craft the autumn leaves.

Aims:

The children will:

- formulate a prediction
- separate the mix of pigments from leaves into bands of color on a special paper using alcohol and heat -a simple technique called *paper chromatography* – in a *follow the instructions* activity
- reinforced their knowledge about plants & leaves by solving *language and math exercises*
- reproduce in a creative way the mix of the colors from the leaves in a simple but spectacular *art craft*

Vocabulary/Key words:

Sun (light) energy, photosynthesis, respiration, chlorophyll, the parts of the plant (root, stem, leaves, flower, fruit, seed), prediction, sugar, color pigments. Only for advanced: carbon dioxide, hydrogen and oxygen, chromatography.

Process skills: observe, analyze and describe, conduct an experiment following instructions, gather information, collect data, interpret data, draw conclusions, communicate observations, make an art craft, information and conclusions

Time/Duration:

1. First day: 15-20 minutes. Waiting time (crossword and secret message activity): 40-45 minutes
2. Second day: 10-15 minutes. Art craft activity: 40-45 minutes

Materials and resources:

A mix of leaves (all colors, forms, shapes or size), small jars with lids (baby food, mustard or sauce jars), rubbing alcohol, plastic knives and plates, a shallow tray, hot water, white coffee filter paper, scissors, aluminum foil, crayons, wax paper, sharpeners, iron, newspapers, scissors, data sheet, crossword worksheet.

Question:

What colors is this leaf?

Procedure:

A. Preparation:

The children already have a rich collection of leaves. Some of them are fresh leaves but they are not entirely green (it's November!) or they are not green at all. Many leaves have a mix of colors: yellow, orange, red, brown, green shades, purple. Children already know about the "little green men"- the chlorophyll cells- which live inside the leaves making food for the whole plant. They have even observed at the microscope very small and thin fragments from leaves. According to these observations next to "the green men" inside the leaves must be yellow, purple, orange or red little "men".

Children work in pairs or small teams. Each team has a plastic plate, plastic knives, leaves from the same plant, and a small jar.

B. Exploration:

Follow the instructions:

1. Chop the leaves into very small pieces with the knives, on the plates.
2. Put the small pieces into the jar labeled with the number of the team and the name of the plant (maple tree, for example).
3. Add enough rubbing alcohol to each jar to cover the leaves. Using a plastic knife, carefully chop and grind the leaves in the alcohol. **SAFETY NOTE:** Isopropyl rubbing alcohol can be harmful if mishandled or misused. It will be handled only by the teacher.
4. Cover the jars very loosely with lids or plastic wrap or aluminum foil. Place the jars into the shallow tray.
5. Add some tap warm water (around 2-2,5cm level).
   SAFETY NOTE: Hot water can cause severe burns. The hot water will be poured only by the teacher.
6. Keep the jars in the water for at least half-hour, longer if needed, until the alcohol has become colored (the darker the better). Twirl each jar gently from time to time. Replace the hot water if it cools off. During the waiting time fill in the datasheet: Name, date, plant name.

   1. Cut long thin strips of coffee filter paper for each of the jars. (Show them how to do it!)
   2. Remove jars from water and uncover. Place a strip of filter paper into each jar so that one end is in the alcohol. Bend the other end over the top of the jar and secure it with tape.

3. The alcohol travel up the paper, bringing the colors with it. Can you see it? Let the jars rest till the next day. What colors will you see? Write your prediction on the datasheet.
4. Have fun solving a crossword and a secret message.

Teacher's notes: The crossword and the secret message allowed children to reinforce their knowledge about leaves (and plants). The definitions are presented by the teacher like short riddles. The link with the math is made by using a code to transform a succession of numbers and shapes into letters and words (forming a short message). In the crossword the children had to write the proper words Across and Down, in the right place.

Second Day:

1. Remove the strips of paper, let them dry and then tape them on the datasheet. What do the paper strips look like? What colors can you see? You probably see different shades of green, possibly some yellow, orange or red, depending on the type of leaf. Why? The colors travel different distances up

the paper as the alcohol evaporates.

2. Optional. Repeat the experiment with another type of leaves. Also you can repeat the experiment increasing the waiting time period. Keep the chopped leaves in alcohol for 2 days.

C. Discussion questions:

What colors is the leaf? What color is the solution? What colors you will see on the paper strips? What colors can you see on the paper filter? Was your prediction correct? Are all the leaves green? Why some plants have purple or dark red leaves even during the summer? These plants don't have chlorophyll?

D. Conclusions:

All the plants have chlorophyll and other pigments (yellow, orange, red, purple) in different concentrations. The heat and the alcohol help us see the colors of the leaves. When a leaf has a high concentration of chlorophyll relative to other pigments, the leaf appears green. When a leaf has a high concentration of carotene relative to other pigments, the leaf usually appears yellow and so on.

Art craft activity:

- Using a sharpener, the children make a lot of crayons scrums on a sheet of wax paper folded in half. They can use all the crayons including white and black.
- The wax paper is covered with newspaper and the teacher irons them one by one.
- Children observe what happens with the crayon scrums. The scrums melt and the colors mix.
- Children draw leaves patterns on these sheets of wax paper and cut the patterns with scissors.
- In the light, the mix of colors looks awesome. They are wonderful window decorations.

E. Assessment:

The teacher took into consideration each student's activity as a whole: activity, records on datasheets, worksheets, communication skills, the accuracy of the observations and conclusions. The teacher appreciated the team work and individual work, too.

Further investigations:

The children worked together very well and decided to repeat the experiment and to use another set of leaves from another plant. Intrigued by the colors of the paper stripes they chose new leaves from plants with purple and dark red leaves. Some of their new questions: *These leaves, do they have chlorophyll, too? We can't see any green! Do they have chlorophyll inside? Can the photosynthesis take place in the absence of chlorophyll?*

In the shade a plant with purple leaves sometimes becomes green! She needs more chlorophyll to survive. Investigate a plant with red or purple leaves. Keep them in the sun for one or two weeks and then in the shade. What colors are the leaves?

		
Begonia	**Japanese maple**	**Common sage**

Inquiry and creativity elements:

The experiment was not planned by the kids but it was a hands-on activity. The children were encouraged to make connections between their prior knowledge and experience, to extend observations and articulate explanations.

Features of creative teaching can also be noticed during these activities in the efforts made to enhance children's attitudes to mathematics by connecting mathematical knowledge with language and science facts. A note of mystery was added by the secret message and by the word indicated by the arrow in the crosswords.

The teacher promoted understanding about the meaning of inquiry through reflection on children's activity and observations.

Enclosure 1

Datasheet: ***What colors is this leaf?***

Team:...Date...................................

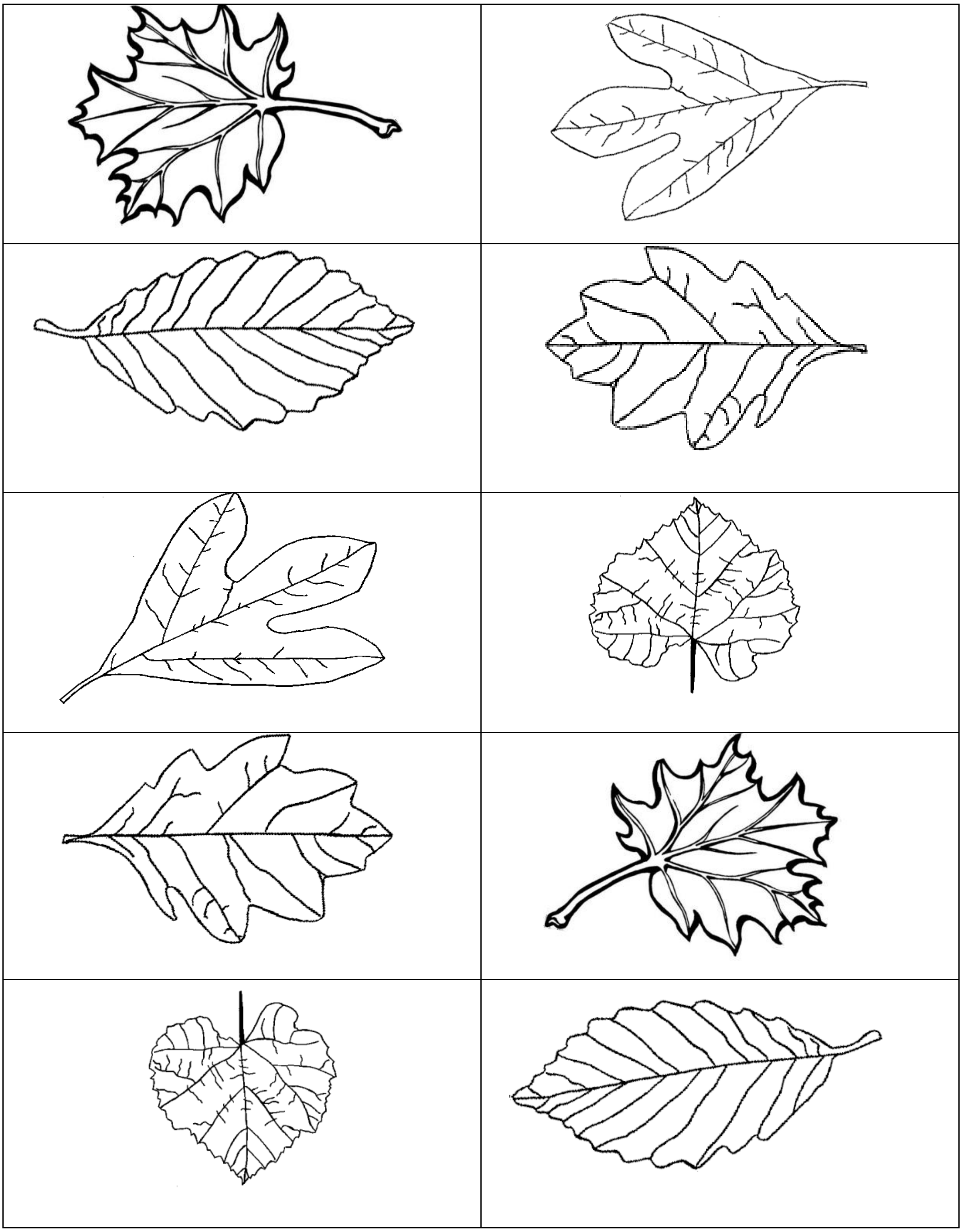
Tape here the paper filter strip no.1	Tape here the paper filter strip no.2

Nr.	Plant name	I think I'll see	I see
Test 1		1. 2. 3.	1. 2. 3.
Test 2		1. 2. 3.	1. 2. 3.

Enclosure 2 Name.............

Date................

Find the pairs. Color the pairs the same.



Enclosure 3

NAME…………………………………………….DATE………………………..

FIND THE SECRET MESSAGE.

10	4	□		7	5	△	6	10	9		7	8	◇	2	⏢	1	□		◇	☆	Y	3	□	6	!

USE THE CODE BELOW.

1	2	3	4	5	6	7	8	9	10	△	□	◇	⏢	☆
C	D	G	H	L	N	P	R	S	T					

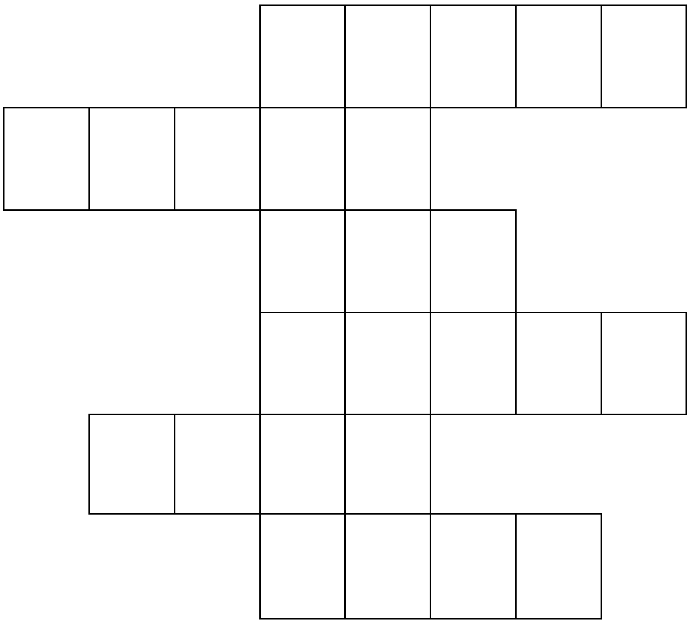
AND THE SECRET MESSAGE IS:

……………………………………………………………………………………………………….

………

Enclosure 4: Crossword

Name……………………….Date……………..



1. TO MAKE FOOD THE PLANTS USE THE ENERGY OF THE …………
2. ONE OF THE INGREDIENTS OF THE FOOD PROCESS. IT IS ABSORBED BY THE ROOTS FROM THE SOIL.
3. THE OTHER INGREDIENT OF THE FOOD, CARBON DIOXIDE IS ABSORBED FROM THE….
4. SMALL TUBES IN THE LEAVES. THEY SUPPORT THE LEAF BLADE AND TRANSPORT THE WATER AND THE FOOD.
5. PART OF THE PLANT. SUPPORT LEAVES AND FLOWERS AND CARRY WATER FROM THE ROOTS TO THE LEAVES.
6. TAKE CARE OF THE ROOTS. FIX IT AND SUPPLY IT WITH WATER.

			L	I	G	H	T
W	A	T	E	R			
			A	I	R		
			V	E	I	N	S
	S	T	E	M			
			S	O	I	L	

School/Kindergarten: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Age group: 5-6 years old
Teacher: Cristina Vacaru

How can a flower stay beautiful for a longer time?

Introduction:

This activity is part of the theme **Falling into winter**. One of the topics was flowers and one day was dedicated to the chrysanthemum. Studying this flower, we talked with our children about its life-cycle and what a plant needs to grow. That morning, a cute girl brought me a chrysanthemum. The question came naturally *How about a flower, Miss? What does a cut flower need to stay beautiful for a long time?* And our investigation started: we decided to deprive the flower of one of the following elements (water, air, light, heat) in order to see which flower can stay beautiful for a longer time.

Background:

To keep cut flowers beautiful for a longer period of time, always have in mind that they have been removed from their source of water coming from the roots. Once cut, the air rapidly moves into the water-conducting tissues and plugs the cells. This is why, it is very important to place the cut flower in water immediately. If it takes time till you can put it into water, cut off a small portion of the lower stem so that the water can enter the tissues again. It is a good idea to cut the stem underwater so no air plugs the cells.

The leaves produce carbohydrates but because we usually keep cut flowers indoors where the light is much reduced, the leaves can produce less sugars for the plant. Complex mixtures of sucrose (sugar) can make up for the loss of the functioning leaves and insure longevity.

(Source: Keeping cut flowers and flowering plants, www.extension.umn.edu)

Purpose:

Developing an inquiring mind through experimentation with natural elements.

Aims:

Observing the natural environment through experiments with flowers,

the children will:

- find out about the necessary conditions for keeping a flower alive for a longer time
- discover what happens if one of this conditions is not present
- describe, draw conclusions and analyze the flowers after we finish the experiment

Vocabulary/Key words:

Water, air, light, heat, the same, different, dry, bleak, less, more.

Process skills: observe, analyze and describe, plan, gather information, collect data, interpret data, communicate observations, information and conclusions.

Time/Duration:

30 min for the experiment

5 days for observing the flowers without one of their vital elements

Materials and resources:

5 fall flowers, 5 plastic cups, 5 labels with the symbols of the four elements

Question:

What does a flower need to stay beautiful for a longer time? What would happen if the flower would not have water, air, light or heat?

Procedure:

A. Preparation:

Start by talking with the children about the importance of plants/flowers for the people, talk about their parts, remind them about pollution and its terrible effects on the nature. Ask the children to consider what conditions should a cut flower have to stay beautiful. (The children in my classroom answered: water, air, light and heat) Propose an experiment in which similar 4 flowers would be deprived of one of the four elements.

B. Exploration:

Give the children five similar flowers with their leaves and shanks and put them in 4 plastic cups filled with water and one empty plastic cup.

Draw on 4 labels the symbols for the chosen elements (in this case: water, heat, air, light) and stick them on the cups. (For example a tap, a cloud or a watering can for water, a sun for heat, a bulb for light and some air circles for air.) After you say *sorry* to the flowers as you will "rack" them for scientific purposes, put one that benefits of all 4 elements next to the window, the second in a cupboard to have no light, the third in the freezer and the fourth one in a sealed plastic bag. Leave the last one, the fifth, without water in the sun.

Tell the children that, in order to observe what will happen with the flowers, they need to watch them for 4 or 5 days and then come with conclusions.

Ask the children to formulate predictions on which flower could resist more besides the one which benefits of all the 4 elements and which will be the less resistant at the end of the experiment. In order to help the children, remind them about how the weather of each season affect the development of plants.

C. Discussion questions

Which are the necessary elements for a plant to develop? What would happen if one of these elements would miss? How long do you think the flower with all 4 elements will resist even without roots? How long will the other flowers resist?

Which flower will resist the most except the one that benefits of all 4 elements? What part of the flower will resist more? How will they look at the end of those 5 days?

D. Conclusions:

Observing the flowers regularly during 5 days, the kids observed how each flower started to wilt except the flower that had access to light, warmth, air and water. The most affected flower was the one in the freezer as it froze the second day and when we touched it, it broke off into small pieces. The second most affected flower was the one without water. Amazingly, the flowers with no air and no light looked really well. This happened because the flower in the plastic bag produced its own oxygen and carbon dioxide (with the small number of leaves it had). The plant needs light but the flower doesn't – was our conclusion after this experiment.

E. Assessment:

The children were very curious, interested and they participated with pleasure to this experiment even if we tested their patience. The teacher appreciated their curiosity and the reasonable predictions.

Further investigations:

Study plant parts on the microscope, experiment by putting colourful pigments in the water to get rainbow flowers, study the different shapes of the petals and compare them with geometrical shapes, make perfume.

Inquiry and creativity elements:

After this experiment the children started to ask questions about other types of flowers that we could work with the experiment. So, some of them brought other flowers and they hid them in the bookcase, in the fridge or in books to compress them.

Teacher's notes

Very interesting was that the children's predictions about which flower would be the most affected did not correspond with reality. They thought that the most affected flower would be the one without water. Observing that the flower without heat had no chance of survival, they understood why during winter the flowers cannot survive.

Kindergarten / School: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Math and Sensory, Age group: 3-4 years old
Teachers: Cristina Preduca, Irina Prejbianu

Naturally colored play dough

Introduction:

Naturally Colored Play Dough is part of the **Falling into winter** project which is about how people and nature get ready during autumn months for the long, cold winter. In our country, when fall comes, people usually start storing in their pantries vegetables and fruit to have during winter. Studying some of the vegetables found in most of the Romanian gardens, like parsley, onions and beetroot, children were surprised to find out that these veggies can be used as great sources for natural dyes.

Natural dyes are dyes or colorants derived from plants, invertebrates, or minerals. The majority of natural dyes are vegetable dyes from plant sources – roots, berries, bark, leaves, and wood – and other organic sources such as fungi and lichens. To make the dye solution, you have to chop the plant material into small pieces and put in a pot, add some water, bring to a boil, then simmer for about an hour. In the end you have to strain the colored liquid and then it is ready to be used.

After learning about the characteristics of some veggies we decided to test their power of coloring by mixing the natural green dye of parsley, the red of beetroot and yellow of the onions with homemade dough and see how it transformed.

Background:

Children of all ages love playing with dough because it is fun, but apart from making a mess what is it really good for? Using play dough (or in fact any type of dough) with young children is beneficial in so many ways. The malleable properties of play dough make it fun for investigation and exploration as well as secretly building up strength in all the tiny hand muscles and tendons, making them ready for pencil and scissor control later on. Poking in objects and pulling them out of play dough strengthens hand muscles and co-ordination.

As part of simple, tactile play it can be squashed, squeezed, rolled, flattened, chopped, cut, scored, raked, punctured, poked and shredded! Each one of these different actions aids fine motor development in a different way, not to mention hand-eye coordination and general concentration. And as soon as you add another element to it, the list of benefits and creative play possibilities continues to grow! Having a wide range of additional extras to use while playing with dough extends endlessly the investigation and play possibilities. Poking in sticks provides a challenge and a new physical skill. Squeezing through a garlic press leads to wonder and amazement at seeing it change shape, as well as using a gross motor movement to accomplish it. Sticking in spaghetti requires a delicate hand and can lead to threading and stacking pasta shapes or beads over the top.

Providing boxes and containers with various shaped compartments can lead to cooking play, sorting, matching, ordering and counting, all naturally and without pressure to learn.

As soon as you introduce open ended play items to add to the mix, play dough becomes the perfect medium for numerous types of imaginative play and can represent so many things in a child's eyes. A jar of candles and cupcakes cases leads naturally to birthday party role-play, counting out candles and singing! Glass pebbles can lead to sea-side imaginative small world play with storytelling about sea creatures and mermaids! It can be chocolates and sweets in a sweet shop, cakes and bread in a bakery, grass and mud in a garden center, sand or ice cream in a beach scene, soil, pebbles, ice or snow at the zoo/ jungle/ farm/ ocean and so on! The list is as endless as a child's imagination!

As any adult who has played with dough can tell you, the effects of all that squeezing and pummeling are great for stress relief and can feel extremely therapeutic! Little children can struggle to express their emotions and using dough while talking and singing can really help that process.

In more focused play, play dough can be used as a fantastic way to practice letter and number work. Children can form letters of the alphabet, spell out their own name, make numbers, form 2D and 3D shapes, compare lengths/ thicknesses/ weights, count out rolled balls to match numeral cards, match and sort by color and SO many more ideas, too!

The actual act of making the play dough together with your child can lead to lots of questioning and prediction skills. Here we have some solid materials (flour, salt etc) to which we are going to add some liquids (oil, water.) What do you think will happen? What can we make? The child gets to explore and observe the changing state of materials in a hands-on way, and be filled with wonder as the bowl of unrelated ingredients comes together to form a sticky then smooth and squishy ball of dough! We often take these things for granted, but in the eyes and hands of a child that's quite some transformation!

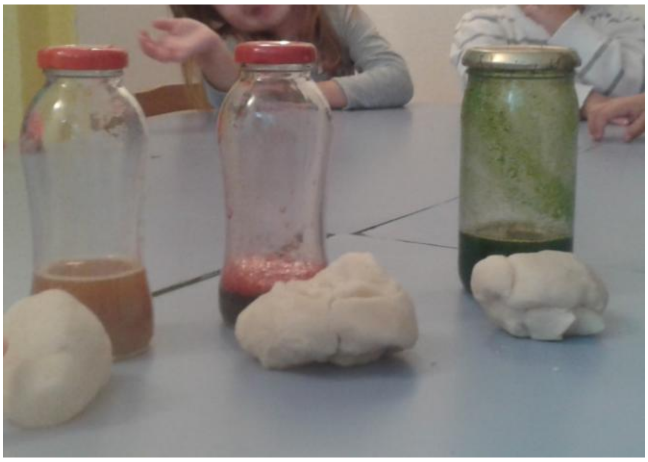
Following a recipe and instructions, counting out cups, stirring and mixing and just being able to spend time on a collaborative project with an adult are all meaningful and important experiences too!

Purpose:

When your spinach isn't as fresh as it used to be, use it to make homemade dye instead of tossing it out. That goes for your orange peels, lemon ends, even the first few leaves of that cabbage head (that have been manhandled at the grocery store). Fruits, vegetables, and flowers have been used for years to alter the color of clothing or giving color to our food. Making homemade dyes is easy, it's eco-friendly, and it costs basically nothing. Let's see if we can use them to color homemade dough and make playing with dough even more fun.

Aims:

The goal of this activity was to see how homemade dough changes once it is mixed with natural dye and if the colors remain as strong as before the experiment once they are mixed together with the dough.



The children will:

- Observe, touch, weight, smell, taste and compare the vegetables: parsley, beetroot and onions.
- Observe the colors of the dyes.
- Match the dyes with the vegetables by color.
- Describe their feelings when playing with homemade dough before coloring?
- Describe their feelings when playing with homemade dough after coloring?
- Compare the two situations: before and after coloring.
- Observe whether the colors stay just as intense after coloring the dough as before it.
- Play with the homemade dough and create out of it fruits and veggies that can be used as natural sources for dyes.

Vocabulary/Key words:

Vegetable, fruit, pantry, dye, boil, solution, color, homemade, dough, flour, water, salt, parsley, beetroot, onions.

Process skills: observe, analyze and describe, predict, plan, conduct an experiment, draw conclusions, communicate observations, compare results, information and conclusions.

Time/Duration:

20 minutes for activity

Materials and resources:

Beetroot, beetroot dye, parsley, parsley dye, onion, onion dye, homemade dough.

Question:

What will happen to the dough once we mix it up with the natural dye?

Hypothesis:

The dough will be colored in the same color as the natural dye. After dyeing it, the dough will become thinner.

Procedure:

A. Preparation:

Give children a short introductory explanation on natural vegetable dyes. Ask them to identify the veggies on the table and describe them. Also ask the children to match each of the vegetables with the right jar of dye. Tell the kids to think of other vegetables or fruits that can be used in order to obtain natural dyes. Ask them if they could think of types of foods in their daily meals that might be colored with natural dyes.

B. Exploration:

Give each child a piece of homemade dough and let them play with it for a while. Then ask them to describe what it feels like when playing with homemade dough. Afterwards pour some dye onto each piece of dough and ask the children to mix them up thoroughly. Then let the children play again and ask them to describe how the dough feels in their hands after coloring it with natural dye. Tell children to focus on the intensity of the color: is the dough colored with the same intensity of the dye or less? Give children freedom to create from colored dough whatever fruits and veggies they think can be used to get natural dye. Have small conversations while they are working about the reasons for their choices and ask them to give as many arguments as possible.

C. Discussion questions:

Can you name the veggies on the table? Can you name the colors of the dyes in the jars? Can you match the veggie with the right natural dye? What other fruits or veggies do you think can be used to make natural dye? Can you think of foods that are colored with the help of natural dyes from vegetables or fruit? How does it feel to play with homemade dough? What will happen to the dough once we mix it up with the natural dye? Is the dough colored with the same intensity of the dye or less? How does it feel to play with the colored dough? Does it have the same texture? Is the dough as flexible as before the coloring process?

D. Conclusions:

Natural dyes color differently homemade dough. Children observed that the beetroot dye color stays as intense after mixing with the dough as before this process. At the same time the other two dyes are not so intense, even though the homemade dough is colored by the onion and parsley dyes. The texture of the dough changes slightly once it is mixed with the natural dye as it becomes more watery and less flexible. However the children were able to create and shape different veggies and fruit.

E. Assessment:

First, the children had to be attentive and listen to the teacher's instructions on what they have to do during the experiment. It was quite easy for the teacher to observe children working as they were keen in sharing as many information as they could on the topic. The teacher appreciated their involvement, curiosity and creativity. After the experimental part had finished they were very creative in shaping favorite veggies and fruit.

Most of the children noticed a change in the texture of the dough after mixing it with the natural dye. Also everyone observed that parsley and onion dyes are not as strong as the one from beetroot.

Further investigations:

Natural dye from veggies and fruits can be used to color fabrics of all types and has been used from ancient times. A next step in a dye related experiment would be to play with natural dyes and different types of fabrics.

Inquiry and creativity elements:

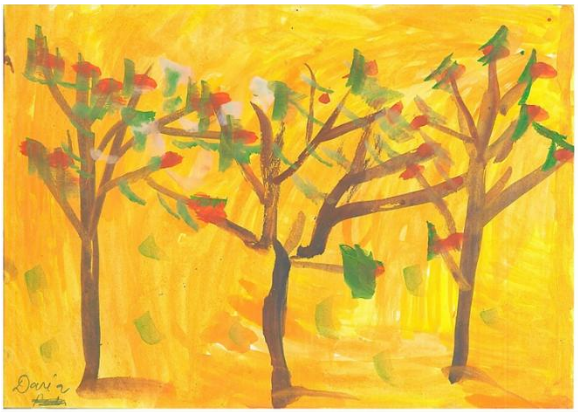
Children enjoyed playing with naturally colored homemade dough. They used their senses to analyze the veggies used to obtain the dye and the homemade dough. They were every creative when thinking of every day food that is colored using natural dye.

Kindergarten/school: Happy Kids Kindergarten, Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Age group: 6-7 years old
Teachers: Laura Popescu, Mihaela Balint, Vacaru Cristina, Roman Ștefania

Introduction:

A teacher can never underestimate the power of outdoor activities: they are both fun and educational and children can connect what they learn at school with real life. The activity described below is part of the theme **Falling into Winter**.

Background:



Children can better understand transitions from fall to winter through daily temperature and weather recording, photographic snapshots of the changes of plants and observations of nature. Almost all preschools and schools organize lessons in the forest. Here are some questions that the teacher should answer before leaving:

- Am I familiar with the area to be explored? How shall we get there? Are the plants and animals safe for the children?
- Is there a specialist I am inviting over / meeting there?
- Is your purpose and expected outcomes well-defined and known to all participants?
- Is my time planning reasonable?
- Do I have the approval of all parents and the authorities?

- What things will I need to take (a pen-knife, water, phone, map, phone numbers etc.)?
- Have I taken risk factors into consideration?
- Do the accompanying people have all the necessary information?
- Do I have some clear rules known by everybody?
- Do I need a medic or a nurse?
- Do I have solid knowledge on the subject of the lesson?

While we are out there we should take into consideration the following aspects:

- Is the age level appropriate for the activities?
- Are the experiences relevant for the purpose and the outcomes?
- Do I leave some time for activities that are chosen by the children?
- Do I encourage creativity and individual expression?
- Am I attentive to risk factors and always ready to prevent accidents?
- In case of unexpected situations do I talk things over with accompanying people?
- Are we time-efficient?
- Are there special situations when it would be better to contact the family?

A valuable experience continues in class where it is important to:

- Have a feed-back from all parties: children, parents, accompanying people
- Analyze outcomes and the way these respond to the initial objectives
- What other valuable unplanned experiences we had together
- What aspects need to be improved for the next outdoor activity.

Purpose:

Observe the changes in nature due to the coming of the fall.

Aims:

The children will:

- Observe changes in the world of plants
- Observe changes in the world of insects
- Show care and concern the environment
- Develop personal qualities, values and positive attitudes towards themselves, the others and the environment
- Develop sensory awareness
- Develop creativity inspired by the outdoor environment
- Develop an interest in outdoor recreational and outdoor activities
- Develop curiosity and wonder in the natural word
- Develop team building and positive attitudes towards the others
- Develop creative thinking and problem-solving skills
- Develop motor skills demanded by working and playing in different outdoor settings
- Observe, analyze, describe and compare the effect of different techniques in leaf pile jumping

Vocabulary/Key words:

Forest, clean environment, environmental care / friends, types of trees / plants/ bugs / birds / local animals, parts of plants / bugs, sign of fall, photosynthesis, temperature, weather changes, shelter, hibernate, migrate

Process skills: observe, analyze and describe changes in nature, compare and draw conclusions of two situations in an experiment, communicate observations, information and conclusions.

Time/Duration:

2 hours

Materials and resources:

Backpack, water, garbage bags, cups, sandwiches, penknife, herbarium, pictures of plants / animals on I-pad or phone, books on natural environment, contact numbers of the parents, rule list, lots of fun

Question:

Which are the signs of fall in our local environment?

Hypothesis:

If we observe carefully the surrounding environment we can notice many signs of the end of fall.

Procedure:

A. Preparation:

Use the set of questions to prepare the outdoor activity thoroughly. Remember to check the weather forecast. Make sure the children are properly equipped and you have taken into consideration risk situations and safety measures. Everybody has to be aware of the rules for this specific activity!

B. Exploration:

Divide the children into groups of four or five students. Ask them to observe attentively the surrounding nature, watch closely the barks and roots of the trees, the leaves fallen to the ground, even dig a little bit under the carpet of colorful leaves or in the ground, listen to the birds and watch for every sign of a living creature. Ask them to find as many signs of fall as they can. Then the group will present their findings. Ask the children what they like and what they don't like about what they see around. "I don't like that the trees cry with yellow tears. I want them to be always happy" said Erik. "I don't like that people throw trash in the forest" – complained Alexia and this started a talk about what we can do to help the environment we live in, recyclable and reusable materials and positive attitudes towards nature.

Let children enjoy a sensory activity in the forest: What do you hear if you close your eyes? How do the sun rays feel on your face? How do you feel when the gentle breeze plays with your hair? Gather things with an interesting touch: stones, tree bark bits, twigs, leaves, moss, mushrooms (careful about that), berries and acorns etc. Ask children to close their eyes and feel them, then describe the feeling and even compare it to earlier experiences. Tell them about the positive energy of plants and animals and let kids hug trees to recharge their "batteries".

Divide the children into teams again and encourage them to gather as many leaves as they can for a fun activity. (Of course they will quickly guess it is pile jumping time!) Build on their enthusiasm and tell them that they will see the science in pile jumping. Now try the difference between jumping into a small or a big pile of leaves, jumping into a thin or thick layer. Why does it feel different? What happens to the pile after you fall into it? When do you leave a bigger hole: when you have a higher or a lower speed? When do you feel better? How can you increase speed before you jump? Will a short run or a long run help you more? Does it happen if you bend your knees? What other techniques can help you? (like hitting the ground with one/two legs, changing the position of the arms, swing, kick with your legs in the air) Is it better to fall on your legs / tummy / back? Why? What are the safety factors we should take into consideration when we jump in huge piles of leaves?

C. Discussion questions:

What signs of fall do you notice around you? How does the canopy of the tree change during fall? What colors are the leaves? Why do leaves change color and fall to the ground? What will happen to the layer of leaves in time? What types of trees / plants / bugs / birds do you recognize? What happens to the trash that people throw in the forest? What can we do we our trash after a picnic?

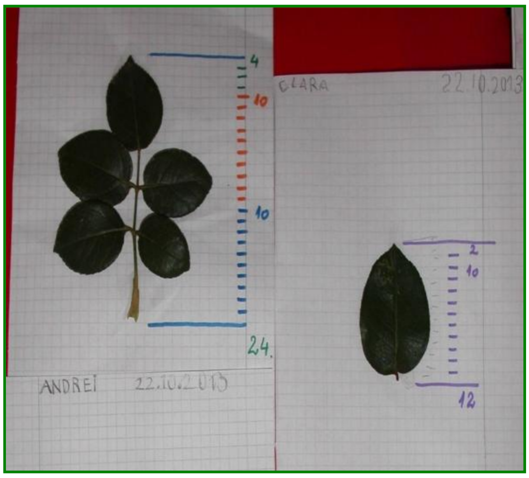
D. Conclusions:

Changes in nature are better observed during outdoor activities. The benefits are multiple: mental, physical and emotional development, decision-making skills, develop self-confidence, self-esteem, cooperation with and support of the others, experiential learning, the wilderness experience, skills learning and environmental awareness.

E. Assessment:

Should we assess outdoor activities? That is a questions that bothers many. What is really important is to learn in a fun and creative way. The teacher can appreciate the children's involvement in the proposed activities and their participation with a great number of good ideas and observations.

Further investigations:



The leaves gathered in the forest help children with Mathematics: here is an example of non-standardized measurements with real leaves.

Art with natural element is sheer pleasure for both hand and eye:

Inquiry and creativity elements:

Challenge the children to find letter and numbers "hidden" in the surrounding environment. Twisted tree branches, plants can take shapes resembling numbers or letters: "Look, here is a V" says Tony with glittering eyes! An interesting landscape is a wonderful oportunity to start a story or a legend that would explain the reality in front of our eyes. Don't hurry, let children take a break and such a story is a nice way to spend the time during a rest. Our children came with funny names, too whenever they saw something interesting: a precipice can be "the dragon's moth", interesting braches can be "deer drinking water", a path under low canopies is "the way to heaven" etc.

Naming known plants and insects is another favourite activity with children. Many times we gather leaves of trees, flowers and leaves to place them in a herbarium and we photograph the tree / plant in its natural environment. Another idea is to take photos of bugs and insects and then make them into a booklet about local bugs.

Let the children use books, images on I-pad or I-phones to identify species of plants and animals.

Outdoor activities can have a natural inquiry twist because:

- It offers an environment where children individually or collectively investigate a phenomenon and draw conclusions about it
- Children can direct their own investigatory activity and draw conclusions about what they have learnt.
- It is cross-curricular
- It is a piece of real life!

Teacher's notes:

Just start the outdoor *activity* and the children's questions will start pouring. Their natural curiosity will make them ask a wide range of questions, just be patient enough to hear them all!

School: Ş. Jan. Uzm. Çvş. Ahmet Güngör Anaokulu, Tarsus-Mersin, Türkiye
Subject: Climate and environment, 5-6 years old
Teacher: H. Tuğba Taşkın

My fireplace

Introduction:

This activity was made as a part of **Falling Into Winter** topic.

Background:

In winter time, we use different kind of tools for heating our houses. These are, stoves, air conditioners, central heating systems and fireplaces. It changes from region to region in accordance with the climate that one lives in.

Purpose:

Getting to know the features of winter time and how to fight against cold weather and how to heat our houses.

Aims:

At the end of this lesson, students will be able to:

- Know about the characteristics of the four seasons
- Changes in nature and environment in winter
- Be familiar with the ways of heating our houses in winter
- Know that there are several ways to heat our houses such as stoves, central heating systems, fireplaces etc.
- Know that we can make a model fireplace by using waste materials.

Key words:

Seasons, climate, winter, heating systems in winter

Time:

3 hours

Materials:

- Packages
- Empty milk packs
- Empty juice packs
- Packing paper
- Color paints
- Handwork-craft paper
- Glue

Question:

Can we make a heating tool making use of waste materials?

Procedures:

A. Preparation:

Children made a circle in the class. They told the names of the seasons. The teacher asked several questions about the characteristics of all seasons and talked about the weather conditions in winter time.

B. Exploration:

Winter is the coldest season and we have to heat our houses. There are several ways to heat our houses. Sometimes we use stoves which use either wood or coal while sometimes we use electrical heating devices such as air conditioners. On the other hand, there are some houses where central heating systems are used. In this lesson, students were informed about all kinds of heating systems and they tried to make their own "*fireplace*" using waste materials. The teacher had asked parents to send some free milk boxes for this activity before. First, the materials were put together and all the boxes were covered with brown paper. Then, they were stuck together giving the shape of a fireplace.

Some of the cardboards were given the shape of wood by being rolled and the fire was painted with crayons by children.

C. Discussion questions:

How can we heat our houses? What can we do to potect ourselves from cold weather? Can we make a model heating tool with waste materials in the class?

D. Conclusions:

There are several ways to heat ourselves in winter. For our body, we can wear woolen and thick clothes but for our houses, there are other ways such as stoves, central heating systems, fireplaces, etc. We can make a model fireplace in the class using the waste materials. Students were given painting sheets for the topic. Then they started to work on the fireplace. They covered all the packs with brown papers. They stuck the packs together on a big package and painted a big fire on it. They made wood rolling the sheets.

E. Assessment:

It was a very creative and enjoyable activity for children to discover the ways of heating in winter and making use of waste materials. We made an exhibition after we completed this theme.

Further investigations:

What else can we do with waste materials?

Inquiry and creativity elements:

Discovering the heating tools, making a model in the class, thinking on other alternatives.

Conclusion:

We can create many things from waste materials.

Further investigation:

Students were given many other painting sheets to represent other ways of heating and they discussed it with their parents.

Kitchen Chemistry in Santa's Workshop – Lesson Plan Synopsis

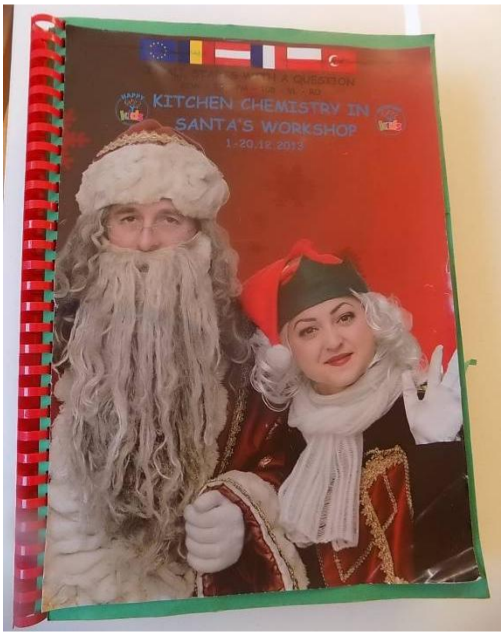
Lesson plans	Partner Country	Synopsis
Kitchen chemistry in Santa's workshop	Romania	A fun, hands-on, engaging way to put into practice with children Christmas recipes.
My own volcano	Turkey	The volcano experiment using kitchen ingredients.
What makes cake so light and soft?	Austria	A fun, scientific approach of a cake recipe to better understand the importance and dangers of CO2.
Why does the bread dough rise?	Poland	Children use balloons and yeast to study fermentation and the release of CO2.
A friendly and useful bacteria	Romania	Three fun experiments developed to acquaint children with yeast.

School/Kindergarten: Happy Kids Kindergarten, Discovery Kids Primary School, Ramnicu Valcea, Romania.
Subject: Integrated Science, Mathematics, Language Development, Art
Age group: 2-6 years old
Teacher: All teachers

Kitchen chemistry in Santa's workshop

Introduction:

The activities described below are part of the theme **Chemistry in Santa's workshop.** This is not a lesson plan but a description of the cooking program which involved all the children of the Happy Kids Kindergarten as well as the students of Discovery Kids Primary School during one week. All the school turned into Santa's kitchen, cooking traditional Christmas cookies and cakes, and believe us, we can still feel the delicious flavors and smells of that wonderful week!



The final outcome was a huge recipe book where all the classes came with their own recipe, observations over the science facts and notes on feelings and impressions!

Background:

Children learn by touching, tasting, feeling, smelling, and listening. They love to help preparing food and cooking because they can use all their senses. In addition, children love to eat the foods they make.

"Culinary education is one of the most effective strategies we can use to combat the childhood obesity epidemic. Hands-on activities such as cooking are powerful ways to transmit healthy habits to children. Teaching children basic cooking skills such as knife skills, sautéing, roasting, and how to transform raw ingredients into a tasty, balanced meal means they can feed themselves healthy meals for the rest of their lives. The more proficient our children are in the kitchen, the less dependent they'll be on packaged and fast foods. When kids bring home recipes they know how to prepare, they ultimately influence how the entire family approaches food.."

("How to teach cooking to kids" – by Julie Negrin)

Purpose:

Introduce children to food science in traditional Christmas cooking

Aims:

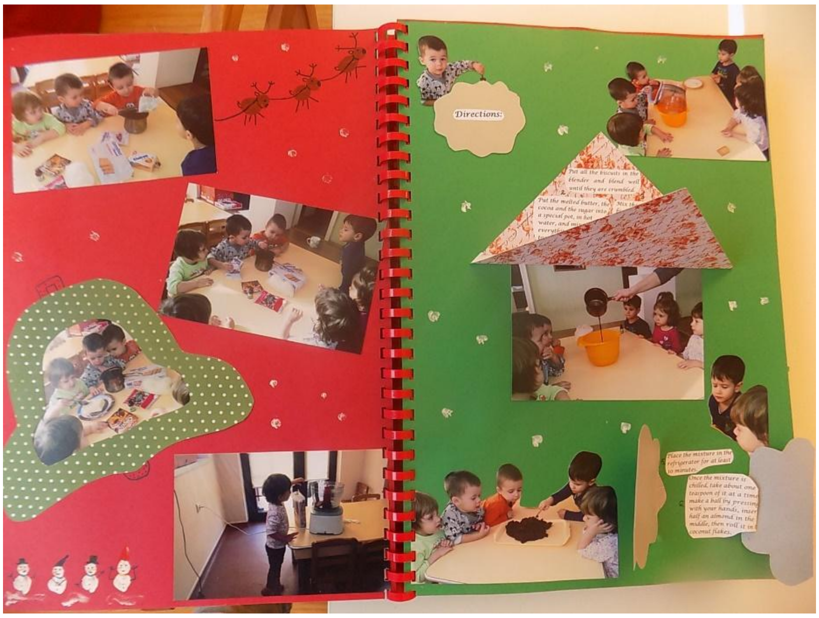
The aim of this program is that the kids discover some ingredients that make our food so tasty and experience the science behind cooking. A very important objective is that they feel the joy of cooking!

The children will:

- identify and select the ingredients for the chosen recipe
- observe, describe, analyze processes like melting, dissolving etc. communicate observations, information and conclusions
- make traditional Christmas cakes
- practice their fine motor skills
- develop vocabulary on ingredients and cooking, describe processes, give reasons and express opinions
- put into practice mathematical concepts about numbers, measurements, one-to-one and two-to-one correspondence
- children over 5 will read words and children over 6 will read recipes
- work together in the group and wait for their turn
- enjoy stories and books on food.

Vocabulary/Key words:

Ingredients, put, add, mix, spoon, tea-spoon, cut, knife, dissolve, melt, yeast effect, grow, cover, mixer, blender etc.



Process skills: observe, analyze and describe, plan, gather information, communicate observations, information and conclusions.

Time/Duration:

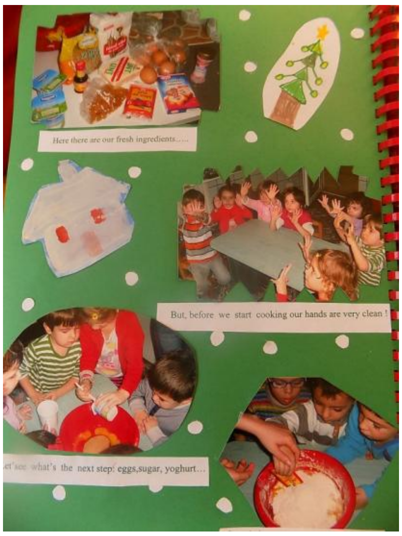
Lessons about 45 minutes during one week of Cooking programme

Materials and resources:

- ingredients for each cake
- appliances and kitchen tools
- cutlery and a wide range of dishes
- Sugar, biscuits, butter, coconut flakes, cocoa, water, roasted almonds, kettle, plates, blender, cooker stove, spoon, weighing food, table.

Questions:

What science facts can we learn from baking traditional Christmas cakes?



Procedure:

A. Preparation:

First of all, decide which recipes are best connected to the classroom project. They also have to be age-appropriate. Our choice was on recipes that are hands-on, take a shorter time, do not need too many kitchen tools and appliances, promote healthy food choices / national traditional cooking, need seasonal affordable products.

Some of the recipes we put into practice were: *Homemade Delicious Chocolate, Santa's Favorite Muffins, Sweet Doughnuts, Santa Baby Cinnamon Rolls, Cut-out Christmas Cookies.*

Before you start cooking, put all the ingredients on a table and name them. Also introduce some interesting facts like where it comes from, effects on human body, healthy or not. Let them feel, smell and taste as many of the ingredients as possible.

B. Exploration:

1. Read / let the children read the recipe
2. The children count, measure, make the correspondence of the ingredients and follow the steps of the recipe.
3. Encourage the children to pour, toss, scrub the fruit, carry the items, dip, tear, break and crack eggs open, mash, mix, pour, spread, knead the dough, juice the fruit, peel, cut or chop soft things with a plastic knife, press cookie cutters or beat eggs / butter.
4. Encourage them to use kitchen tools like all kinds of spoon, the funnel, forks, knives, pipettes, skimmer as well as appliances like mixer, blender, kitchen robots, freezer, fridge, oven, micro-wave oven etc.
5. Take the chance to wonder about physical and chemical processes such as: dissolving, melting, changing solid into liquid and then back into solid (chocolate, for example), vaporizing, mixing dry and wet ingredients together, observing the yeast, vinegar and baking soda effect.
6. After every step, make sure you go and check together the recipe.
7. Create situations for the children to verbalize and describe the ingredients and the cooking process, pose problems for the children to solve, model positive and healthy attitudes and behaviors, make connections to

children's literature on food, talk about safety in cooking and in using the kitchen tools / appliances.

8. When finished, make sure you pack the food, wipe up, clear the table and clean-up together. Don't worry, this is more fun for the children than it is for you!

Here is the learning story of what the teacher did with her two-year-olds:

We put the biscuits in the blender and observed how they turned into fine powder. The children realized that the rotation of the knife inside the blender turned the solid biscuits into small pieces. Safety measures for blender use were discussed. Then we weighed the sugar and the butter and we experimented dissolving the sugar and the butter in hot and in cold water. The kids observed that the hot water helped ingredients dissolve better. Next, the kids tried to dissolve cocoa in cold and hot water. They noticed that if the water is cold, the cocoa creates lumps and dissolves only a little bit. So they decided that we needed hot water.

After that, we mixed the hot water with sugar, the butter, cocoa and biscuits together with a spoon. The kids observed that the biscuits became brown when mixed with the cocoa and hot water. *What ingredient changed the color of all the rest?* The teacher gave details: cocoa contains a pigment that colors all the ingredients, as tempera colors the water. The children waited until the composition cooled down and then they modelled small round pieces with a ½ of the almond inside. *How do we move the palms in order to make round balls?* The teacher noticed that even at this early age, the children understood very well the concept of half. At the end the children rolled each candy into coconut flakes. *How do we handle the cake so that it doesn't break? Why do the coconut flakes stick to the cake? How about if we put a few cakes to dry and try later to put them in the coconut flakes…what do you think it will happen?*

C. Discussion questions:

The discussion questions depend on the recipe and may refer to the names and nature of the ingredients, processes and problem-situations.

D. Conclusions:

Cooking is a fun, practical, engaging activity that can we done with children of all ages. But, most of all, it can be a powerful tool for teaching because it can ensure:

- Social-Emotional development. The children's confidence and self-esteem raises when they take pride in the final result (especially since it can be a really spectacular one), when they see that they become independent in activities such as cutting or peeling. Cooking, just like playing a game, also means following a sequence, fostering patience and developing thinking skills. In preschools and schools, cooking is a social activity where you have to take turns and follow safety rules. Once they go home, children share the recipes / experience with family and friends. The children are also involved in after-cooking cleaning process which teaches them to follow all the steps and be tidy.

- Physical development. Chopping, squeezing, mixing, cutting, spreading are not only fun but they enhance hand-eye coordination and help developing the small muscles that are used for writing.

- Cognitive development. Cooking develops curiosity, imagination, thinking and problem solving skills; it offers opportunities to make predictions and observations on the process. It means real-life opportunities to understand and apply knowledge in mathematics: measuring, one-to-one correspondence, counting, number recognition, patterning, time measurements and even simple fractions when we talk of half / quarters / three quarters.

- Language development of specific vocabulary, question-making, describing new experiences or a cooking experiment, reading a recipe / recipe cards, references to children's literature like *The Gingerbread Man, The Fruit Is a Suitcase, The Stone Soup, The Very Hungry Caterpillar, If You Give a Mouse a Cookie*.

I observed that the kids have short attention span, so I gave them simple jobs and I gave instructions one at a time. The children were very excited so I repeated directions as often as needed.

And to conclude: *Bon appétit*!

E. Assessment:

The children enjoyed the whole process and tasting the ingredients. The children worked like a group and they enjoyed communicating to each other and sharing with enthusiasm their new discoveries. The more they did, the more they loved it. They drew special drawings for this activity and combined all the materials to create a beautiful book for Christmas.

Further investigations:

Special units on healthy food can be really useful not only for preschoolers and young students but also for shaping the eating habits in their families.

Some cookies can be painted with food-coloring or packed as gifts while having fun in an Art class.

Inquiry and creativity elements:

The children learn by doing, they make hypotheses based on their earlier experience and have the chance to try them out.

School: Ş. Jan. Uzm. Çvş. Ahmet Güngör Anaokulu, Tarsus-Mersin, Türkiye
Subject: Integrated science, Geography; 4-5 years old
Teacher: Atiye Taş

My own volcano

Introduction:

This activity was made as a part of **Kitchen Chemistry In Santa's Worksop** topic.

Background:

There are many geographical constructions on earth. Mountains, rivers, sea, oceans, etc. In this lesson, students find out useful information about mountains and volcanic mountains.

Teacher talked about volcanoes and gave information about them. Then she gave information about the form of the earth and its layers.

Purpose:

- Find out about the structure of a volcanic mountain and about how and why it erupts
- Show the chemical functions of some materials that we use daily in our kitchens

Aims:

At the end of this lesson, children will be able to:

- Know about geographical structures on earth
- Know about the layers of the ground
- Know about volcanic mountains
- Know about volcanic eruption
- Make a model eruption using kitchen materials

Process Skills: Observation, experiment, questioning, drawing conclusion

Time:

45-50 mins.

Key words: volcano, volcanic eruption, mountain, liquid, lava, reaction, kitchen materials-vinegar

Materials:

- Aluminium foil
- Plastic cup
- Food colouring
- Carbonate
- Vinegar
- Pipe
- Detergent

Questions:

- Why do volcanoes erupt?
- What is the liquid inside the volcano?
- Can we make a model volcano in our kitchen?

Procedures:

A. Preparation:

The teacher stated that the center of the earth is the hottest and she started her experiment with a student using the materials listed.

B. Exploration:

First, they covered a plastic cup with some aluminium foil and made a funnel.

One of the students added all the ingredients: Food colouring, carbonate, vinegar and detergent in the aluminium funnel and stirred it. One of the mothers was her personal assistant. Then, she put the pipe in the middle. The other children made a circle around and watched the experiment. The teacher told the phases step by step. After waiting for a while, the handmade volcano erupted. In this experiment, students had a chance to learn about the earth and see a demo of a natural event with simple kitchen materials.

C. Discussion questions:

What happened inside?

Why did the liquid come out of the funnel?

D. Conclusions:

This small experiment gave the children an idea about the volcanic eruptions and their process.

Assessment:

It was very exciting for children to see how their small volcano erupted and how the liquid inside came out of their volcanic mountain.

Further investigations:

The teacher can give many real examples from their countries and other countries. They can show photos or videos about the eruptions and their influence on the earth.

Inquiry and creativity elements:

Simple materials in our kitchen can be used for many creative reasons for teaching science and geography.

School/Kindergarten: Kindergarten der Volkshilfe Rosental a. d. K., Austria
Subject: Integrated Science / Kitchen or Food Chemistry, Age group: 3-6 years-old
Teacher: Sabine Hirschmugl-Gaisch

Kitchen Chemistry in Santa´s Workshop – or: What makes cake so light and soft?

Introduction:

A fresh, flavorsome, light and soft baked cake often let our mouths water. But what makes a cake so light and sweet? This is the question we asked in the context of our kitchen-chemistry-project.

Background:

Children have always loved preparing snacks in the kitchen, but baking a cake mostly has been their favorite task. But what does it need to prepare a sweet cake? What are all the various ingredients used for? Answering these questions should especially encourage the children to a more conscious and sustainable use of daily food products.

Purpose:

Unfortunately, many of the children these days only know a very limited number of food products. They are also unable to name many kinds of food and do not know how certain ones taste, what they are used for or where they come from.

Aims:

The aim of this series of experiments is to encourage people to a more sustainable use of food products and to get across the proper handling of some common ones like e.g. eggs. Furthermore, we want to explore experimentally, how various ingredients effect the consistence of food (e.g. baking powder, baking soda - How does yeast influence the dimension of my dough?)

The children will:

The children are given the opportunity to become acquainted with all ingredients, which are necessary to bake a cake. They should get an idea of how they affect the final food product and how many organic chemistry is included in an ordinary cooking or baking process. They get to know various kinds of food in detail and learn that food abuse is seen as serious delinquency.

Vocabulary/Key words: all ingredients and activities as well as all domestic appliances are mentioned: flour, eggs, sugar, baking powder, yeast, raisins, vanilla, blender, oven, scales, learn to read recipes, carbon dioxide, CO_2, gases, propellants, baking / heat, degrees, acids, bases, the difference between yeast dough and short crust pastry and a cake without additives (solid contexture)

Process skills:

Children should develop following skills by means of the experiments:

- Ability to read a recipe (What ingredients do we need to bake our cake?)
- Ability to weigh ingredients accurately
- Skillfulness and carefulness in handling the food (for example: correct cracking and separating of eggs)
- Observation and documentation skills
- Caution and concentration in handling technical equipment like blender, oven, etc.

Time/Duration:

It took us one hour to prepare each sort of cake and one whole morning to observe the „Dancing Raisin".

Materials and resources:

We used the ingredients given in the two recipes of one yeast dough and one short crust pastry cake. Further we needed glass bottles, raisins, a balloon, baking soda, yeast and sugar for the experiments.

Questions:

- ***How is carbon dioxide gas generated and why do we need it for baking a cake?***
- ***How can we make the effects of the gas visible?***
- ***What makes a heavy cake light and soft?***
- ***Is carbon dioxide dangerous? If yes, to what extent, in what context and at which level of concentration?***

Procedure:

A. Preparation

First of all we prepared glass bottles, raisins, a balloon, baking soda, yeast and sugar for the experiments and started with the explanation of our plans and aims.

B. Exploration

In each glass bottle put one bag of baking soda, one bag of baking powder, yeast or sugar. Then add the raisins and prepare the balloons. Next, the bottles are filled with water - up to approximately three-quarters - and quickly sealed up with the balloons. After that you vsn start with observations of the happenings.

The raisins start to move up and down very quickly in the bottle. Gradually, the balloons start to inflate (except the one on the bottle with the sugar) and the raisins stay in motion for hours. After one day the balloons gradually reduce their size again and the raisins in the bottle stop moving.

It eventually comed as a big surprise to the children that some balloons not only are incredibly small, but also have been turned back into the bottle over the weekend!

C. Discussion questions:

What sets the raisins in motion? What causes the expansion of the balloons? Responsible for these spectacular effects is the carbon dioxide (CO2). It forms small gas bubbles which meet all around the raisins and makes them moving up and down in the water. At the same time the CO2-gas also displaces the air respectively the oxygen in the bottle, which rise and cause the inflation of the balloon.

In a cake this small gas bubbles lead to the formation of air bubbles and can transform heavy dough into a light and soft one.

The carbon dioxide gas is heavier than air and so it sinks to the ground in a vessel and eliminates the oxygen there. This is the reason, why carbon dioxide can be dangerous for all animals and human beings, who need the oxygen to exist.

Too much carbon dioxide extinguishes candle lights and can especially be dangerous for people entering cellars or silos. CO2 is often used by fire brigades for fire fighting and it is also known as a so-called "greenhouse-gas". It prevents the sun rays, which are reflected from the earth, to be fully sent back into the cold universe and is therefore responsible for the global warming.

D. Conclusions:

Through this experiment, the children were able to learn that the carbon dioxide (CO2) on the one hand is necessary for baking cakes, but on the other hand can endanger the existence of human beings. Therefore, a very conscious and mindful dealing with this gas is important.

The final task in the context of our project was an experimental cake-baking series.

On the basis of recipes, three different kinds of cake were baked together with the children: a yeast dough cake, a short crust pastry cake (with baking powder) and the same recipes again without additives like yeast or baking soda. During the baking process we could observe hardly any difference between the different recipes, but after the first bite we realized, that the cakes without special baking ingredients were hard and nearly impossible to chop.

E. Assessment:

The children enjoyed the preparation and the tasting of edible things in the shape of very delicious cakes very much and filled them with a certain pride concerning their achievement - especially on the day they could invite their parents to taste their self-made food products. They also were able to explain, why some of the cakes were light, soft and delicious while some pieces were dry and quite hard.

Further investigations:

Another possibility to show the effects of carbon dioxide was offered by the so called "match test": a glass with a screw-cap is filled up to one third with lukewarm water and a teaspoon of sugar and yeast is added. Then the screw-cap is closed and the glass is left standing for a few hours. A burning match is prepared and after removing the screw-cap, the match is held directly over the glass opening. The yeast has eaten up the sugar in the meantime and carbon dioxide has been formed during this process. If the burning match is held above the glass, the gas flame is extinguished immediately because of the carbon dioxide.

Inquiry and creativity elements:

Carrying out the different experiments could really spark the interest of the children in creating their own recipes. So the following production of muffins gave them the opportunity to bake their personal mini-cakes on the basis of their own ideas and creativity.

Teacher's notes:

The experiments in order to detect carbon dioxide encouraged the children to have a closer look at domestic processes, in which carbon dioxide possibly could occur: effervescent tablets in water, baking soda and vinegar in different mixtures. Children became curious about the topic and they started to look for more experiments – and also for more recipes of delicious cakes and cookies - in provided books independently.

School: Szkoła Podstawowa Nr 2 in Siewierz, Poland
Subject: Integrated Science, Age group: 5-6 years old
Teacher: Joanna Gornisievicz

Why does the bread dough rise?

Introduction:

These activities are part of the theme **Kitchen chemistry in Santa's workshop**. Children often help their mums in the kitchen. Together, they prepare simple meals, help with the washing-up. They often do not realize that cooking is magical… Santa will help us to notice and understand this magic.

Background:

Yeasts are tiny one-celled organisms. Some are harmful to humans, but most are very useful, especially in making bread and other food and drinks. There are many kinds of yeast. Each one is a type of fungus.

Yeasts are useful because of the changes that take place when they consume sugar. Yeasts contain substances known as enzymes. Some of those enzymes change sugar into alcohol and carbon dioxide gas. This process is called fermentation. In bread making, the carbon dioxide gas causes bread dough to expand or "rise."

Yeast is rich in protein, minerals, carbohydrates, and vitamin B. Therefore it is also used to enrich human and animal diets. Yeasts have also been used to decompose, or break down, waste and to help clean up oil spills and other pollution.

(Source: Britannica Junior Encyclopedia. Britannica Online for Kids, http://kids.britannica.com/elementary/article-9442746/yeast)

Purpose:

To demonstrate, that carbon dioxide is produced during yeast fermentation.

Aims:

The children will:

- Get to know the application and properties of yeasts.
- Touch and describe yeasts: appearance, smell, taste.
- Make a mixture of yeasts, sugar and water.
- Observe a balloon and describe their observations

Vocabulary/Key words:

Yeasts, one-celled organisms, fermentation, carbon dioxide

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, draw conclusions, communicate observations, information and conclusions

Time / Duration:

30 min.

Materials and resources:

A glass, a spoon, a bottle, a balloon, yeasts, sugar, warm water

Questions:

What will happen with the balloon on the bottle? What is fermentation? What happens during yeasts fermentation?

Procedure:

A. Preparation:

Explain to the children what yeasts are. Show them some yeasts. Let them touch and smell some yeasts. Try to describe the yeasts with children: appearance, taste and smell. Invite the children to 'Santa's magic kitchen'.

B. Exploration:

Put some yeasts, sugar and water into the glass. Mix everything and pour into a bottle.

We mix yeasts, sugar and water.

Place the bottle into the bowl of warm water. On the top of the bottle put a balloon. Tell the children to observe what happens with the balloon – if all goes well the balloon will begin to inflate ☺.

Wow! The balloons are getting bigger!

C. Discussion questions:

What will happen with the balloon on the bottle? What is fermentation? What happens during yeasts fermentation? Why is the balloon getting bigger? What makes it bigger?

D. Conclusions:

During the experiment the children noticed that the balloon began to inflate. As the yeasts consume sugar, they release a gas called carbon dioxide – this process is called fermentation. Carbon dioxide fills the bottle and then fills the balloon – that is why the balloon is getting bigger.

Now you can explain to the children that the bread dough rises because it is full of carbon dioxide gas pooped out by the yeasts. After the bread is baked we all can notice that it is filled with little holes. Those were made by carbon dioxide – a magician that makes our bread soft and fluffy and causes the balloons to inflate☺.

Carbon dioxide fills the balloons.

E. Assessment:

The children really liked the classes. They enjoyed carrying out an experiment with balloons and carbon dioxide and couldn't believe their eyes! It was quite easy for the teacher to observe children working. They enjoyed communicating with each other and shared their observations spontaneously. The teacher appreciated children's involvement, creativity and curiosity.

Further investigations:

You can carry out another experiment with children.

WOW!

Half fill the bottle with vinegar and add some washing-up liquid. Wrap three tea spoons of bicarbonate of soda in facial tissue, making it small enough to go through the bottle's neck. Put the package into the bottle. After a few minutes you will see foam coming out of the bottle. Magic? No, it's carbon dioxide again.

<u>vinegar + bicarbonate of soda = carbon dioxide</u>

<u>carbon dioxide + washing-up liquid = foam</u>

Inquiry and creativity elements:

All the kitchen experiments inspired us to create our first cookbook .

Sample pages.

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science and Language Development, Age group: 5-6 years old
Teacher: Mihaela Balint

A friendly and useful bacteria

Introduction:

The following three activities are part of the theme **Chemistry in Santa's Workshop**:

- **We are good bacteria!**
- **What does yeast like best?**
- **We'll blow up the balloon!**

If you ate a sandwich at breakfast today, the bread was most likely soft and chewable; the bread wasn't hard as a brick. Why? Because it was made with a help of tiny organisms called *yeast*. Do you have a slice of bread handy? Check out those little holes all over the bread. The *yeast* - one-celled organisms - is feeding on sugars in the bread dough and "burping" out gas. These "burps" of gas make the dough puff up. The tiny little bubbles pop up during baking, but leave the holes where they are, in the bread.

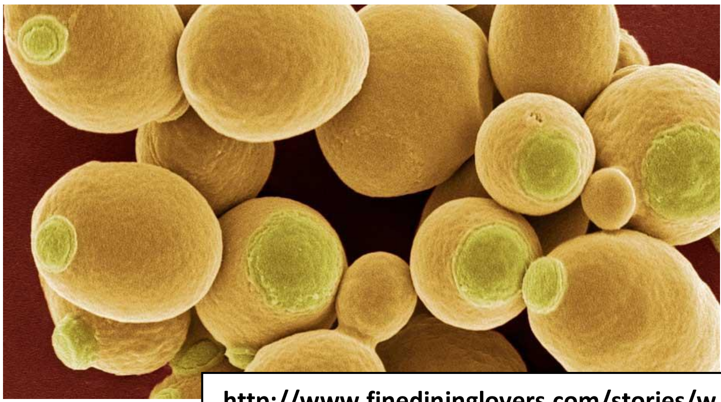
Background:

Yeast is a type of fungus and is related to mushrooms. If you look at yeast cells under the microscope, you will see that they are shaped like balloons or footballs.

The single-celled organisms reproduce themselves by making tiny buds that will become new yeast cells.

The scientific name of this organism is *Saccharomyces cerevisiae. Saccharomyces* means "*sugar fungus*" and the word *cerevisiae* comes from the name of ***Ceres***, who was the goddess of farming in Roman mythology.

People have been using yeast to bake bread for thousands of years, possibly going all the way back to ancient Egypt. They used yeast to make beer and wine, also. The bubbles in beer were made by yeast feeding on grains like rice and barley and then "burping" out gassy fizz and turning (fermenting) the grains into alcohol.



http://www.finediningloversers.com/stories/what-is-yeast-food-science/

Purpose:

- Discover some of the properties of the yeast
- Make predictions and draw conclusions based on observations and experiment.

Aims:

The children will:

- Observe and analyze different kinds of yeast
- Identify some of the yeast properties
- Investigate the process involving yeast
- Make predictions
- Conduct an experiment
- Record and organize data
- Draw conclusions based on their direct observations
- Make use of the specific vocabulary

ACTIVITY1. WE ARE GOOD BACTERIA -YEAST PROPERTIES

Purpose:

To observe, analyze and identify some of the yeast properties. To use a specific vocabulary to describe the observations and the results.

Vocabulary/Key words:

Micro-organism, fungus, cell, mushrooms, wet, dry, soft, hard, mild, bitter, sour, sweet, salty, firmness, consistency, pasty, rough, silky, fine, sticky, gluey, pleasant, unpleasant, tasty, white, whitish, light brown, yellow, feed, grow, sugar, gas, dough.

Process skills: observe, collect data, record data, interpret data, communicate, draw conclusions.

Time:

45-50 minutes

Materials and resources:

- Different images with yeast under microscope, computer, smartboard
- Different kind of fresh and dry yeast
- Plastic knives and plates
- Magnifying glasses
- Datasheet 1

Questions:

What are the properties of the yeast? (color, smell, taste, consistency...) What are the differences between fresh yeast and dry yeast?

Procedure:

A. Preparation:

Find on the internet some images with yeast cells. Show them to the kids and ask them what they see. Let them describe the pictures and give you some of their ideas about what it is? Discuss with them about yeast and take a short ride in the history. What does the yeast look like? Those pictures are taken under the microscope. Do they know what it really looks like? Write some of their answers. And now, the moment of the truth…

B. Exploration:

Split the children in small groups. Show them some packets of fresh yeast (different marks). Each group will receive one packet of yeast, a plastic plate and a plastic knife.

Ask the kids to cut the yeast in smaller parts (3 or 4 it depends of the number of the kids) and observe it carefully. What does it look like? Look, smell, taste, feel it. Notice the color, the smell, the consistency. Compare the color, the smell with something familiar. Invite your students to take a good look with a magnifying glass. What do they see? What does it look like? Can you identify any similarities with other organisms/life forms?

C. Discussion questions:

Does it look alive? Does it move? What color is the yeast? How does it smell like? Is it a pleasant/unpleasant smell? What does it feel like? Is it hard, soft, wet, dry, sticky, gluey…? What about the taste? Do you like it? Does it remind you of something else?

The teacher will provide support and encourage children's communication. She will write each team's opinion about her sample of yeast. See Enclosure 1 *Yeast Datasheets* file. Print Datasheet in A3 format to fill in or project it on the screen.

D. Conclusions:

The color varies between white and very light brown. The yeast feels dry/wet, fine and soft, pasty. It feels like sweet cheese, old play dough, it smells like beer, sour milk, cheese, rotten vegetables.

Teacher's notes:

Many students recognized the cells in the pictures. Some of their answers: cells, bacteria, micro-organisms, microbes.

They were very excited by the idea that whitish paste is something very, very small and *alive. It is something that eats, grows and multiply!?*

For half of the kids the smell and the taste are pleasant or acceptable, at least. Very interesting choices for the smell of the yeast. Notice that all the smells are related to bacteria and bacteria effects.

ACTIVITY 2. WHAT DOES YEAST LIKE BEST?

Fresh or dry yeast from the grocery store is inactive. The micro-organisms (bacteria) are resting. What makes yeast to become active? Let's try o few things.

Purpose:

Give yeast some water, sugar or salt and watch what happens.

Process skills: observe, collect data, interpret data, communicate, predict, experiment, draw conclusions.

Time:

45-50 minutes

Materials and resources:

- Fresh or dry yeast
- Small jars, cups or Ziploc bags
- Teaspoons, knives, plates
- Warm water
- Sugar, salt
- Datasheet 2

Question:

What makes yeast to become active?

Predictions: Yeast will become active with:

1. Water
2. Sugar
3. Salt
4. Water and sugar
5. Water and salt

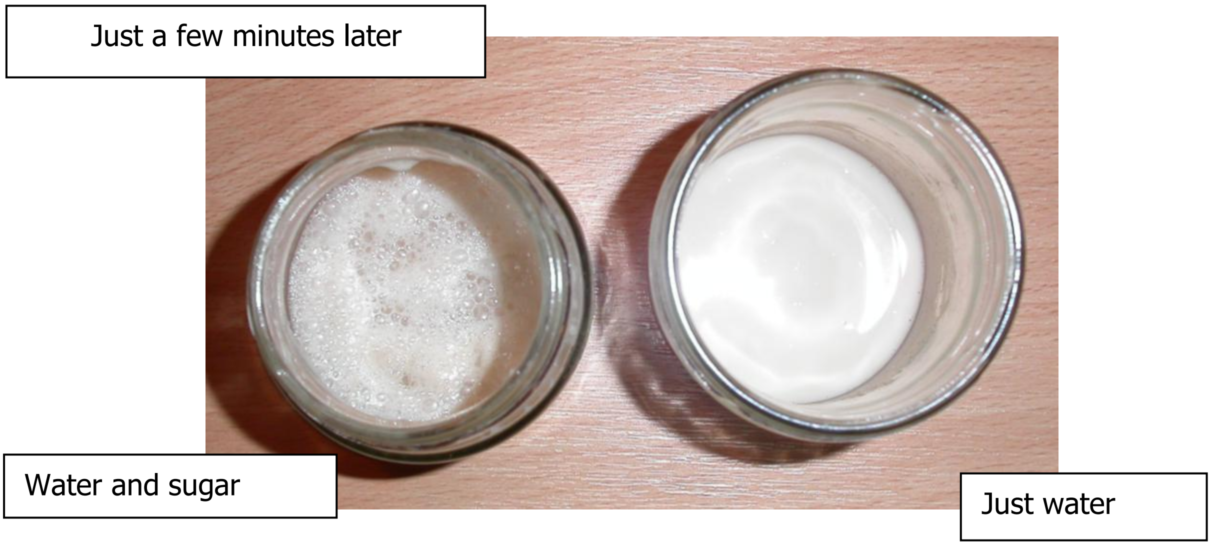
Procedure:

A. Preparation:

- The kids work in pairs or small groups (3).
- Labeled the cups (glass) with numbers or stickers.
- Put the same quantity of yeast (or a packet of dry yeast) in each cup.
- Each group can decide the order of the cups but ask them to write the right information on their datasheet.

B. Exploration:

- In the first cup add 4 teaspoons of warm water.
- In the second cup add 2 teaspoons of salt
- In the third cup add 2 teaspoons of sugar
- In the fourth cup add 2 teaspoons of salt and 4 teaspoons of warm water.
- In the fifth cup add 2 teaspoons of sugar and 4 teaspoons of warm water.
- Put all 5 cups at rest for approximately 15-20 minutes. In the meantime fill in the datasheet. After 15-20 minutes check the cups out.
- Use the mixture (water, yeast, sugar) and bake some bread in the next activity.



C. Discussion questions:

Does the yeast look alive? What are the main characteristics of a living form? Plant or animal, small or big, each form of life needs food to grow and develop. First the yeast is resting. What does it like to eat? How do you think the yeast will react?

D. Conclusions:

Only in the fifth cup you will see some activity. The yeast eats the sugar and release bubbles of gas (carbon dioxide). The yeast doesn't like salt. It likes sugar but it eats and grows only in the presence of moisture (water).

Further investigation:

So, moisture is important. We used warm water. Let's try hot and cold water. Will the yeast enjoy it?

What quantity of sugar helps yeast create more bubbles? 2,3,4 or more teaspoons? *More* or *much more* isn't always the best choice; it could be *too much.* What "sweet food" helps yeast create more gas? Honey, syrup or sugar?

What about the room temperature? In the classroom the air temperature is around 21-22^{0}C. If we put a cup with yeast, water and sugar in the fridge (4^{0}C) will the yeast become active?

Teacher's notes:

The yeast experiments are especially good for little kids who are fascinated with the timeless question: *Is it alive?*

ACTIVITY 3. WE'LL BLOW UP THE BALLOON!

As the yeast eats sugar and grows it releases a gas called carbon dioxide. Is it enough gas to blow up a balloon?

Purpose:

To observe the process of feeding and expelling carbon dioxide at the yeast.

Process skills: observe, collect data, interpret data, communicate, predict, experiment, draw conclusions.

Time:

40 minutes

Materials and resources:

- A small packet of fresh yeast or a packet of dry yeast
- Warm water
- A small bottle (500ml)
- A small balloon
- 2 teaspoons of sugar
- Plastic teaspoons

Question:

Is it enough gas to blow up a balloon?

Predictions:

Based on the previous experiments' results and observations the yeast:

- will produce enough gas to blow up a small balloon
- will not produce enough gas to blow up a small balloon

Procedure:

A. Preparation

The kids will work in pairs. Each pair has a small balloon, a bottle, some sugar, a plastic teaspoon, a cup with 100ml of warm water and a packet of dry yeast. Write on the whiteboard the predictions and ask children to think about it and choose one option. Record their predictions, too. They can also, fill in the datasheet 3.

Special note: Use warm water not hot water! Hot water can kill the bacteria.

B. Exploration.

- Fill the bottle up with about 100ml of warm water
- Add all the dry yeast packet and swirl the bottle a few seconds.
- Add the sugar and swirl it around some more.
- Blow up the balloon a few times to stretch it out.
- Place the balloon over the neck of the bottle. Fix it if it’s necessary.
- Let the bottle set in a warm place for about 20 minutes.
- Fill in the **datasheet 3**. See **Yeast Datasheet** file.

C. Conclusions:

As the yeast dissolves, it becomes active. Then it starts to eat (when we add sugar). As the yeast feeds on the sugar, it produces gas. With no place to go but up, this gas slowly fills the balloon. After several minutes you’ll notice the balloon will inflate. If you don’t’ see anything happen, keep waiting.

Teacher’s notes: it would be helpful if you will run the experiment before. Be careful with the yeast packets (see the validity term), the water temperature and the amount of sugar.




Further investigation:

What happens if you change the temperature of the water? Does the balloon grow bigger faster when water is warmer or colder? In what way do you think the temperature is affecting the yeast?

What happens if you leave the experiment running for the next couples of hours? Does the balloon stop inflating at some point? Does this mean the yeast is dead, or that it's finished the food (the sugar)? Add sugar again and attach a new balloon. Does the balloon start inflating again?

Inquiry and creativity elements:

The children felt free to explore different packets of yeast. The teacher introduced the subject of the activity in an interesting manner. The children were deeply involved in an investigation; they were detectives and scientists in the same time. Their observation and analysis skills were tested. Also the teacher knew how and when to guide/stand back.

The children were intrigued by the not so good looking organisms; it was hard to believe it is something alive. The reaction of the yeast mixed with water and sugar marked a point. "*Yet this doesn't prove anything"* said a child. *"We didn't see any puffed bread dough…*" They decided to add the yeast mixture to the bread dough. This makes the bread dough rise up and soften. The bubbles of gas were also exciting. "*For how long did it makes bubbles?*" *asked a child. "How can we find out? Think about that! It's a great idea for a future activity. Now let's find out how much gas is producing yeast during feeding".*

During the activities the teacher knew how to keep the children focused on the subject. She allowed children to express freely their ideas, their conclusions, but keep the line of the lesson.

Assessment:

The bread was quite tasty and the children were having a lot of fun doing it. The balloon was quite big. "*...it almost exploded!"* said a child. "*It was awesome!".*

An interesting worksheet was also prepared by the teacher. See Yeast Worksheet file. The children solved a crossword (the key word is *Yeast*) and a secret message. In this message the letters were replaced with numbers or shapes. Using the code the children succeeded to discover the secret ingredient.

The teacher appreciated the entire activity of the children: communication, team work, ideas, predictions, datasheets and worksheets.

Encosure 1 Yeast Datasheeets

Name..Date.....................

Activity 1. We are good bacteria-Yeast properties.

Nr.	Type of yeast	Color	Smell	Taste	Consistency	Other observations
1						
2						
3						

Name...................................... Date........................

Activity 2. What does yeast like best?

	No. of the glass	**1**	**2**	**3**	**4**	**5**
	The content of the glass	**Yeast Water**	**Yeast Sugar**	**Yeast Salt**	**Yeast Water Salt**	**Yeast Water Sugar**
	Active yeast (Circle your prediction)	**Yes / No**	**Yes / No**	**Yes / No**	**Yes / No**	**Yes / No**

I think that yeast will become active in the glass number........

Conclusion:

Yeast becomes active with:

1. **Water**
2. **Sugar**
3. **Salt**
4. **Water and salt**
5. **Water and sugar**

I was right! **I was wrong!**

Name..................................... Date.......................

Activity 3. We'll blow up the balloon!

I think:	**I observe (as an experiment result):**
The balloon will inflate **Yes** **No**	The balloon does inflate **Yes** **No**

Conclusion:

I was right! **I was wrong!**

Enclosure 2 East Worksheet

NAME……………………………….DATE…………………….

ACTIVITY: A FRIENDLY BACTERIA

			Y					
			E					
			A					
			S					
			T					

1. THE COLOR OF THE DOUGH. THE YOLK HAS THE SAME COLOR.
2. IT HAS AN OVAL SHAPE. INSIDE HAS A YOLK AND A WHITE. (PLURAL)
3. WHITE AND SWEET CRYSTALS FOR THE DOUGH.
4. WHITE AND SALTY CRYSTALS FOR THE DOUGH.
5. GREASE MADE FROM MILK. WE CAN EAT IT ON THE BREAD, TOO, WITH HONEY OR JAM.

NAME......................................DATE...........................
ACTIVITY: FRIENDLY BACTERIA
FIND THE SECRET INGREDIENT.
REPLACE THE NUMBERS OR THE SIMBOLS WITH THE LETTERS.

1	□	4	☆	5	3		6	0	8	2	△	7

THE CODE:

A	B	D	E	G	I	K	N	O	P	R	W
□	1	2	△	3	☆	4	5	0	6	7	8

THE SECRET INGREDIENT IS...

Answers:

			Y	E	L	L	O	W
			E	G	G	S		
S	U	G	A	R				
			S	A	L	T		
B	U	T	T	E	R			

THE SECRET INGREDIENT IS: BAKING POWDER

It Starts With a Drop of Water – Lesson Plan Synopsis

Lesson plans	Partner Country	Synopsis
Does a snowman in a coat melt faster?	Austria	A snow and ice experiment made indoors and outdoors to answer a simple question about melting.
How does it rain?	Turkey	A classic water cycle experiment to do inside the classroom.
It starts with a drop of water	France	An integrated activity (science, art, language) to better understand the importance of water in nature.
Dancing raisins	Poland	How to better discover the presence of carbon dioxide in water than having fun with raisins?
Sink of float	Romania	A sink or float experiment for the children to practice prediction skills.
Water experiments	Romania	Some fun water experiments with colored ice, snow, fennels and droppers.
How can we break the ice?	Romania	Kids learn how to break the ice without using heavy metals or tools, just salt.
Water cycle models	Romania	A series of three water cycle models developed by age group.

School/Kindergarten: Kindergarten der Volkshilfe Rosental a. d. K., Austria
Subject: Integrated Science: Physics, Information Sciences, Mathematics
Age group: 3-6 years-old
Teacher: Sabine Hirschmugl-Gaisch

Does a snowman in a coat melt faster?

Introduction:

This activity is part of the theme: **It starts with a drop of water**.

Background:

This topic came up in the wintertime, so we decided to explore the different aggregation states of water, e.g. snow, ice.

Purpose:

Careful observation over a longer period of time (long-term observation), creation of hypotheses and documentation of assumptions as well as a subsequent comparison of the assumptions with the scientific facts allows a combination of physics, computer sciences, language and mathematics.

Aims:

Children get to know the element of water in its different states. They can recognise, describe and create conditions that make changing processes observable.

The children will:

First introduction to the method of "Concept cartoon"; creating hypotheses with the children and documentation of the assumptions; review of the hypotheses set beforehand at the end of the test series; practice evaluation and documentation.

Vocabulary/Key words: water, ice, snow, snowman, freeze, aggregate state, density, solid, liquid, presumption / assumption; "What do you think?", "How does it happen?" - documenting, evaluating, "Concept cartoon".

Process skills: observing, analyzing and describing, planning, conducting an experiment, gathering information, collecting data, interpreting data, drawing conclusions, communicating observations, information and conclusions.

Time/Duration:

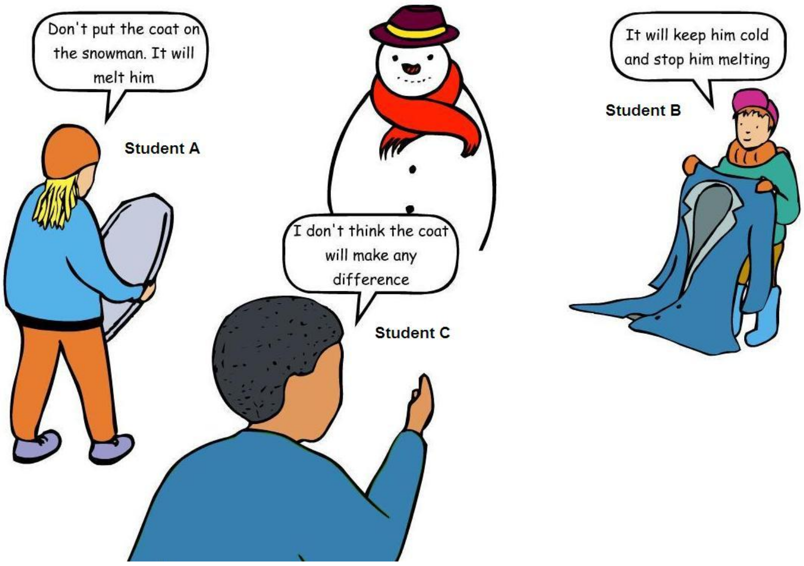
Introduction to the subject and carrying out the first evaluation: approx. 1 hour; long-term monitoring (little snowmen and ice): 1 morning; observation of large snowman: approximately 4- 5 days.

Materials and resources:

"Concept Cartoon" - magnetic panel and identity cards, - ice and socks, glass bowl; 2 small and 2 large snowmen; one large and one small coat plus hats

Question:

Does a snowman in a coat melt faster?



Procedure:

A. Preparation:

After a brief discussion about the current season and what changes in nature are visible, the method of "Concept cartoon" is presented and first questions for the discussion are asked. We use a magnetic board with three statements and after a short discussion each child must say his/her presumption and attach his/her identity card to the preferred statement. At the end of the observation series the assumptions will be reviewed and, if necessary, corrected.

B. Exploration:

For an experiment outside, build 2 small and 2 large snowmen with the children. One of them is dressed with a jacket and a hat and then observed over a longer period of time in order to experience if the clothing has an influence on the melting process of the snowman or not.

Back in the rooms of the kindergarten put a handful of ice cubes in a small drinking glass and one handful in a sock. Then wait and observe closely which cubes melt faster.

C. Discussion questions:

Which snowman or which ice cubes melt faster? Can a covering protect the snowman from melting? Or does it support the melting process?

D. Conclusions:

It can clearly be observed that the protection layer (coat) preserves the snowman. The coat keeps the temperature stable (refrigerator effect) while the "naked" snowman respectively the ice cubes in the glass melt faster.

Further investigations:

Experiments concerning the questions: "Which substance can melt ice faster: Sand or salt?", "The production of ice: Does it also work when salt is mixed into water?", "How many cubes can be put on top of each other? / Installation of a "salt-ice-refrigerator" and the production of ice cream without a fridge completed this observation series.

Inquiry and creativity elements:

In this experimental unit, children could collect and combine data, set assumptions and hypotheses, evaluate (first steps in computer science) and document their own findings in a creative way for the very first time. The analysis of the element water gave us the opportunity to learn about the different aggregate states and to make interesting observations and documentations (drawings, photos) over a longer period of time (approx. 1 week).

Teacher's notes:

The analysis of the element water would provide a very wide range of experiments and it was not possible for us to perform them all for lack of time. The method of "Concept cartoon" came out as a very innovative one and children also enjoyed the evaluation and documentation with the help of the magnetic board respectively the identity cards.


WASSER

School: Ş. Jan. Uzm. Çvş. Ahmet Güngör Anaokulu, Tarsus-Mersin, Türkiye
Subject: Science, drama geography, 5-6 years old
Teacher: Zehra Okur

How does it rain?

Introduction:

This activity was held under the topic of **It Starts With A Drop Of Water.**

Background:

Water is one of our most important life sources. Everything in nature needs water to live and grow up: people, plants, animals. There are several water sources in nature: rivers, oceans, seas, lakes, etc. But water generates itself with evaporation in a process that is called "water cycle" and comes back to the Earth, mostly in the form of "rain".

Purpose:

Increasing students' interest and sense of questioning through experimential work making connection with natural events.

Aims:

At the end of this lesson, children will be able to:

- Be aware of the importance of water in our life
- Know about water cycle in nature
- Know about the natural facts behind rain
- Improve their drama skills

Key words:

Rain, water, water cycle, sun, evaporation, drama, thunder, lightening, plants

Process Skills: observation, dramatization, experiment, communication, estimate, discovering, drawing conclusion.

Time:

3 hours with drama activity

Materials:

- Boiling water
- Nylon cover
- Hand-made flowers
- Hand-made clouds
- Sound of thunder
- Light

Questions:

- ***When does it rain?***
- ***How does it rain?***
- ***What happens when it rains?***

Procedures:

A. Preparation:

First, the teacher gave information about the water sources and water cycle in nature. Then, they did an experiment activity in the class with the participation of a father.

B. Exploration:

Through this activity, children saw how water transforms. Some hot water was put in a large pot. It was covered with a piece of kitchen nylon. Children saw how the evaporated water hit the colder nylon and the steam turned into tiny drops of water. When the tiny drops became bigger, it began to rain.

After the observation, students acted out the water cycle in the class using drama technique. The teacher gave story-based instructions to students and they acted their roles. One of them was the sun, others were the flowers, clouds and water. A thunder sound was used in the background and the curtains of the class were opened and closed for darkness and light. The lights in the class were switched on and off for lightening.

C. Discussion questions:

How does it rain?

How does water evaporate?

What happens in nature while it is raining?

D. Conclusions:

There is water cycle in nature.

Assessment:

Seeing all the experiment and acting the water cycle in the class was very exciting and enjoyable for all the children.

School/Kindergarden: Ecole Maternelle J.JAURES Brignoles, France
Subject: Integrated Science, Chronology and art, Age group: 3-5 years old
Teacher: Marie-Agnès Lahougue

It starts with a drop of water

Introduction:

This activity is part of the theme **It starts with a drop of water;** oceans and seas cover 3/4 of our planet; events such as pollution, over-fishing, global warming, desertification of land, lack of access to water for millions of people, must make people act quickly to preserve this essential resource for life; because if "*there is no water, there is no life".*

Background:

Water is essential for the living beings: humans, animals, plants; the objective of this lesson plan is to make the children understand this.

Purpose:

Children love animals and they are very interested in their way of life; so, observing them will make children understand easily that water is essential for life.

Aims:

The children will:

- Observe the animals
- Describe their behavior.

Vocabulary/Key words:

Water, snail, shell, fish, fin, marine animals.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

Throughout the year, 1 hour per week

Materials and resources:

- Snails, vivarium; fish, aquarium
- Magnifying glass, dip net
- Outdoor school by the sea

Questions:

Do animals need water to live?

Procedure:

A. Preparation:

Bring different animals (snails, fish...) and put them in a fish tank (fish) or a terrarium (snails) to describe and to observe them during several weeks: what they eat, how they move.

B. Exploration /Discussion questions:

Activity 1: snails

Snails are put in a snail terrarium.

The snail has a hard spiral shell, he returns inside for protection. When we add water, it comes out of its shell; the snail likes rain.

Its body is soft and sticky. It moves by crawling on its foot. The snail slimes, so it can slide on the table.

It has two large and two small horns. When we touch them they close immediately. On large horns there are two small black dots: they are the eyes. Under the head, it has a mouth and tongue on which there are lots of little teeth to eat salad.

Activity 2: a goldfish

We put a fish in a fish tank. It lives in water. To move it has *fins and a tail.*

Activity 3: discovery of marine wildlife

In a discovery class by the sea children went fishing on foot to discover animals that live in sea water.

C. Conclusions:

Through all these experiences children became aware that animals needed water to live.

D. Assessment:

- *Science*: *Water is essential for animals to live.*
- *Art*: children use drawings and pictures as representation of their observations; they also make artistic productions on the subject.
- *Language*: children use language to describe the activity and to communicate with peers.

Further investigations:

Experiments are done to make children understand that water is essential for plants to grow.

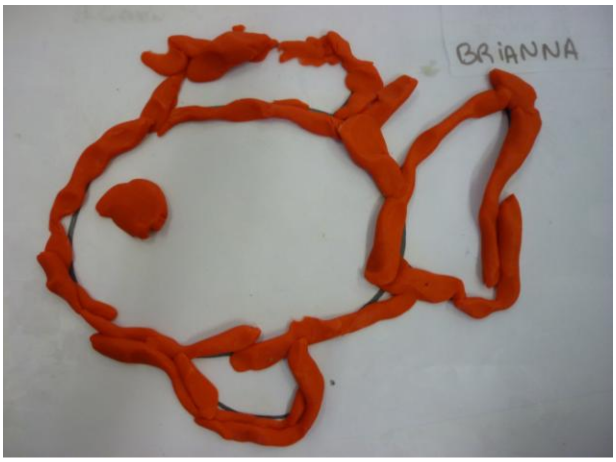
Inquiry and creativity elements:

- Reading story books and watching wild-life programs
- Making animals crafts following different technics.

Making a snail (cutting and collage)

Realization of modeling snails

Realization of a fish with clay



Realization of a goldfish by hoarding like the artist Tony Cragg

Little fish made with Cds

A cake in the shape of a fish

Seafront foot fishing

Starfish and shells

School: Szkoła Podstawowa Nr 2 in Siewierz, Poland
Subject: Integrated Science, Age group: 4-5 years old
Teachers: Joanna Gornisievicz

Dancing raisins

Introduction:

This activity is part of the theme **It all starts with a drop of water**. We all know what water is. We drink it and use it every day. But do we know everything about it? What secrets does it hide?

Background:

Nearly three-fourths of the Earth's surface is covered with **water**. Perhaps the most important liquid in the world, water is usually easy to get from rain, springs, wells, streams, rivers, ponds, and lakes. It fills the vast ocean beds. As vapor, water is also present in the air, where it often condenses into clouds. The bodies of most living things contain a large proportion of water. For example, water comprises about 60 percent of the weight of the human body.

Water is necessary for life. Millions of years ago the first forms of life on Earth grew in the sea. Although today many plants and animals are able to live on land, they still need water. This life-sustaining liquid makes up most of the animal blood or plant sap that nourishes living tissues.

(http://kids.britannica.com/comptons/article-9277663/water)

Carbon dioxide is a compound that is usually in the form of a gas. It is made up of one atom of carbon and two atoms of oxygen. Its chemical formula is CO_2. Carbon dioxide was discovered in the 1600s by a Belgian chemist named Jan Baptist van Helmont.

Carbon dioxide is necessary for life on Earth. When animals breathe out, they release carbon dioxide into the air. Plants use this carbon dioxide to make their own food in a process called photosynthesis. Plants then release oxygen into the air for animals to breathe in. (http://kids.britannica.com/elementary/article-603042/carbon-dioxide)

Purpose:

- To discover the presence of carbon dioxide in water.

Aims: the children will

- observe raisins immersed in carbonated and non-carbonated water, describe their observations
- know that carbonated water is saturated with CO2
- know that raisins have a higher density than water
- know that carbon dioxide has a lower density than water

Vocabulary / Key words:

Water, carbon dioxide (CO_2), density of water, density of raisins, buoyancy force

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, draw conclusions, communicate observations, information and conclusions

Time duration:

20 min.

Materials and resources:

- A long glass
- A spoon
- Raisins
- Sparkling water
- Non – carbonated water

Questions:

What happens to raisins immersed in carbonated water? What happens to the raisins immersed in non-carbonated water?

Procedure:

A. Preparation

Tell the children about the water. Show them sparkling and non-carbonated water. Explain them 'what's inside' sparkling water. Tell them about carbon dioxide.

B. Exploration

We pour some plain water into a glass. Then we add some raisins.


The raisins sink to the bottom.

Take another glass, fill it with carbonated water and add some raisins. The raisins start dancing! Gas bubbles from the sparkling water stick to the raisins making them lighter. That's why they start floating to the surface! Reaching the surface gas bubbles escape into the air and the raisins fall to the bottom.


Discussion questions

What happens to the raisins immersed in carbonated water? What happens to the raisins immersed in non-carbonated water?

C. Conclusions

During the experiment the children noticed that raisins immersed in carbonated water started 'dancing' while raisins immersed in non-carbonated water sank to the bottom. The raisins 'danced' because the carbon dioxide gas bubbles in the sparkling water began to attach themselves to the rough surfaces of raisins, making them more buoyant. By and by, enough bubbles attached themselves to the raisins that the density of the raisins and the gas bubbles was less than the density of the soda. This caused the raisins to float toward the top of the soda. The raisins in non-carbonated water sank to the bottom because their density was higher than the density of water.

D. Assessment

The children really liked the classes. They enjoyed carrying out an experiment with water and delicious raisins (some of the raisins disappeared in mysterious circumstances). Children couldn't believe their eyes! They were very excited and tried to dance like dancing raisins. It was quite easy for the teacher to observe children working. They enjoyed communicating with each other and shared their observations spontaneously. The teacher appreciated children's involvement, creativity and curiosity.

Further investigations

You can carry out another experiment with children. You can replace raisins with other products like rice, groats, sunflower seeds or peanuts and observe what happens when they are immersed in sparkling water.

Inquiry and creativity elements:

Experiments with water are very interesting. We decided to explain to the children the water cycle. To better understand the theme we created a water cycle diagram and…..

… a book about the water cycle.

Isn't it great?!

Kindergarten/School: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Math and Sensory, Age group: 3-4 years old
Teachers: Cristina Preduca, Irina Prejbianu

Sink or float

Introduction:

Sink or float is part of the **It Starts with a Drop of Water** theme which tried to answer a very simple question to: why is water so important to life? It all has to do with the unique properties that water exhibits. First of all, it is the only substance on Earth that is in liquid form at the temperatures commonly found on the Surface of our planet. Secondly, it is a superb solvent, meaning that other substances regularly and easily dissolve into it. This allows water to carry nutrients to cells, and carry waste away from them.

In addition, water has the unique property of expanding as it freezes. Because water expands becoming less dense, frozen water, more commonly known as ice, floats. This is very important because it protects the water underneath, insulating it from freezing.

Imagine what would happen if water became more dense? It would sink, allowing another layer of water to freeze. Eventually all the water across the entire surface of our planet would freeze, making life impossible.

Most people around the world have access to clean drinking water but it is a major problem in poorer areas of the world. Water pollution and low quality water can lead to dangerous bacteria, disease and viruses such as E coli and Cryptosporidium. Drinking water is needed for humans to avoid dehydration, the amount you need each day depends on the temperature, how much activity you are involved in and other factors.

Water is also used for fun. Water sports are a very popular recreational activity and include things like swimming, surfing and waterskiing. Ice and snow is also used in ice skating, ice hockey, skiing and snowboarding.

Some of the Earth's water supply is temporarily locked up within the many life forms found across the Earth's biosphere. This water makes up a majority of most organisms, and is a critical component, making the processes of life possible. Some organisms are made up of 95% water, while almost all the rest are more than half water.

Background:

While doing some of the experiments to demonstrate the amazing characteristics that water has, the children started to wonder why some things sink and some things float. They started to argue that bigger things sink and smaller things float, but as they later found out in the weird and wonderful world we live in, that's not actually true! There are far more reasons behind the mystery of sinking and floating.

What causes some things to sink and float? Well, it's all about something called density. Do you know what density means? Well everything around us is made up of tiny molecules. In some objects tiny little objects called molecules are jam packed together, and in others they are loosely packed together. This is actually what density means. The objects that are jam packed together have a higher density, and the more loosely packed objects aren't as dense.

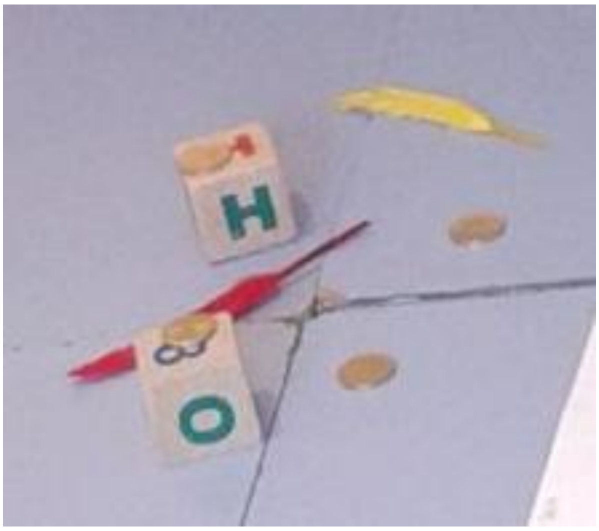
Let's think for a minute about other large objects like a boat, or maybe even an airship. How does this sink and float work? Some boats are massive, and would seem very dense, so how do they stay afloat? Well basically the boat has to push the water aside so that there's room for it. As it's so heavy it actually gets pulled down by gravity. But there's more to this. Now comes buoyancy, which is the opposite of gravity. But what is buoyancy? Think about what happens when you put an ice cube into a glass of water. As the ice cube moves some of the water to make way for itself, the water level rises and floats partially in and out of the water. Gravity is pulling the ice cube down and the buoyant force is pushing it up. How far in or out of the water your ice cube stays depends on its density, as that is what the pushing and pulling forces are working against.

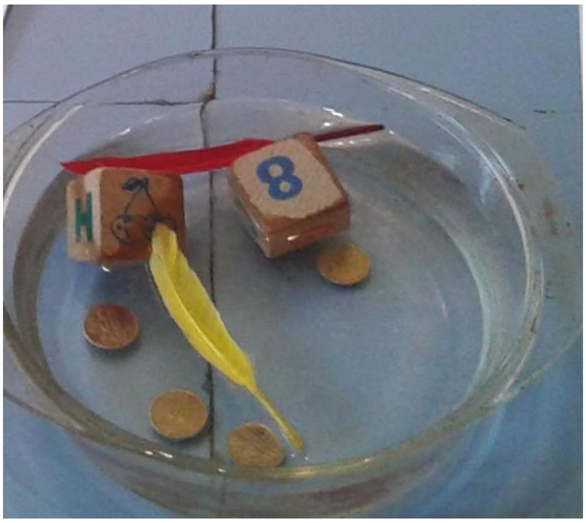
Purpose:

Playing around with water and doing different kinds of experiments with it will enable children to learn and appreciate the importance of water in our lives and on Earth in general.

Aims:

The goal of this project is to learn to predict what will happen to different objects (metal coins, feathers and wooden cubes) when put in water.





The children will:

- Observe, touch, weight and compare three different types of objects: metal coins, feathers and wooden cubes.
- Observe the shape of these objects.
- Name the material the objects are made of.
- Predict what will happen when the objects will be put in the water: will they sink or float?
- Write down in an observation sheet their predictions and what actually happened
- Compare the results (their prediction versus what actually happened)

Vocabulary/Key words:

Water, sink, float, density, buoyancy, gravity, big, small, metal, coin, feather, light, heavy, wood, cube, prediction, result, compare, experiment, glass, transparent, bowl.

Process skills: observe, analyze and describe, predict, plan, conduct an experiment, draw conclusions, communicate observations, compare results, information and conclusions.

Time/Duration:

15 minutes for activity

Materials and resources:

Worksheets, pencils, metal coins, feathers, wooden cubes, glass transparent bowl, water.

Question:

What do you think will happen to these three objects when we put them in water: will they float or sink?

Hypothesis:

The bigger objects will sink, the smaller ones will float.

Procedure:

A. Preparation:

Give children a short introductory explanation on what *sink* or *float* means. Ask them to give examples from real life of objects that sink or float. Depending of their answers ask them to explain why they thought those objects sank or floated? Give them some clues regarding the material, shape or size of the objects when they give their explanations. Also introduce terms like *gravity, buoyancy* and *density* in order to better explain the phenomenon.

B. Exploration:

Give children the individual worksheet and explain what they have to write down: there are two columns for each of the three objects, one for sink and one for float. The children will have to take the objects one by one, analyze it and predict whether the object will float or sink once it is put in the transparent, glass bowl filled with water. Once everyone has made the prediction the object is placed in water and everyone can observe what actually happens. At this point the children can compare their predictions with the actual result. In the end they can give more examples of real life objects that are similar to the ones tested and the teacher can explain using the terms *buoyancy* and *density* what happened in each experiment's case.

C. Discussion questions:

Do you recognize these objects? What are they made of? Are they heavy or light? Which of these objects will sink and which will float? Why do the coins sink? Why does the wooden cube float? Have you ever heard of gravity / density? Can you name other objects that can float on water? Can you name other objects that will sink in water? Why doesn't the feather sink? What objects from our classroom do you think will float? Why? What objects from our classroom do you think will sink? Why? How can we make a wooden cube sink? How can we make a coin float? How can we make the feather sink?

D. Conclusions:

Most of the children predicted that the feathers and coins will float because they were light and little. At the same time most of them said that the wooden cubes will sink because they were the heaviest and biggest out of the three objects.

E. Assessment:

The children listened carefully the teacher's indications on what the experiment was about and how to fill in the observation worksheet. They all made predictions about what was going to happen and were waiting impatiently to compare the results. It was quite easy for the teacher to observe children working. The teacher appreciated their involvement, curiosity and creativity. Some of the kids made interesting comparisons to objects seen in real life and thus they made accurate predictions: they compared the wooden cubes with fishermen boats or thought of birds and how they float on water when they worked with the feathers. The materials of the three objects were familiar to the children, thus it was very easy for them to find other similar objects in our classroom. The kids whose predictions did not match the actual result were very intrigued and tried the experiment by themselves many times to make sure that the final result was accurate.

Further investigations:

Fill up a giant backyard pool with water and do this experiment with larger items. Liquids vary in their density too. Try mixing corn syrup, oil and water together. The corn syrup sinks to the bottom because it is the densest. The water is in the middle and the oil floats to the top because it is the lightest.

The shape of an object can also determine if it sinks or floats. A ball of clay sinks right away. However, if you flatten the clay out into the shape of a raft, it floats.

Objects filled with air also float. Place an orange in your container of water to see if it floats. Peel the orange and try it again.

Inquiry and creativity elements:

Children enjoyed playing water and different objects. They particularly liked when the teacher asked them to try and think of ways to make the feather sink anyway or make the coins float.

School/Kindergarten: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Age group: 2 years old
Teacher: Georgiana Boaza

Water experiments

Introduction:

This activity is part of the theme: **It starts with a drop of water**.

Water might be the most precious resource we have on Earth. Threfore, from a very early age, children learn about the importance of water, as well as snow, bubbles and ice while they having fun participating in a number of playful activities.

The children come to know about interesting water related topics such as ice, bubbles, snow and why water doesn't mix well with oil. They experiment with different materials as they learn important science principles and guess what? They are having a great time!

I have a tremendous opportunity to teach the kids about the significant role water plays in our life. In order to convey them the importance of water, it helps if they have some background information like where water comes from and how it becomes the drinking water that pours out of a faucet.

Background:

Most people drink at least one glass of water every day. On a daily basis, millions of people turn on faucets at work and at home filling their glasses or bottles with water. People also take showers or baths, wash their clothes, turn on their garden sprinklers, and use water in dozens of other ways. Not surprisingly, most people don't think about where their water comes from or how it got there.

Purpose:

To explore some water experiments, to combine some substances and to find out the answer to some questions that we have, like: Where do animals drink water from during winter?

Aims:

Children get to know the aggregate state of water in nature. They also learn how to handle the funnel and the dropper.

The children will:

Discover new experiments, the aggregate state of water, how the combination of two colours can produce a new colour.

Vocabulary/Key words:

Water, ice, snow, snowman, freeze, aggregate state, pressure, solid, liquid, melt, colouring food, dropper, funnel.

Process skills: observing, analyzing and describing, planning, conducting an experiment, gathering information, collecting data, interpreting data, communicating observations, information and conclusions.

Time/Duration:

30 minutes.

Materials and resources:

Empty bottle, water, food colouring, cups, funnel, pipette, spoon, balloon, rubber band, stick, bowl and tray

Procedure:

A. Preparation:

Children, like many, have a real fascination with water and will happily play with anything involving water for quite some time. Water games are fabulous when the weather is hot and especially when you can get outside. But we can play with water in winter too, because in that season we have ice and snow. So, from that idea we decided to do some interesting activities with ice, water and snow.

B. Exploration:

For the first experiment melt snow with different things. *If I put my hand on the snow it will melt,* said one child. Try it out! Because they are too young to know all the things, I suggested putting water on the snow to see what's happening. They enjoyed discovering that water melted snow quite fast. Now try with two bowl of snow and two cups of cold and hot water. In which does the snow melt faster?

Another experiment was to see the pressure released by the air from a balloon, when the balloon is placed on a bottle with water. The kids were too young to understand the pressure of the air in a small object, but they liked the experiment.

The purpose of this experiment was to obtain the *WOW effect* and not to understand a scientific process.

Experiment number three was about discovering how coloured ice melts in coloured water and the combination of the initial two colours will result in a third colour. Therefore, the chidlren put the blue ice in yellow water and they waited until the ice melted. They were very surprised to discover that the yellow water became green.

C. Discussion questions:

How can we melt the snow? How can we colour the water? How can we pour water in a bottle? How can we get a new colour if we only have two?

D. Conclusions:

The children learnt about water and how to handle the funnel and the dropper. The children understood how science can be fun with experiments.

Further investigations:

Our happy kids enjoyed these types of experiments so we decided that in the future we will make some more experiments that involved water and other non-toxic substances.

Inquiry and creativity elements:

Children enjoyed playing with water. They easily learnt how to handle the funnel and the pipette. They also enjoyed melting snow and playing with colored ice.

School/Kindergarten: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Age group: 3-5 years old
Teachers: Cristina Vacarau, Stefania Roman, Boaza Georgiana

How can we break the ice?

Introduction:

This activity is part of the theme **It starts with a drop of water** when we studied the different states of water, water properties, water cycle, saltwater versus freshwater and also marine animals. Because when we approached this theme we were in winter, we continued our investigations and experiments with …ice. Winters can be pretty harsh in Romania, leaving a layer of cold snow and ice in the streets. Why do we use salt in these situations? - this is the subject of the following activity.

Background:

Water is the most common liquid on Earth. It covers about 71.4% of the Earth. Pure water has no smell, taste, or color. Lakes, oceans, and rivers are made of water. Rain is water that falls from clouds in the sky. If water gets very cold (below 0 degrees Celsius), it freezes and becomes ice. Frozen rain is called hail. Snow is formed from water vapor, not rain. If water gets very hot (above 100 degrees Celsius), it boils and becomes steam. Water is a fluid and the only substance on earth that exists naturally in three states (liquid, solid and gaseous).

(Source: http://ga.water.usgs.gov/edu/earthwherewater.html)

Purpose:

By investigating and experimenting, children realize the fact that it is not necessary to use different tools to break the ice, but we can use salt and magic can happen as the magic dust can *break* the ice.

Aims:

The goal is to see how can we break the ice without using heavy metals or different tools.

The children will:

- Observe and compare the characteristics of water (smell, taste, colour) in two states of water (liquid and solid)
- Observe the shape, weight, of the water when it is solid
- Experiment, observe and describe how salt can melt ice, changing the surface and its hardness
- Create ice-art
- Connect class-room experience with outdoor reality.

Vocabulary/Key words:

Evaporation, fresh water, frost, rain, wet, ocean, pure, salty, non-potable, river, ice crystals, waves, liquid, solid, gas.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

35 minutes.

Materials and resources:

Round plastic bowl, water, tempera, pipettes, freezer, plastic tray and fine salt.

Question:

Can salt break the ice?

Procedure:

A. Preparation:

First put a round bowl filled with water in the freezer. When this turns to solid ice, gather all the materials for the experiment on the table (a plastic tray, the round ball with ice, fine salt, pipettes, different tempera pigments). Turn over the bowl so that the ice falls on the tray, fill the round ball with water and then analize similarities and differences of characteristics between ice and water (colour, smell, taste, weight, shape). At last, ask the children how can we break the big, thick, heavy piece of ice?

B. Exploration:

Most of the boys tried to break it with their hands and feet. No matter how strong the boys, their muscles were of no use. A girl said *we should try my special princess shoes* but not even that worked. Less strength more thinking helps: sprinkle salt on the ice and for 10 minutes tell the children an interesting story about ice.

Within 10 minutes, the salt has already begun to melt the ice. But how can something that is not hot can melt the ice so fast? However, salt is not about melting, it is about freezing. Have you noticed that while rivers and lakes can turn into solid ice, the seas and oceans still enchant us with waves? The freezing point of water and ice is much lower, so it appears to us that the chunk of ice is melting.

Some thin cracks appear in the ice. These can be seen much better if you add tempera with pipettes. It's real freezing art as water starts flowing through these cracks spreading the paint. What can you see? A rainbow appeared, or Earth planet.

When these cracks can be seen really well, you can explain children that this is how icebergs melt. Fresh water fills in these cracks and when it freezes, it expands making the iceberg break into pieces.

Now connect to real life situations: what happens when there is salt in the streets and on the roads. *What can we do? Have you ever seen your parents / people spreading salt? Have to ever seen huge trucks spreading salt on the roads? What else can you throw on the roads (sand). Which do you think are the disadvantages of using salt? (in spring it can affect plants growing next to the roads, it can affect road quality, it can get into rivers and lake and affect the life of freshwater plants and animals etc.)*

C. Discussion questions:

What happened with the ice? What is the best way to melt ice? Do you think salt can save some drivers live in wintertime? How do you think icebergs are melting? Why do you think that is dangerous?

D. Conclusions:

Rock salt represents the main way of melting the ice in the streets during wintertime.

E. Assessment:

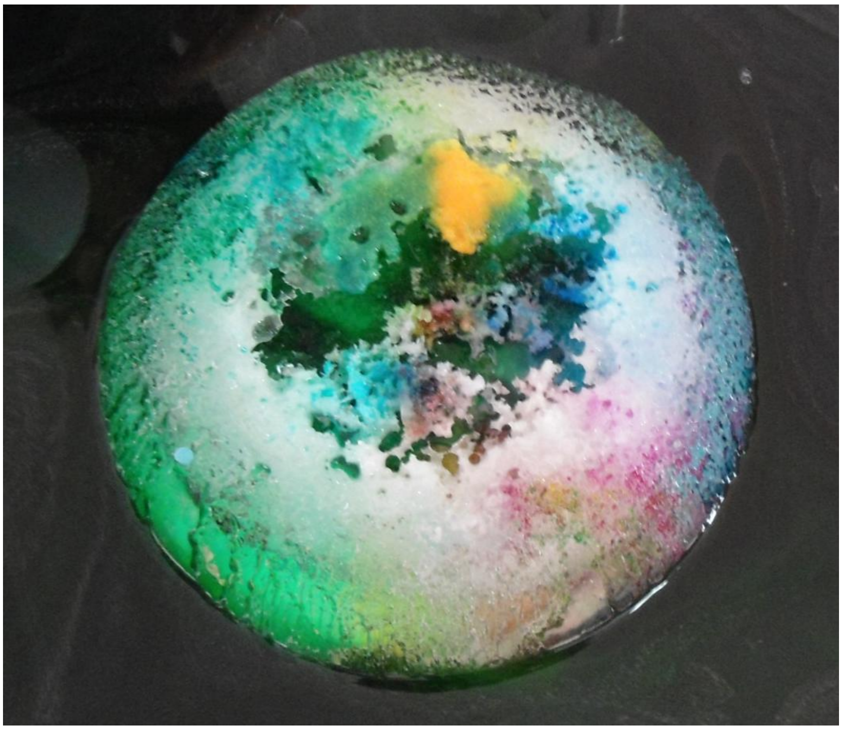
The children were very curious and they showed a great deal of interest in this activity. They were happy and enthusiastic about the experiment. They shared their ideas and drew their own conclusions. The teacher appreciated their ingenuity, curiosity and creativity.

Further investigations:

- Molecular gastronomy
- Artic animals
- Winter sports
- Water effects on ice (warm, hot, cold)

Inquiry and creativity elements:

It has been a great pleasure for the kids to observe and do experiment with water. They tried to see if it is possible to break the ice without tools and the result was negative, and that actually the ice is melting using salt.



School/Kindergarten: Happy Kids Kindergarten, Discovery Kids Primary School, Ramnicu Valcea, Romania.
Subject: Integrated Science, Language development and Art, Age group: 3-7 years old
Teachers: Prejbianu Irina, Preduca Cristina, Vacaru Cristina, Roman Stefania, Balint Mihaela, Popescu Laura

Water Cycle Models

Introduction:

These activities are part of the theme **It all starts with a drop of water.**

The water cycle describes the changes water goes through as it moves from place to place around the Planet Earth.

Background:

The water cycle describes the continuous movement of water above, on, and below the surface of the Earth. The Sun's energy evaporates water stored in the oceans, seas, lakes and rivers which later condense as clouds in the atmosphere. Clouds release water as precipitations (rain, snow) which eventually runs into the oceans, seas, rivers and lakes.

The water cycle has been running on the Earth for billions of years, keeping the overall balance of water on Earth constant. That's why children must understand why preserving the quality of water is a very important issue.

The main stages of the water cycle are:

Evaporation - heat from the Sun causes water on Earth (in oceans, lakes, rivers) to evaporate (turn from liquid into gas) and rise into the sky. This water vapor collects in the sky in the form of clouds. Plants, also, release water vapors through their leaves.
Condensation - as water vapor in the clouds cools down it becomes water again. *Precipitation* - water falls from the sky in the form of rain, snow, hail, or sleet. *Collection* - oceans, seas, rivers and lakes collect water that has fallen as precipitation. Water evaporates into the sky again and the cycle continues. Some water fallen on the ground feeds the plants' roots or is collected by underground reservoirs.

Purpose:

To make different models of the water cycle.

Aims:

The children will:

- Discuss the water cycle and identify key components
- Observe water cycle in action
- Become aware of how water conservation is important in relation to the water cycle

Vocabulary/Key words:

Cycle, water cycle, evaporation, condensation, precipitation, collection, clouds, rain, snow, hail, water on and underground (lake, pond, rivers, sea, ocean), liquid, ice, vapors, salt water, fresh water.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

15-40 minutes

Materials and resources:

For activity 1: yarn, cut-out colored circles representing the water cycle

For activity 2: one bowls and a glass, a clear sheet of plastic wrap, salt, hot water, ice cubes, tea spoons

For activity 3: Pic-Pic stories, a fish tank or a large, tall and transparent bowl, a small, shallow tray with some dry soil, sand and stones, hot water, plastic wrap, a small cup with some dry soil and a little plant, ice cubes.

Question:

How can you make a water cycle model?

Procedure:

A. Preparation

Based on internet resources (video presentations, songs, pictures, lessons) and encyclopedias, the teacher helps the children identify the key elements in the water cycle.

B. Exploration:

Activity 1 (age group 3-4 years old):

The children make an easy craft to represent the idea of cycle as a circle that goes over and over again through the same "stops". It also represents key elements of the water cycle like this:

Blue – rain

Brown – the earth

Green - plants

Yellow - Sun

When connected, all the elements form a bracelet which goes with the following story: The rain falls on the ground, part of it is "drunk" by the plants. The sun turns some of the remaining water into clouds and finally it rains again! At this early age, if they understand that a cycle looks like a circle (bracelet, in our case) through which you go again and again – it is already a milestone!

Activity 2 (age group 4-5-6 years old):

After introducing the water cycle ask the children the following question: *If the sun evaporates water mainly from seas and oceans which are salty, how comes rain is not salty at all?* Tell the children they will observe water cycle into action to find out the answer. Take a larger bowl. Ask a child to put 8-10 spoons of salt in the bowl. (The saltier, the funnier!) Then the teacher carefully pours very hot water. Ask some calm children to stir until the salt is dissolved.

Have some tea-spoons at hand and let the children taste the salty water (blow first!) Laugh together at the funny faces

children will make and ask them what the water tastes like. Then take the glass and make sure all children can see that the glass is empty. Place the glass right in the middle of the bowl, then cover the bowl with a clear sheet of plastic wrap. The children will soon comment on the vapors they see and on the condensed little drops of water appearing on the plastic sheet. Help them with scientific language if necessary! Ask them why the water evaporated and what makes the water evaporate in nature. Explain that the higher vapors go, the colder it becomes so the process of condensation begins. First, only very tiny droplets of water can be observed. *What do these tiny drops form in the sky?* Next, take several ice cubes from the freezer and place them on top of the wrap, right above the grass. Tell the children ice represents the colder strata of the atmosphere. The children can easily observe that where the ice was placed, the wrap lowers and the tiny droplets gether and form bigger water drops. When these drops get big enough, it precipitates – that is, it rains in the glass. Make sure, they see the first drops of water falling into the glass and then let the experiment continue for another hour.

Back to the experiment table, the children will notice that more water "precipitated" in the glass. Carefully remove the water on top of the wrap and the sheet itself. Take the glass out and taste the water: it is sweet. *Even if the sun evaporates water from the seas and oceans which are salty, the rain is sweet! What happens to the salt?* You can continue this experiment by placing a pot with very salty water on the cooker. The children will realize that, after all the water evaporates the salt remains in the pot. *What would happen if it rained with salty water?*

Activity 3 (age group 6-7 years old):

Thanks to Pic-Pic, a friendly and funny water drop, children are already familiar with the processes of evaporation, condensation, precipitation and collection - the main parts of the water cycle. Using a diagram and retelling one of the Pic-Pic stories the teacher reinforces children's knowledge on the water cycle. The children are asked to imagine a model of water cycle.

First, through questions and answers, children are gently guided to imagine a "small piece of planet Earth" with land (soil) & plants, water and air. On the table, they can find a lot of materials and objects and they are free to explore. At this point, the teacher introduces the fish tank and tells the children that they can "build" their mini-Earth model in the fish tank. In the middle of the tank they place "the land"– the tray with soil, sand and stones. "*It's an island*", said David, "*like a pirate's island". "It's the Discovery Kids' Island"*, said Iris, "*It's our island*". In the middle of the island the teacher fixes the small cup with dry soil and a small plant. "*It's a secret. You we'll see what's for. All the island used by pirates have their secrets…*", said the teacher. *"But two thirds of Earth are covered with water. Where is the water?"* The water is added under the teacher's supervision because it was hot. The children soon notice the presence of the water vapors. The water vapors are spreading quickly in the air. The teacher asks children to find a solution to keep the water vapors inside the tank. "*Remember the fact that the Earth has water vapors in his atmosphere. So, our little piece of earth must have, too",* completed the teacher. In our case, the kids made the connection with a previous experiment when they observed the condensation of the water vapor in contact with a cold object. "*We have to cover the tank with a kind of lid*", said one of the kids.

Choosing between the objects from the table, the children decided to cover the tank with plastic wrap. "*Do you remember Pic's adventures? High up in the upper atmosphere the air is cold. How can we <u>cool down the atmosphere</u> of our Earth?"*. Once again they can explore the objects from the table and they soon notice the ice cubes in the thermo-insulating container. The children should place the ice cubes on the wrap foil, above the island. Very soon they observe the condensation of the water vapors. A lot of water drops cover the plastic wrap on the inside. Outside the ice cubes melt and some water is now on the plastic wrap. Carefully, the teacher takes off the plastic cover and askes kids to examine the cup. Now there is some water inside the cup, on the plant, the stones and the sand are wet. Where did it come from? "*On our island did rain!",* said a child.

C. Discussion questions:

What shape whould you associate with the water cycle? Why? How did the vapors form? What happened with the vapors? What happened with the ice cubes? What would happen if it rained with salty water? What is the role of plants and trees in the water cycle? Do you think the water cycle would be possible on a planet without vegetation? Why?

D. Conclusions:

These models look pretty fantastic but are these models similar to the real water cycle? How are they different? Something is missing. What? The last two models do show the evaporation, condensation, precipitation (rain) and collection. However, these models do not repeat themselves like the real water cycle does. What can we do about that? (One of the children noticed that in this model always rains, but in fact on Earth the precipitation comes in various forms it could snow, for example.) The problem of *a right model or a wrong model* (or incomplete) raises another question: *"The oceans water is not hot. We used hot water. So, is our model completely wrong?* Making connections with previous experiences and knowledge the teacher helped children understand that water does not have to be hot to evaporate. The sun provides heat which makes water from the ocean's surface to evaporate. In the model, we used hot water just to make the processes of evaporation and condensation more visible and faster.

E. Assessment:

The teacher takes into consideration each child's activity as a whole: enthusiasm, ideas, communications skills, the accuracy of the observations and conclusions, knowledge and the ability to apply and use previous knowledge and experiences in new contexts.

The hidden agenda of the 2nd and 3rd activity was to elicit the children's current conceptual knowledge of water states and water cycle. The intention was to raise questions and potential gaps in understanding, which would form the basis for planning future topic work sessions.

Further investigations:

If we try the same experiment with colored water, do we get the same results? What does this tell us about water pollution?

Investigate how much water is wasted while you soap your hands or brush your dishes!

What filters better dirty water: sand, earth, plant roots or the mixture of the three?

Inquiry and creativity elements:

Creativity was present in the opportunities the teacher provided for children's problem solving and agency. In the 3rd activity, the children were even able to explore and choose different materials and objects, imagine and build a mini-Earth model and a water cycle model. The teacher provided children a lot of materials and objects, but allowed them to explore these items and to decide what to do with them. Also, encouraging children questions and answers the teacher helped children to realize a water cycle model and to understand the gaps and the limits of their model. In all activities, children drew on their earlier knowledge and made connections with previous experiences and knowledge all the time.

The planned activities fostered children's creative dispositions. The children's attitudes to the natural phenomena activities were positive. They showed high levels of understanding and they were not daunted by challenges or by failing to get an answer. They showed a sense of initiative in coming up with ideas to solve the problems they faced and reasoning skills in justifying their suggestions.

Teacher's note:

Useful link: http://water.usgs.gov/edu/watercycle-kids.html

Science in a fairy-tale – Lesson Plan Synopsis

Lesson plans	Partner Country	Synopsis
Playing with mirrors	Romania	Starting from Snow White learn what happens when you play with one, two or more mirrors?
Bob – the magnetic dog	Austria	A fun, introductory activity on magnetism for children.
Nasreddin Hodja and fermentation of yoghurt	Turkey	With the help of a beloved character children find out about the process of fermentation and how yoghurt is made.
The three little pigs	Poland	A fun analysis and comparison of the three little pigs famous houses.
The Gruffalo's child	Romania	An introductory experiment on shadows and how they can be created.
Egg power	Romania	Children test how strong egg shells can be by building a tall wooden construction on top.
The knight's weapons	Romania	Kids learn about medieval weapons: study their parts, understand the science behind their mode of operation and of course, make some.
Making a boat	France	Children study different common materials and test their ability to float or sink.
Solving problems: the goat, the wolf and the cabbage	Romania	Using geometrical shapes and color symbolism children are encouraged to solve problems.

Kindergarten/School: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Mathematics and Art, Age group: 6-7 years old
Teachers: Mihaela Balint, Laura Popescu

Playing with mirrors

Introduction:

These activities are part of the theme **Science in a fairy-tale**. The beautiful but bad queen from the story of *Snow-White and the seven dwarfs* had a magic mirror. When she looked in the mirror she didn't see her own image, but the image of a spirit. Moreover, she could talk to the spirit. This is the starting point of our adventure in the land of the magic mirrors.

Background:

Mirrors serve practical purposes. They reflect light so we can see an image of whatever is in front of it. They are used in many scientific instruments. Our dentist uses a tiny mirror to check our teeth for cavities. Some cameras contain small mirrors that help the photographer compose a picture before shooting. Giant telescopes have huge mirrors that enable astronomers to observe distant stars. Studying mirrors also helps scientists understand the basic properties of the light.

The common mirrors we find in the bathrooms or we carry in the handbags are pieces of glass with a shiny metal backing. The surfaces are flat. These flat and shiny mirrors are called **plane mirrors**. When they are placed next to each other, many kinds of interesting images occur.

Purpose:

Playing around with mirrors gives children the opportunity to be both artists and scientists. They arrange mirrors in special ways and create special and awesome effects. In the same time the mirrors help them carry out scientific investigations about light.

Aims:

The children will:

- Observe the plane mirrors
- Observe the reflection of light on the mirror surface
- Practice locations and directions, the symmetry
- Create, observe, analyze, describe and compare different images which occur when mirrors are placed at various angles and positions
- Analyze and describe the special effects which occur for some positions of the mirrors and when we increase the number of mirrors in use
- Create awesome images using their own drawings, cards, sequins in different patterns, small objects for crafts

Vocabulary/Key words:

Mirrors, plane mirrors, flat surfaces, shiny, metal backing, light, reflection of light, ray of light, image, reflection, angle, camera, telescope, microscope, left, right, in front of, up, down, above, under, behind, small, big, tall, short, thin, thick, symmetry, pattern.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

50 minutes for each activity

Materials and resources:

Plane mirrors, supports, cards with geometric shapes, cards with different shapes and figures, children's drawings, a black marker for the whiteboard, beads, small, colorful pieces for crafts, sequins with different patterns, flashlight, stickers, pencils, fibber pens, paper, crayons.

Question:

How many images (reflections) of yourself can you see by <u>looking in one mirror</u>?

Hypothesis:

We will see a single reflection because we use one mirror.

Procedure:

A. Preparation:

Just put the **Magic box** on the table**.** You will open the box and share with the children all the materials as they need them.

B. Exploration:

Give children a mirror and ask them the question. <u>It is a tricky question!</u> Ask them to look into the mirror at themselves and the room around them. They can see straight ahead or at different angles, but beyond this, they are limited at a single image, a single reflection. Probably you will get the hypothesis above. And yet…

Give the children a second mirror and ask them to put the second mirror on the table, face to face (parallel) with the first one. Now ask them to place their eyes at the edge of one mirror <u>and look sideways into the other mirror</u>. Surprise! When 2 mirrors are located directly across from each other they observe a remarkable effect. They will see multiple reflections of themselves that seem to go on forever.

Now, let's remember the bad queen's mirror. *Can you look in the mirror and yet see another person?*

Ask the children to look in the mirror. Yes, they are pretty/handsome! Now, show them to move slowly the mirror to the left, to the right, change slightly the angle. Can they see their own reflection anymore? They are still looking in the mirror but very soon they will not be able to see their reflection anymore. Instead they will see one of their colleague's reflection.

C. Discussion questions:

How many images/reflections can you see by looking into one mirror? What can you see on your left/right? How can we arrange 2 mirrors in relation to each other? On which side does your colleague stand: on your left or on your right? What is he/she holding in his/her left/right hand? What can you see in front of you?

The hand become a tree

Or another shape

New questions:

Can you line up 2 mirrors so that <u>you can see</u>:

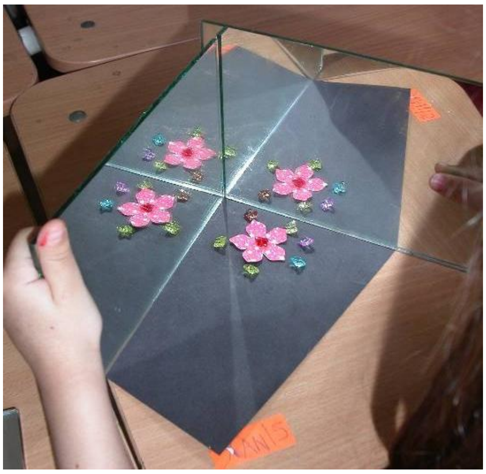
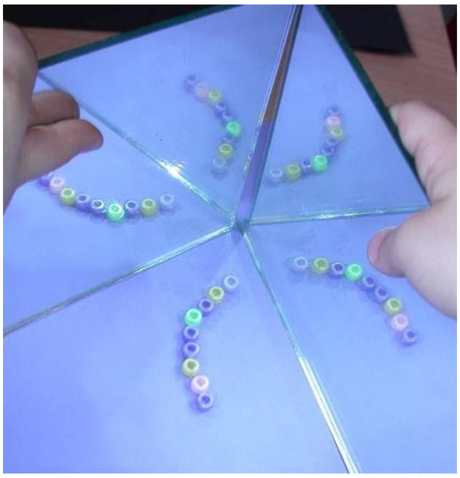
- *2, 4, 6, 8 images of your face*
- *half of your face*

- *your face appears upside down*
- *most of your face but not your mouth* ***when you look into both mirrors in the same time?***

B. Exploration:

- Lift the mirrors off the table and hold them in your hands. Now put the mirrors next to each other, move the outer edges very slightly and look into both mirrors in the same time. Slowly decrease the opening between the mirrors. What can you see? *They can see multiple reflections of their own face. When the mirrors are held at certain exact angles the children will see 2, 4, 6, 8 reflections of their face- always an odd number!*
- Now hold the mirrors side by side and gradually move the outer edges back instead of forward. Funny, isn't it? *They will continue to eliminate their reflected features until they have only ears left.*
- Keep the mirrors in front of you, horizontally, like a book. Slowly open and close "the book". What can you see when you look in the bottom mirror? *As they slowly lower the top mirror toward them the image of their face will alternate between being upside down and right side up in both mirrors.*
- Just hold one mirror on top of the other one. Move the mirrors up and down and away from you. What's that? *A face with no nose or even a face with only a chin and a forehead!*
- Let the children freely explore the magic land of mirrors playing with cards, drawings, small objects for crafts.

D. Conclusions:

4 reflections

When we use a mirror we will see a single reflection. If we use 2 mirrors even if we look in one of them we can see multiple reflections and weird, strange, funny effects. All of these effects can be produced by placing the mirrors in standing position next to each other and then moving their outer edges very slightly. Sometimes little changes in the distances between the outer edges can result in a large change in what we see.

E. Assessment:

First the children worked independently but they enjoyed communicating to one another and share with enthusiasm the new discoveries. It was quite easy for the teacher to observe children working. The teacher appreciated their involvement, curiosity and creativity. They drew special drawings for this activity and combined all kinds of objects to make "art in the mirror" as they called it. In the first part of the activity one of the children noticed that we can see an even or an odd number of reflections in one mirror but we'll always see an odd number of reflections when we look in two mirrors in the same time. During free play with the mirrors, the children had the opportunity to practice locations and directions.

Further investigations:

Secret messages could be sometimes read using mirrors. Michelangelo's writings for example, can be read only with the help of a plane mirror. So the children will have the opportunity to act like detectives or secret agents and decode some strange messages (words, short sentences, simple figures written in the mirror). See the attachments.

During these activities we use 1 or 2 mirrors. What about 4?

Inquiry and creativity elements:

Children enjoyed to play with mirrors. They easily discovered new shapes and figures moving mirrors in all directions, using their own drawings, geometrical shapes or small, colorful beads.

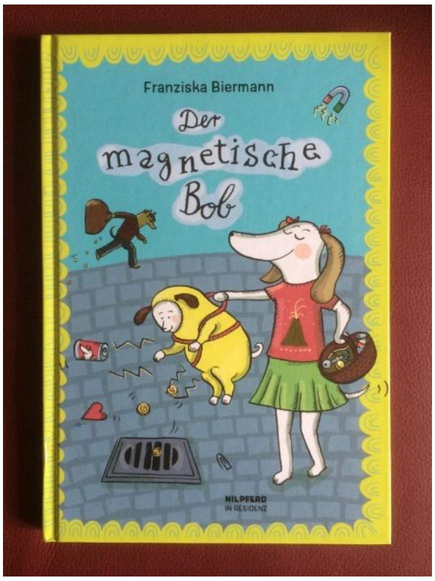
School/Kindergarten: Kindergarten der Volkshilfe Rosental a. d. K.
Subject: Integrated Science – Physics, Invisible Powers
Age group: 3-6 years-old
Teacher: Sabine Hirschmugl-Gaisch

Bob – The Magnetic Dog

Introduction:

This activity is part of the theme **Science of a fairy tale**.

Bob, the little dog can suddenly attract objects out of iron and other iron-like materials magnetically – What is the secret behind this ability? The method of "Storytelling", experiments and philosophical discussions on how to deal with toys in a responsible way are used to explore the phenomenon of magnetism.



Background:

The discovery of the phenomenon of magnetism and to experience it with all senses is the main objective of this experimental series. To experience invisible physical forces and to feel magnetism is fascinating for children of all ages.

Purpose:

To create a „Chinese Compass".

Aims:

Getting to know the phenomenon of magnetism; Creation and magnetisation of a compass; Application of the compass; Describing the magnetic field of the earth

The children will:

The children will learn about the power and abilities of magnets and magnetism. They are given the chance to explore this phenomenon individually and independently.

Vocabulary/Key words: attraction - rejection – magnetic field, magnetize, invisible forces / powers, Chinese compass, recharge, north pole, south pole

Process skills: getting to know magnetic forces: What items can attract each other? - Documentation of the findings; Learning how to use a compass - Development of fine motor skills and language

Time/Duration:

1 hour – 6 children (3-6 years olds)

Materials and resources:

1 large bowl of water

1 sewing needle - 1 nutshell half per child, coloured sponge rubber plates

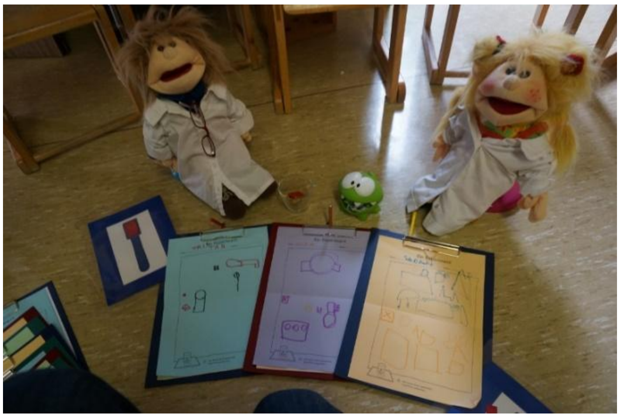
Scissors, glue stick, felt-tip pen

Strong bar magnet

Turtle Body Stencil

Question:

What is a compass? What can we use it for? Is it possible to make a compass out of the materials prepared? What steps in the working process are necessary? What happens when we magnetize a sewing needle?



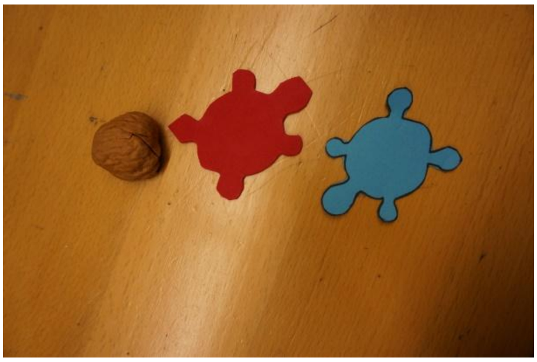
Procedure:

A. Preparation:

A compass is introduced, explained and tested. Then a self-made turtle-compass is shown.

B. Exploration:

First the turtles` bodies are cut out of foam rubber, decorated and the nutshells as well as the glue is prepared. Then the children rub the needle along the strong bar magnet (about 30 times in one direction) in order to magnetize it. After that, the magnetized needle is lengthwise inserted into the turtle-foam rubber body and the nutshell-half is glued onto it. Finally the "Turtle Compass" is placed into the bowl of water and it can be observed what happens with the compass and to what criteria the needle aligns itself.



C. Discussion questions:

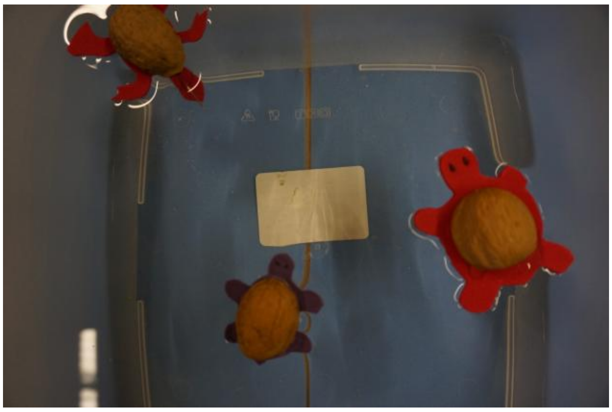
How can we magnetise a needle? What happens to the particles in the needle? Can I magnetise all materials and objects or only certain ones?

D. Conclusions:

The magnetized needle of our turtle has a north and a south pole. The north pole of the magnetized needle is attracted by the south pole of the earth, the south pole of the needle by the north pole of the earth. This is the reason, why the turtle orientates alongside the poles and the north-south direction becomes visible for everybody.

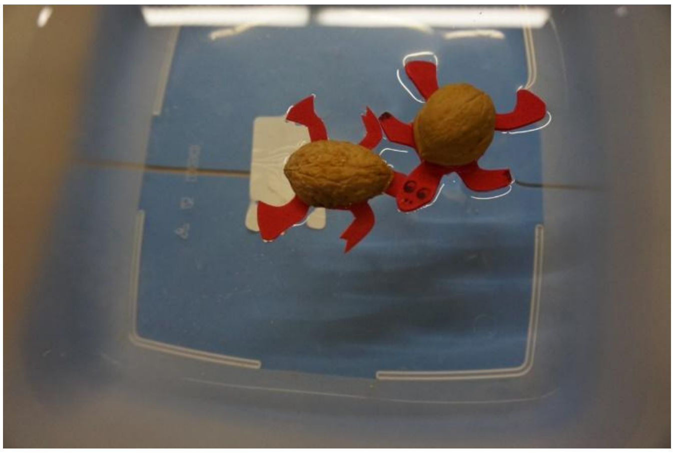
E. Assessment:

The children were very proud of their homemade turtle compasses and of their ability to magnetise needles. The handling of a compass and its use could be explained and practiced with them for the first time. This offer turned out to be very successful and children took part in the exercises enthusiastically.



Further investigations:

Making the magnetic field of a magnet visible (iron filings), building magnetic sculptures, working with magnetic blocks, exploring and to documenting where objects made of iron, nickel or cobalt can be found ("Magnetic Detectives on the way"), creating objects with everyday materials (can ends, coins and bottle corks) and exhibiting them.



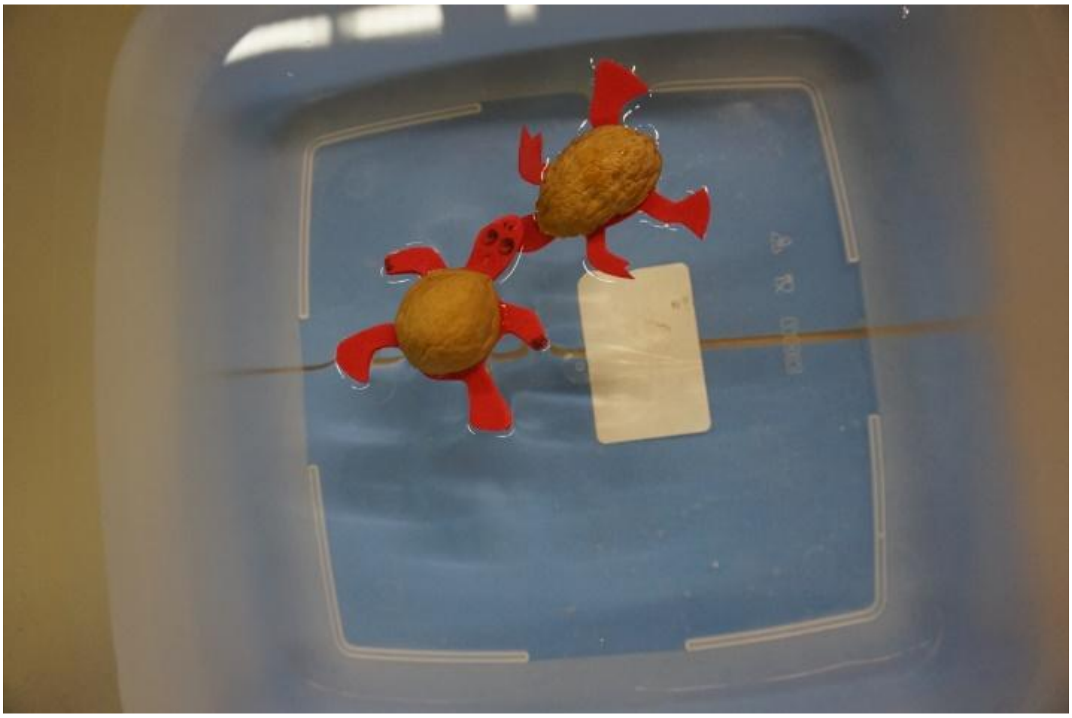
Inquiry and creativity elements:

What kinds of magnets do you know? (strong magnets, horseshoe magnets, bar magnets, ring magnets) - What are the special functions of the individual magnets? - Inspection of models (particle and "geomagnetism" model); Storytelling in order to arise children`s curiosity.

Teacher's notes:

Magnetism in all its diversity is an issue that always delights the children. Many of the phenomena can be independently discovered in their everyday lives and many of the experiments can also be performed independently without any special instructions.

It often happens that children randomly discover and develop possibilities how they can experiment with small magnets. Therefore, this is a topic that can be worked on over a longer period of time and still raising the enterest and enthusiasm of children and teachers.



School: Ş. Jan. Uzm. Çvş. Ahmet Güngör Anaokulu, Tarsus-Mersin, Türkiye
Subject: Science, Language development and Drama, Age group: 5-6 years old
Teacher: Zehra Okur

Nasreddin Hodja and the fermentation of yoghurt

Introduction:

This activity is a part of **The science of a fairy tale.**

Background:

Fairy tales are very important in children's world. They learn a lot from them and improve their imaginative skills through listening to stories. In this lesson, we want to go beyond and find a hidden scientific fact in a story.

Purpose:

- Getting to know Hasreddin Hodja and his stories
- Introducing our cultural characters in history
- Showing how to make yoghurt through fermentation

Aims:

At the end of this lesson, children will:

- Know who Nasreddin Hodja is
- Listen to stories of Nasreddin Hodja
- Know how yoghurt is made and what it is made of
- Know that there are chemical events in the kitchen
- Know the benefits of yoghurt for our health
- Act out some stories of Nasreddin Hodja with costumes

- Improve their language skills

Key words:

Fairy tale, Nasreddin Hodja, drama, yoghurt, fermentation

Process Skills: observation, communication, drawing conclusion, role-play

Time:

90 minutes

Materials:

- Costumes (for role-playing) and materials for drama
- Milk
- Some yoghurt

Questions:

- ***Who is Nasreddin Hodja? (where and when he lived)***
- ***What are the messages lying underneath Hodja's anecdotes***
- ***How is yoghurt fermented?***

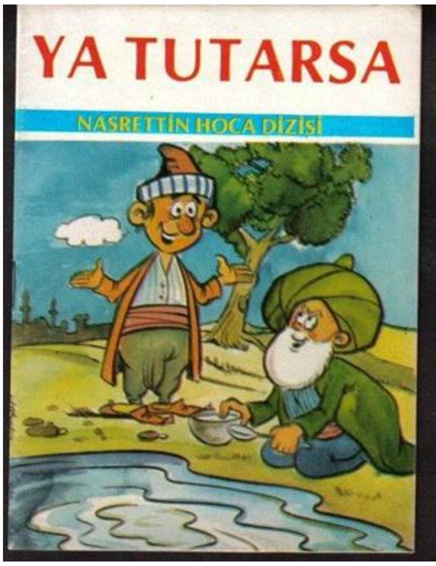
Procedures:

A. Preparation:

Teacher brought some books, posters and photos to introduce Nasreddin Hodja to children. First, she asked if they knew him or not.

B. Exploration:

After introducing Nasreddin Hodja, the teacher told some anecdotes to her students. She brought some costumes to class so that children could do role-play activities for the stories they listened to. Thus, the teacher asked the students to act out one of his stories which was about the fermentation of yoghurt called "what if it happens?" (what if it is fermented?). This story recalls the fermentation of yoghurt. From this starting point, the teacher asked if they liked yoghurt. They talked about the benefits of yoghurt for our health and which vitamins it includes. The teacher asked what food can be made with yoghurt. Students replied: ayran (a cold drink made with yoghurt, water and salt), soup, some pies, etc. "So how do we make yoghurt?" asked the teacher. She said that we could make yoghurt at home and she wanted to show it to the children in the class. The teacher provided for all the materials needed. Later on, they made yoghurt in the class with the help of a student's mother.



C. Discussion questions:

- How is yoghurt made?
- What do we need to get yoghurt from milk?
- What is fermentation?
- What happens to milk when it becomes yoghurt?

D. Conclusions:

There is a chemical event which is called "fermentation" while the milk turns into yoghurt. We need the right "heat" and atmosphere to make yoghurt.

E. Assessment:

Most of the children like yoghurt. It goes very well with most of the food. That is why it was really interesting for them to see how milk turns into yoghurt and how we make it at home (actually in the class).

It was very enjoyable to make a role play with Nasreddin Hodja's tales.

Further investigations:

Children can be informed about other chemical changes with simple kitchen experiments. There are many other alternative fermentation examples in our kitchens.

School: Szkoła Podstawowa Nr 2 in Siewierz, Poland
Subject: Integrated Science, Mathematics and Art and Craft, Age group: 5-6 years old
Teacher: Joanna Gornisievics

The three little pigs

Introduction:

These activities are part of the theme **Science in a fairytale**. Three little pigs leave their home and seek for their fortunes. They build three houses of three different materials: straw, wood, stones. A big bad wolf is able to blow down two pigs' houses made of straw and wood, but is unable to destroy the third one, made of stones. Why did the stone house survive? Why shouldn't we build houses of straw? Let's check it out.

Background:

- *Straw* – the dry stalks of cereal plants used by human beings from ancient times as fodder for cattle, as a covering for floors or as a construction material.
- *Wood* – it has been used for thousands of years for both fuel and as a construction material.
- *Stone* – a small piece of rock, used by human beings throughout history. It is the longest lasting building material available.

Purpose:

Children discover the strength of different building materials: straw, wood and stones.

Aims:

The children will:

- explore the use of materials like straw, wood and stone in everyday life
- touch and describe: straw, wood, stone

- cover cardboard houses with straw, wood and stones
- test which house is the strongest (an experiment with a hairdryer)
- mark their observations on a graph

Vocabulary/Key words:

Straw, wood, stone, air blast force

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, draw conclusions, communicate observations, information and conclusions.

Time / Duration:

60 min.

Materials and resources:

- Hairdryers,
- A graph
- Cardboard houses
- Straw
- Sticks
- Stones
- Glue, pencils, colored paper, scissors
- 3 pigs and a wolf – paper silhouettes

Questions:

What will happen with the houses made of different materials (straw, wood, stones) if the air blast is directed against them? Which of the houses is the heaviest and which of them is the lightest?

Procedure:

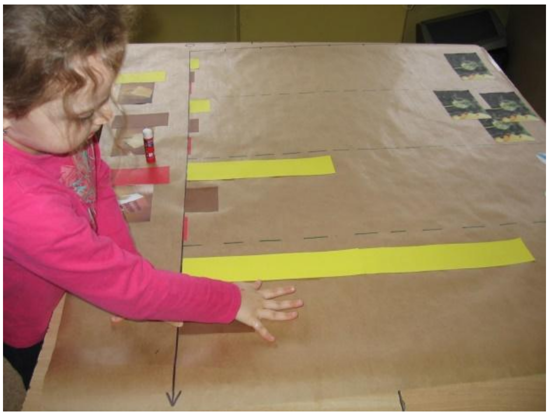
A. **Preparation**

Read and act the story about three little pigs. Show the children materials: straw, wood and stone. Let them touch all three materials. Tell them how to use each of them in everyday life.

Divide children in three groups. Group number one covers the cardboard house with straw, group number two covers the cardboard house with wood and group number three covers the house with stones.

B. Exploration

Each group puts their house on a graph. Give the children hairdryers. They direct the air blast against the house and mark the new position of the house on the graph: group number one marks the position of their house with a yellow colour, group number two with a brown colour, group number three with a red colour.



C. Discussion questions

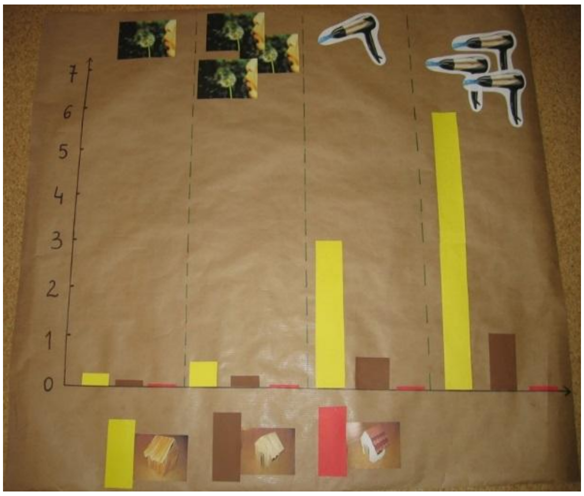
What will happen with the houses made of different materials (straw, wood, stones) if the air blast is directed against them? Which of the houses is the heaviest and which of them is the lightest?

D. Conclusions

The children noticed that the lightest is the house made of straw. It was easily moved by air blust. It also means that the straw house is the least durable and it is much better to build houses of stones because stone houses are really solid.

E. Assessment

The children were very fascinated with 'building' the houses of straw, wood and stones. They also really liked carrying out an experiment with hairdryers. The children enjoyed communicating with each other, they spontaneously shared their observations. The teacher appreciated the children's involvement, creativity and curiosity.



Inquiry and creativity elements:

The children enjoyed all the tasks prepared by the teacher. They easily discovered which of the three houses is the most durable and solid. They promised to build their houses of stone☺.

School/Kindergarten: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Age group: 2 years old
Teacher: Georgiana Boaza

The Gruffalo's child

Introduction:

This activity is part of the theme **Science of a fairy tale**.

One night, ignoring her father's warnings, the Gruffalo's Child slips out of their cave searching for the legendary Big Bad Mouse. She is disappointed to meet only the Snake, the Owl and the Fox. They all assure her that the Big Bad Mouse really exists but will she find him? Meeting a little mouse, the Gruffalo's Child thinks she has found a tasty snack. But wait, what is that? A shadow of a very large, scary creature falls on the ground. Could it be the Big Bad Mouse? *After all, the Big Bad Mouse doesn't really exist . . . does he?*

Background:

Sometimes more can be learned by doing things and taking note of what happened. We use scientific testing and experimentation to seek reasons and evidence in an attempt to prove or disprove our ideas and hypotheses, to discover new information, and to draw conclusions. Teaching pre-school children about shadows is fun. Learning about shadows teaches children about light and movement. The discovery of shadows and experiencing it with all senses is the main objective of this experimental series.

Purpose:

To understand how we can make a shadow and create different shadows.

Aims:

- Describe what a shadow is;
- Understand that larger objects make larger shadows and smaller objects make smaller shadows when the objects are placed at the same distance from a light source;
- Explain that if an object moves closer to a light source, its shadow becomes larger.

The children will:

Investigate shadows indoors and outdoors to develop their understanding of the sun as a light source and how the distance to a source light changes the size of the shadows formed. They are given the chance to explore this phenomenon individually and independently.

Vocabulary/Key words:

Shadow, sun light, sun, flash light, bigger / larger, smaller, closer, further.

Process skills: observe, analyze and describe, plan, gather information, communicate observations, information and conclusions.

Time/Duration:

30 minutes

Materials and resources:

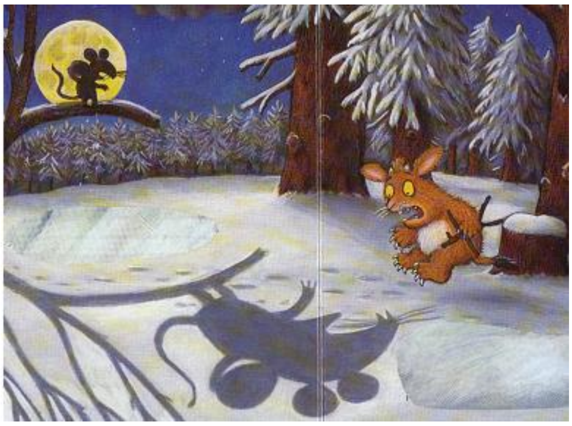
Graffalo's child book, sunlight, flash light, a projector, different objects like: plastic animals, superheroes.

Question:

What is a shadow? Can you pick up a shadow? What makes a shadow? How can we make a big or a small shadow?

Procedure:

A. Preparation:



I introduced the lesson on shadows by reading the story "*The Gruffalo's child*". I told the children that they need to listen carefully to find out how a little mouse who knew a bit of science could scare away the Gruffalo's child. During the reading of the story, I called their attention to the illustrations. When I finished the book and I saw their enthusiasm, I suggested to have some shadow experiments to understand and observe what a shadow is.

B. Exploration:

Ask the children to guess what an object is, just by seeing its shadow. Gather a collection of objects and turn off the lights in the classroom. For example, I used a book to place a barrier around an overhead projector to prevent children from seeing the different objects. I turned on the overhead projector and placed an object on it. The light from the projector cast a shadow onto a wall. I asked the kids what each object was. After they guess the objects move the objects closer and then farther away from the light source to see the difference of the shadows. Explain to them that if you put the object closer to the source light the shadow will be smaller and if you put the object farther the shadow will be bigger. Repeat this experiment in the sunlight, too. (Sometimes, children between 1-3 get easily scared if you put out the lights and

light up a flash-light or a projector. This is why, using the light of the sun can be a great idea.)

After that explain that they will be conducting an experiment based on the information they have just discussed. Darken the room by turning off the lights and shading the windows. The children can now use flashlights to cast light on different objects, causing a shadow to appear on the wall.

C. Discussion questions:

Do shadows change? What happens to your shadow when you get close to the light? What happens to your shadow when you move away from the light?

D. Conclusions:

The children understood that shadows occur when light is blocked by an object; that shadows occur naturally when sunlight is blocked by an object and that shadows can be produced by blocking artificial light sources.

E. Assessment:

First the children worked independently but they enjoyed communicating to one another and sharing with enthusiasm the new discoveries. It was quite easy for me to observe children working. I appreciated their involvement, curiosity and creativity. The children were very proud when they "produced" their own shadows.

Further investigations:

The children can draw the shadow of on object on a paper, by putting the object closer or farther to the source light, and after that then can measure the shadow to understand how the shadow changes size, influenced by the position to the source light.

A shadow play can be really fun for children!

Inquiry and creativity elements:

Children enjoyed playing with different source of light and objects, discovering their shadows. They easily learnt what a shadow is and how we can make one. They also enjoyed listening the interesting and the beautiful story about the Gruffalo's child.

Kindergarten/School: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science and Literature, Age group: 3-4 years old
Teachers: Cristina Preduca, Irina Prejbianu

Egg Power

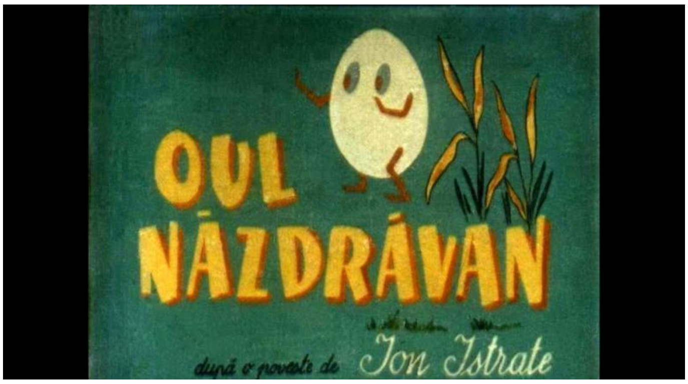
Introduction:

Egg Power is part of **The Science of a Fairy Tale** theme which tested some of the scientific facts written in the best known and loved childhood fairy tales.

A fairy tale, or wonder tale, is a kind of folktale or fable. In these stories we meet witches and queens, giants and elves, princes, dragons, talking animals, ogres, princesses, and sometimes even fairies. Marvelous and magical things happen to characters in fairy tales. A boy may become a bird. A princess may sleep for a hundred years. A seal may become a girl. Objects too can be enchanted — mirrors talk, pumpkins become carriages, and a lamp may be home to a genie.

The oldest fairy tales were told and retold for generations before they were written down. French fairy tales were the first to be collected and written down, but now we can read fairy tales from almost any culture. When these stories were studied together, something amazing was discovered. From countries as distant and different as Egypt and Iceland similar fairy tales are told. Both Egypt and Iceland have "Cinderella" stories, as do China, England, Korea, Siberia, France, and Vietnam; and the list doesn't stop here. There may be a thousand versions of the Cinderella story, each with a unique telling which carries cultural information about the time and place the story was told. One thing is for sure; people everywhere like stories in which truth prevails over deception, generosity is ultimately rewarded, hard work overcomes obstacles, and love, mercy and kindness are the greatest powers of all.

The Egg Power activity was based on **The Magic Egg Story** by Ion Istrate. This is an old Romanian folk fairy tale and even though the main character is an egg, the story is very similar to the **Town Musicians of Bremen** by the Brothers Grimm because just like in the German version the egg has to carry on its "shoulders" its animal companions: a crab, a cat, a rooster and a goat.



Background:

Eggs are a protein-packed, nutrient-rich, and affordable breakfast food that can help you get fit and healthy without breaking the bank. Here are 10 amazing facts about eggs you need to know. An egg's shell color doesn't indicate the quality or nutritional value of an egg, but rather the breed of the hen that laid it. Hens with white feathers tend to lay white eggs and hens with red feathers tend to lay brown eggs. The color of an egg yolk is determined by a hen's diet. Like shell color, it has nothing to do with an egg's nutritional value. If you crack open your egg to discover a dark yellow yolk, the hen was probably fed green vegetables. A medium-yellow yolk would indicate a diet of corn and alfalfa while a light-yellow yolk could be the result of eating wheat and barley.

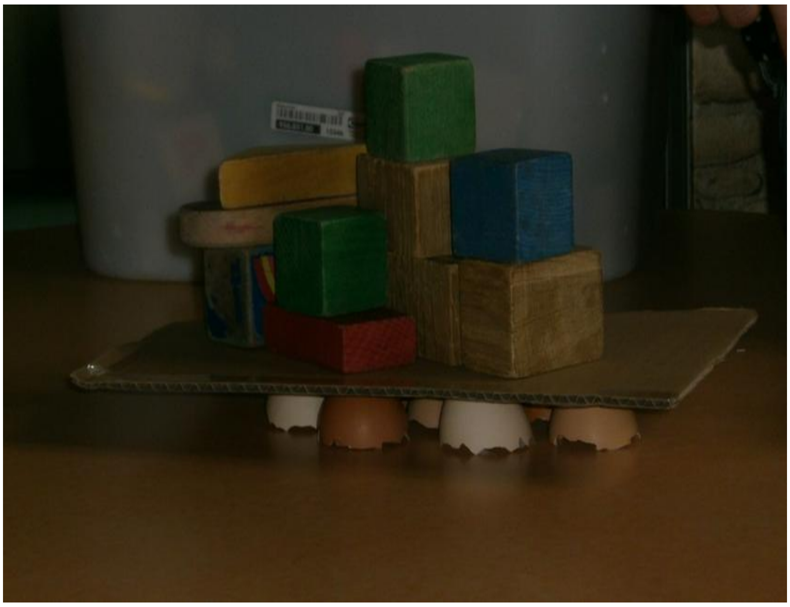
The only thing that limits you with the cooking of an egg is your imagination. You could scramble some eggs for a quick-and-easy healthy breakfast. You could upgrade to an omelet by chopping some veggies and adding mozzarella cheese with a dash of hot sauce. Or you could make an egg sandwich with spinach and tomato. You could also boil a few eggs, sprinkle them with a bit of salt and pepper, and cut them up for a tasty addition to your salad.

(Source: 10 Amazing Fact About Eggs You Need to Know, www.lifehack.org)

Purpose:

Have you ever wondered why hens don't break their eggs when they sit on them? The secret lies in the shape of the egg. An egg is a great example of nature's excellent skills in packing. If you squeeze the ends of an egg between the palms of your hands, it won't break. However, if you squeeze it in the middle, it pops and creates a terrible mess.

If you have seen the way eggs are sold in the market, you would have noticed that they are kept with their ends pointing up and are never left lying horizontally. Hens, too, incubate their eggs the same way, with the narrower end pointing upwards. For distorting or crushing an object, its shape is as important as the material it is made of. Although an eggshell is really fragile, its queer dome-shaped end makes it a 'tough nut to crack'. So we wanted to see just how powerful the egg shell really is.



Aims:

Build a tall construction from wooden blocks on top of the egg shells in order to see if the shells will break or stay strong.

The children will:

- observe, touch, smell and compare different eggs and egg shells
- observe the colors of the egg shells
- weight wooden cubes and egg shells and say which ones were heavier or lighter
- work as a team and build a castle on top of the egg shells
- predict whether the egg shells will break or stay strong.

Vocabulary/Key words:

Egg, shell, yolk, white, fairy tale, friend, foe, break, hatch, hard, soft, small, big, delicate, strong.

Process skills: observe, analyze and describe, predict, conduct an experiment, gather information, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

20 minutes

Materials and resources:

Eggs and egg shells, cardboard, wooden blocks.

Question:

Will the egg shell break or stay strong if we put a large number of heavier wooden blocks on top of them?

Hypothesis:

The eggs will break because many wooden blocks weigh a lot.

Procedure:

A. Preparation:

First talk to the children about the egg parts and focus on the shell especially. Give them raw, uncooked eggs and let the kids study them by using their senses. The children can also test the eggs' resistance by trying to break them by pressing the eggs in their palms. Ask children to remember if they ever saw their parents break some eggs in the kitchen for some scrambled eggs during breakfast or for baking a yummy cake. If so, let them show you how they did it and ask the children to explain why it was possible to break the eggs like that but not by pressing them in their hands.

B. Exploration:

First all the children came and took a wooden block and an egg shell the weight them using their hands. Everyone said out loud which one was heavier or lighter. The half egg shells were put on a table. A soft cardboard was placed on top of the egg shells. The children came one by one and placed one or more wooden blocks on top on the egg shells watching at the same time the egg shells for some cracks.

Note: The egg shells should be about the same size. If one of them is taller, this egg shell will take over all the weight and it will crack soon.

C. Discussion questions:

What is an egg made of? What shape is an egg? Which animals or birds lay eggs? How can we break an egg using only our hands? Have you ever seen someone in your house cooking some eggs? How did they break the eggs? Can you try breaking an egg like that? Which is heavier: the wooden block or the egg shell? How many wooden block are necessary to break the egg shells?

D. Conclusions:

Even though the egg shells were very delicate they were also very strong. The wooden blocks were much heavier than the egg shells but they could not break the egg shells which remained intact during the experiment.

E. Assessment:

All children were curious and showed a real interest in the experiment. They had fun listening to the fairy tale and were immediately ready to start the experiment. At first they were afraid to put the wooden blocks on top of the egg shells because they were afraid they will break them. After a couple of turns they became more daring and started to put even four wooden blocks at once. They worked as a team and enjoyed communicating to one another their new discoveries. It was quite easy for the teacher to observe the children working and appreciate their involvement, curiosity and creativity.

Further investigations:

Walking on Eggshells would make an "eggcellent" and very dramatic science fair project. An effective science fair experiment changes something, creates a new experiment, and then compares results. In this case, you've already proven that egg shells are strong. Very cool, but that's really just a demonstration. Now you have to add a variable, run some new tests, and compare the results. Test the strength of the eggs by stacking books one at a time on top of the board which is set on top of the eggs. How much weight can you put on the board before the eggs break? In other words, how heavy is too heavy? How does that weight compare to your weight as you walk across the eggs? When stacking books onto the board, does it make any difference how the books are arranged? Does one particular arrangement cause more eggs to break?

Upside-down plastic soda bottle caps can be used in place of an egg carton to keep the eggs in an upright position while you're attempting your strength test. Does using the upside-down soda bottle caps have any impact on the "breakability" of the eggs? Do the eggs break more easily when they are in the bottle caps than when they are in the egg carton? Why or why not?

Try arranging the eggs into an "X" pattern instead of in rows to fully support the board. How much weight will five eggs support before cracking under the pressure? Does the number of eggs you use make a difference? Does the positioning of the eggs in the carton make a difference?

Inquiry and creativity elements:

If you have seen the Taj Mahal or any mosque, you would have noticed that the roof is a huge dome. In earlier architectural forms, buildings had huge horizontal roofs which had to be supported by a large number of pillars.

The dome is, however, a curved structure – it has no angles and no corners – and it can enclose an enormous amount of space without the help of a single column.

What the dome essentially does is that it distributes the weight and the pressure applied on the top evenly to the entire structure. In fact, in architecture, the dome is one of the strongest designs for it supports the weight of the roof evenly so that no single point on the dome supports the whole load and gives way under stress.

Similarly, the dome shape of each end of the egg distributes all the weight evenly and minimizes stress and strain.

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Language and History, Age group: 5-6 years old
Teachers: Cristina Vacaru, Roman Stefania

The knight's weapons

Introduction:

This activity is part of the theme **Science in a fairy tale** during which we dedicated a week to understand the medieval sources of fairy-tales. It was a magic week when we found out about the way castles were built, studied the secrets hidden in their walls, read and invented stories, interpreted different characters and learnt about medieval weapons.

We have chosen to study medieval weapons not for the purpose for which they had been invented but to study their components, understand the science behind their mode of operation and manufacture our own artillery.

Background:

The most representative and valuable things of a knight were his armor, horse and weapons with which he went to war. Some weapons were most effective when they were used while were riding horses as it was the spear, others were made to fight from a distance (bow and arrow, catapult), while other weapons were used for hand-to-hand fighting (sword, mace). Many wars were won by kings not only thanks to their strategy but also to the large number of soldiers and the quality of weapons used in the fight.

Children, both boys and girls have always been fascinated by weapons, probably because they are a symbol of power and have been used to punish bad people.

Purpose:

Through investigation and testing, the children manufacture medieval weapons in order to study the science of their making and operation.

Aims

Experience and explore the characteristics of weapons.

The children will:

- observe, experience, combine and analyze different types of materials
- notice, analyze, describe and compare their weapons with the real ones
- develop their imagination, creativity, their fine and gross motor skills
- observe and describe how the weapons function, their components and making
- search stories where such weapons were mentioned or appear in the illustration

Vocabulary/Key words:

Bow, arrow, catapult, slingshot, components, manufacture, function, further, closer, up, down, big, small, easy, difficult.

Process skills: observe, examine analyze and describe, gather information, plan and manufacture, experiment, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

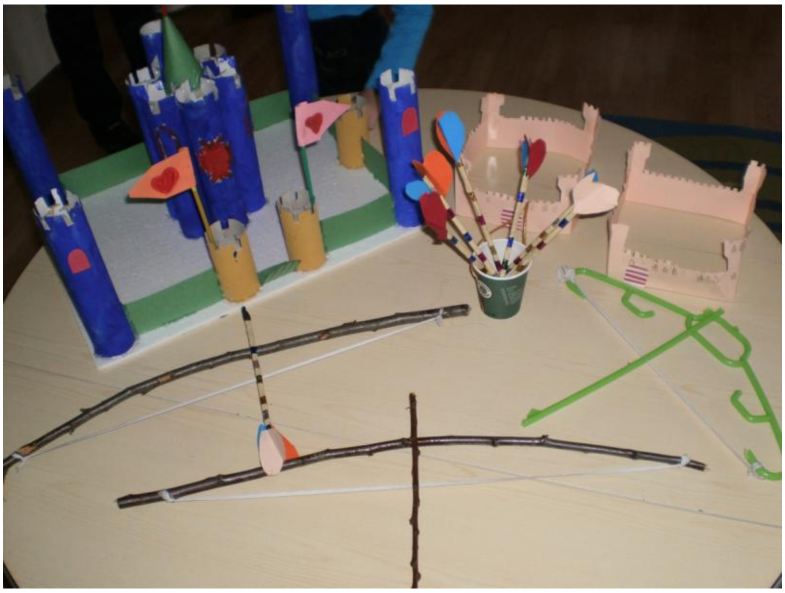
45 minutes

Materials and resources:

Elastic of different sizes, wooden spoons, cartons, pencils, plastic hangers, trees twigs, plastic spoons, glue, adhesive tape, erasers, wooden pallets, plastic or metal caps.

Questions:

What types of weapons were used in the times of princes and princesses? What were they made of and how did they work?



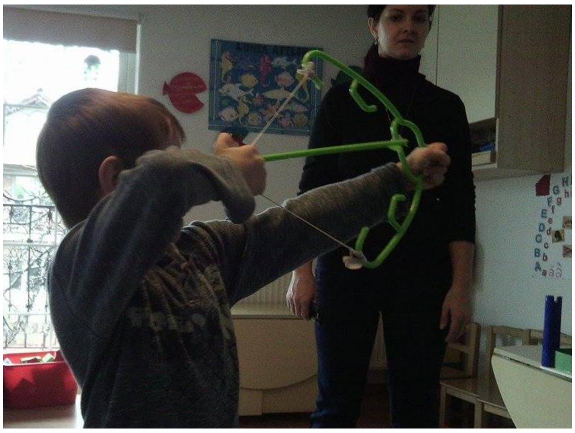
Procedure:

A. Preparation:

Read fairy-tales parts and watch illustrations of weapons. Tell the children that, mostly because fairy-tales are about princes and princesses, the weapons represented in the pictures were used in the medieval times, a time in the history when chivalry was really a way of life. Make with the children a list of weapons they would like to make and group them according to their choices. Have some plans, pictures, encyclopedias ready showing close pictures of some popular weapons (like bows, arrows, catapults etc.) and talk over with each group what weapons they want to make, the different parts and how the weapon becomes operational. Let the children sort the materials that they need (of course, remember reusing!) and … go for it!

B. Exploration:

Bows and arrows can be manufactured from tree twigs and elastics or from a plastic hanger. For the slingshots you will need short, thick branches tied with an elastic or you can even use plastic or metal objects. An empty shoe box, some wooden spoons and a paper ball, two wooden pallets tied with an elastic and an eraser can make a catapult.



Next step is testing your weapons.(not on each other, please!). From our experience, the children might find it difficult to make their weapons work. Our kids were anxious and enthusiastic but surprised that they did not know how to use their weapons at the beginning, thinking that they did something wrong while manufacturing them. Some demonstrations projected on the smart-board or a little help from the teacher and the children will have a happy ending of the experience. (They might need help with the archer's position and handling of the arrow, for instance.)

Now, it's time for variables: test the catapults using paper balls / metal caps/ plastic caps / play-dough. When does it work better? Notice that if you tie the elastic tight the distance that the paper ball reaches is longer. Test a slingshot with a longer and a shorter elastic. What is the difference? Use the bow and arrows on a target. Now close your eyes. Can you hit the target anymore? How is it easier...if you are closer or farther from the target, if you are straight in front of the target or a little side-ways?

Also dedicate some time for the children to play at ease and you will see how enquiring their mind can be.

Draw conclusions and express opinions about their functions, make comparisons between the medieval weapons and today's weapons and bring a large collection of fairy-tale books for the children to find other pictures of these weapons.

Explain to the children that weapons were used both for defense as well as for conquering other territories. We no longer use those weapons and fortunately, wars have ended a long time ago in our country.

C. Discussion questions:

What are these weapons made of? Which materials do you choose to manufacture these weapons? Which are the parts of these weapons? How do these weapons work? Do the paper balls or the metal caps reach the longest distance? Why? What happens if you shorter/lengthen the elastic on the slingshot?

Which is the position of your body when you use a bow? Do they manufacture this kinds of weapons anymore? Why?

D. Conclusions:

The children were very involved in this activity even if their patience was tested when they had to make the weapons work. After they practiced, all the children played with them over and over again.

E. Assessment:

The teacher appreciated the children's ability and skills in manufacturing the weapons. Sometimes, their still limited fine motor skills prevented them from putting into practice their ideas, but they could express in words what they wanted to be done. The teacher also appreciated their dedication in trying and using them while changing different variables.

Further investigations

Which were the materials used to make an armor? How much did they weigh? Let's test: is metal really harder and more resistant than wood or cardboard? What were the disadvantages of using a metal armor? Let's test again: which material gets hotter in the sun? Which is heavier / lighter? Which was the evolution of weapons over time?

A trip to a medieval castle and a visit to a knight's apprentice shop would be an ideal outdoor activity to connect to real history:

Templars' capes, armory and weapons at Rasnov castle.

Inquiry and creativity elements:

The children loved manufacturing medieval weapons. After this activity, we discovered that spoons and bread can make perfect catapults during lunch time. The teachers didn't like this!

School/Kindergarten: Ecole Maternelle J. Jaures Brignoles, France
Subject: Integrated Science, Chronology, Literature and Art
Age group: 3-6 years old
Teacher: Marie-Agnès Lahougue

The science in a fairy-tale: making a boat

Introduction:

This activity is part of the theme **The science in a fairy-tale** and is based on the story *"Le Bateau de Monsieur Zouglouglou"*.

Background:

During preschool years, children have to discover different common materials (wood, cardboard, earth, paper, metal) and to identify their simple features. In conjunction with art, they make objects using these materials, choosing tools and technology suited to the project (bend, cut, crease, glue, assemble, nail, disassemble, operate). The children are very interested in fairy tales which develop their imagination; fairy tales are an interesting support for oral and written language learning .

As a further development for the sea discovery class, the study of the tale "*The boat of Mr. Zouglouglou*" will involve the children in building a ship like the hero of the story.

Purpose:

Inspired by the story "*The boat of Mr. Zouglouglou*", the children will understand the concept of buoyancy, how a boat functions and will build one with reused materials.

Aims:

The children will:

- Listen and understand a story "The boat of Mr. Zouglouglou"
- Discover different materials, shapes and objects, and their buoyancy, and try to understand why some objects float and others do not.
- Highlight the buoyancy of an object depends on the material that constitutes it.
- Learn to make assumptions
- Learn to make a realization by reinvesting knowledge (make a boat).

Vocabulary/Key words:

Wood, plastic, paper, metal, polystyrene, cardboard, boat, sail, hull, mast, floats, sinks.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, communicate observations, information and conclusions.

Time/Duration:

2 times for approximately 1 hour (for the experiments of buoyancy) and 2 hours for making the boats

Materials and resources:

Wooden pencil, a plastic spoon, a cork, a glass ball, a metal coin, a piece of polystyrene, a sheet of cardboard, water vessel, scissors, cutter, tape, elastic, glue gun, acrylic paint.

Questions:

Mr. Zouglouglou used a nutshell to build his boat. What materials can we use? What objects float and which ones sink?

Procedure:

A. Preparation:

First, the teacher introduces students to objects made of different materials. They thus discover metal objects, plastic, glass, cork, wood, cardboard and polystyrene. Then, after reading the story "*The boat of Mr. Zouglouglou*" the teacher proposes to build a boat. The teacher then presents the objects (pencil, spoon, plug, ball, coin, polystyrene).

Students make hypothesis: what object will sink, which object will float, and why?

B. Exploration :

Students then test experimentally to confirm, or not, their hypothesis. Everyone argues, then jots down the results and make a synthesis (classifying in a table the drawings of objects).

Students then choose among those various objects that can be used to build their boat: wooden, plank, stick, plastic bottle or container, polystyrene sheet, cork stopper, skewer.

Finally, make the boats with reused materials and check their buoyancy.

C. Discussion questions:

Self-evaluation step: test the buoyancy of boats on the water.

D. Conclusions:

The children have learned that: some objects float (stay at the water surface), others sink (fall to the bottom of the water) and buoyancy depends on the material of the object.

E. Assessment:

- *Science:* identify the materials that flow and those that float, establish a ranking
- *Art:* making boats with reused materials
- *Language:* use language to describe activity and the results

Further investigations:

Build a boat that floats and carries the characters. How can we make the boat move?

Inquiry and creativity elements:

Read story books and watch documentaries about boats.

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science and Mathematics, Age group: 6-7 years old
Teacher: Mihaela Balint

Solving Problems: The Goat, the Wolf and the Cabbage

Introduction:

This activity is part of the theme **Science in a Fairytale.**

Background:

This is a very well - known problem. One farmer wants take a boat, a goat, a wolf and a cabbage on the other shore of the river which proves to be quite difficult because when the farmer is not around, the wolf will eat the goat, the goat will do the same with the cabbage. This problem involves the use of knowledge of food chains, the analysis of the possibilities and prediction if there is more than one solution. Using geometrical shapes and color symbolism (inspired by the Vygotsky's method) children are encouraged to solve the problem with *style* (in a creative and logical way*).*

Purpose:

Children use and developed science skills such as predicting, observing, analyzing and describing, demonstrating scientific and mathematical creativity in generating alternative ideas and reasoning critically with them.

Aims: the children will:

- Predict, observe, analyze and describe, find at least one solution to the problem
- Make connections between the mathematical aspect and their knowledge of food chains
- Develop problem-solving skills
- Collaborate in sharing and discussing different ideas and solutions to the problem
- Represent the same problem in different ways - use geometrical shapes and color symbolism to solve the problem
- Give reasons why some ideas would not work

Vocabulary/Key words:

hapes (circle, triangle, square, oval, star, rectangular, hexagon, pentagon), colors (red, blue, green, grey, black, brown, white, yellow, orange), problem, solution, symbol, alternatives, possibilities, food chain.

Process skills:

Observe, analyze and describe, collaborate, predict, generate alternatives, model different potential solutions.

Time/Duration:

60 minutes

Materials and resources:

Shapes, colored pencils, paper, pencils

Question:

How can we move the goat, the wolf and the cabbage on the other shore of the river?

Procedure:

A. Preparation:

The teacher introduces the problem. The farmer had to carry the wolf, the goat and the cabbage on the other side of the river on a boat, one by one. Of course, there are a few conditions. If the wolf is left alone with the goat it will eat the goat. If the goat is left alone with the cabbage, the goat will eat the cabbage. Yet, as long as the farmer is nearby, the wolf will not eat the goat and the goat will not eat the cabbage.

B. Exploration:

The teacher introduces a set of geometrical shapes. These shapes can help children solve the problem. For each character of the story and for the boat children can choose a shape and a color. For this activity the children's choices were: *a green circle for the cabbage, a grey triangle for the wolf, a white square for the goat and a brown rectangle for the boat with the farmer inside.* On a paper children drew a blue river and worked to solve the problem moving the boat with two passengers (the farmer and one of the others) from one shore to the other.

C. Discussion questions:

Who can go first? Why? Who will be the second? Why? Can we leave the goat on the other side of the river alone? What about the wolf and the cabbage? How many solutions has the problem got? How many times does the farmer cross the river?

D. Conclusions:

Colored shapes help children operate with different ideas and try different solutions. Children also made links between the characters of the story and their knowledge of food chains, between shapes, colors and some characteristics of the goat, wolf and cabbage.

E. Assessment:

The whole class reached conclusions and solved the problem. The teacher didn't specify a time-limit and encouraged them to collaborate and to try freely all their solutions.

Further investigations:

This activity had an interesting follow up. The teacher herself was encouraged to apply this new method in other activities completely different from this one.

Inquiry and creativity elements:

The context of this activity sparkled the children's imagination. The informal and fun nature of the task motivated children to become engaged in the problem. Working in pairs encouraged children to formulate their ideas and reasoning. Children collaborated in sharing and discussing different ways to solve the problem. The teacher created a web connecting the story, some of the natural features of the three forms of life and the mathematical aspect, helping children in generating alternative ideas, reasoning critically and solve problems.

Teacher's notes:

Children could also use small pictures of a goat, a wolf and a cabbage and an origami boat, but this new method was very interesting, welcomed and a real challenge for the children's imagination. I asked them why they chose a grey triangle for the wolf, for example. "*Triangle because of the wolf's sharp teeth and grey because of the color of the wolf's fur. The boat is brown- the color of the wood.*" Why rectangular? "*If you cut* *the edges of a rectangle what is left looks like a boat."* Another team chose a brown trapeze for the boat and other team a brown parallelogram. And, of course, *"the cabbage is round and green".* Obvious, don't you think?

See ***Symbols*** worksheet.

https://www.youtube.com/watch?v=dP-AHVYLNzg on - line

Can I play on that? – Lesson Plan Synopsis

Lesson plans	Partner Country	Synopsis
Sound – experiments and recycling	Austria	Three fun, engaging experiments on how sounds are produced.
Making musical instruments for the Carnival	France	An integrated activity (science, music, art) to get a better understanding of sounds and music.
Musical bottles	Poland	A study of sounds using glass bottles and water.
Green musical instruments	Romania	Reusing things to make creative and fun musical instruments.
Ring the bells and beat the drums	Romania	An investigative activity on how sound vibrations travel through different environments.

School/Kindergarden: Ecole Maternelle J. Jaures Brignoles, France
Subject: Integrated Science Music Language Art, Age group: 3-4 years old
Teacher: Christiane Coumoul

Making musical instruments for the Carnival

Introduction:

Music is the art of combining sounds and silence: rhythm is the support of this combination in time. Music is both a creation, a representation and also a mode of communication. According to Claude Debussy, "music begins where speech is powerless to express". It uses certain rules or composition systems, from simple to complex. It can use various objects, the body, the voice and also musical instruments.

Music has existed in all human societies since prehistoric times. It is both an individual form of expression (including the expression of feelings), a source of collective gathering and fun (party, singing, dancing) and a symbol of a cultural community, national or spiritual (national anthem, traditional, folk, religious or military music).

This activity is part of the theme **I can play on that.**

It is because children can hear that they put the language in interaction with the environment, thus getting the desire and pleasure of communicating. They listen, reproduce, listen again and modify their production depending on the model. Thus, they gradually learn to speak. As they grow, their hearing function refines and builds.

After hearing is a very important sense, it serves children:

- to detect noises and sounds, i.e. to develop its auditory attention,
- to gradually discriminate i.e. compare the difference between two sound sources
- to identify i.e. make sense, recognize what it means to finally understand the language.

We always have in mind that the first preschool goal is - to make children aware of all the concepts that make up the musical language, familiarize them with listening by giving them tools, keys and precise vocabulary.

Background:

How can we make music instruments for Carnival ?

Manufacturing instruments in the classroom is interesting from several point of views:

- Children can work fine motor skills, and they will gain knowledge on types of materials;
- One can easily make the link with the experimental sciences and technology;
- From a strictly musical point of view, making instruments sound causes investigations which allow to refine listening; the instrument will be able to sound accordingly, depending on whether it is appropriate or not to what you want;
- Making an instrument also overcomes the absence of musical instruments in certain classes, and therefore the weak music productions;
- We manufacture instruments primarily to play, and children take great pleasure in exploring all the sonic possibilities of the instrument they have manufactured. They will make instruments they can use for the school Carnival.

Purpose:

The aim of the sessions is to build musical instruments for the school Carnival.

Aims:

The children will:

- listen to the sounds of their environment (flowing water, wind in the trees, birdsong)

- discover how to make sounds with everyday objects (table, sticks, containers), with their body (clap, hit the thighs, with the mouth), by tapping on objects or with objects and their mouth (scream, whisper, whistle)
- discover musical instruments: wind instruments, percussion, plucked or struck strings. Watch DVDs on the Carnival, listen to music Cds.
- make assumptions about the production of percussion instruments using collected objects (toilet rolls, pots and cans)
- they will make drums, maracas and bells for the school Carnival.

Vocabulary/Key words

- ear and hearing: listening;
- noise, sound, music: pitch, intensity, rhythm; hitting, blowing, whistle, sing, shout, whisper, scratching, pinching, strings, silence
- percussion musical instruments: drum, bells, bells, maracas, claves, tambourines, cymbals
- Carnival.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions

Time/Duration:

30 minutes each session

Materials and resources :

- sound environment of the classroom and the school, various everyday objects, musical instruments
- DVD, CD with various types of music, musical instruments

- equipment for the instrument production: toilet rolls; cans, pots; drawing paper, scissors, glue, paint, brushes, rope

Question:

How can we make percussion musical instruments ?

Procedure :

A. Preparation :

The teacher encourages the children to listen to the sounds that surround us in the classroom and in the school, inside and outside, and also listen to the silence; children describe what they hear; then the teacher offers everyday objects from the classroom: are they a sound? How could they make a sound? Children discover the sounds they emit by striking; can we make noise with our body? Yes, clapping our hands, with the voice etc.

The teacher presents musical instruments: the children are very enthusiastic to discover the sounds of these instruments and how we get those sounds (blow, hitting, scratching, pinching); they especially like percussion instruments they saw in the film about the Carnival; they want to make instruments for the school Carnival;

What instruments can we make? How to make them? What materials do we need? After discussion the children decide to make maracas, drums and bells using collected objects and decorate them with paper and paint.

B. **Exploration:**

The teacher organizes the class into 3 groups; each group makes one of the instruments.

Maracas:

The children put seeds in toilet paper rolls then close the rollers by taping paper; then they glue the colored papers and place them on the rolls; after 2 days of drying they can decorate them with paintings.

Drums:

The children cover the tins with colored drawing paper; they decorate them with drawings and paintings; next they attach a string so that they can put the drum around their neck; they take small sticks to tap on the drums.

Bells:

The children decorate clay pots; they make a string pass through the pot hole; inside the pot they fix on the string a heavy object that will hit the walls of the pot when you wave; outside they put 3 large beads and a loop to hold the bell.

C. **Assessment and conclusion.**

Science:

- A definition of sound. The sound is an auditory sensation caused by an acoustic wave. The sound is what the ear perceives from the vibration of a body. Generally it propagates as a wave in air to our ear, but it is also transmitted in liquid and in solid bodies.
- The human ear is the organ which is used to pick up sound. It is the seat of the sense of hearing.

Music:

- Music is the combination of sounds and silences: the pace, intensity and pitch of sounds allow the production of very varied music. The music is both a creation, representation and as a mode of communication. It can use various objects, the body, the voice, but also music. Music is both an individual expression and a source of collective gathering and fun (party, singing, dance)

Art:

- Creating musical instruments using various materials and collected objects
- Creating music

Language:

- Use everyday language to describe an activity
- Use everyday language to communicate

The children took great delight in making maracas, drums and bells they could use for the school Carnival.

Further investigations / Inquiry and creativity elements:

- Make other musical instruments
- Sound effects of a story
- Accompany songs
- Make a small orchestra

Let's play music at the School Carnival

School/Kindergarten: Kindergarten der Volkshilfe Rosental a. d. K., Austria
Subject: Integrated Science / physics, sound, instrument making and recycling of waste materials as well as social - creative engagement, Age group: 3 – 6-years olds
Teacher: Sabine Hirschmugl-Gaisch

Sound-Experiments and Recycling

Introduction:

This activity is part of the theme **Can I play on that?**

Background:

Sounds, noises, tones and music are our constant companions - our language is a sequence of tones and all are transmitted by sound waves. We try to make these invisible sound waves visible. In addition, we think of a practical and creative way of using waste products.

Purpose:

We have collected and classified waste materials and had a look at various musical instruments, which we also tried out in order to get a feeling for their sound and music.

Aims:

The aim of this experiment is to make tones, sound waves and vibrations observable. The visibility of these effects allows us to provide an explanation how tones, sounds, noises, music and speech can be transmitted.

The children will:

The children experience the difference between noise, music, tones, voice and different sounds. Furthermore, we deal with the subject of recycling and create "precious things" (musical instruments) out of "worthless things" (waste products), which we can use to make creative, happy and funny music together (orchestral concert).

Vocabulary/Key words:

Sound, sound waves, acoustic echo, voice, communication, telephone, transmission, vibration, noise, sounds, different pitches, rhythm, melody, canon, musical language, shouting, talking, whispering, piano, pianissimo, forte, fortissimo, singing, music, tones, giving concerts…

Process skills:

Observing, analyzing and describing, planning, conducting an experiment, gathering information, collecting data, interpreting data, drawing conclusions, communicating observations, information and conclusions.

Time/Duration:

Approximately 30 minutes per unit.

Materials and resources:

We make use of waste materials and products, which are also used by children in their everyday-life. In order to perform these experiments, we go on a search for "naturally-existing instruments" (e.g. chair bottom as a drum or a bag of nuts as a rattle) and listen to instruments and orchestras in a live concert as well as via CD recordings, including all genres of music. We use our self-made instruments as well as instruments from parents who enjoyed a musical education.

Questions:

- ***How are sound waves transmitted?***
- ***How does that happen?***
- ***How can we make this process visible?***
- ***When do we hear sound waves, tones,… and why?***

Procedure:

A. Preparation

Experiment 1 – observing sound waves: bowl, plastic film, rubber ring, saucepan, wooden spoon, rice grains

Experiment 2 – sound cannon: cardboard tube, plastic film, cardboard, paper strips, pencil, rubber ring and tape

Experiment 3 - cardboard telephone: 2 cardboard tubes, thin paper, 2 rubber rings, 2 paper clips, a long string, tape

B. Exploration

Experiment 1: This experiment can be used to visualize that sounds and noise create vibrations that are transmitted to the air and then are carried on by it. A bowl is covered with a plastic film, which is fixed firmly to the bowl. On this cling film we place dry rice grains. After that, a metal saucepan is placed closely to the bowl and heavily beaten with a wooden spoon. These "drumbeats" do not only produce noise, they also bring sound waves which make the rice grains shake, bounce and jump up and down on the film.

Experiment 2: This experiment demonstrates that loud sounds can put objects in motion: Seal a cardboard tube with a plastic film on one side and with a paper circle on the opposite side, in which a small hole is cut (= sound cannon). A strip of paper is folded at right angles to the bottom and taped to the table. Then the sound cannon is moved towards the piece of paper so that the hole is facing the paper strip. A powerful beating of the plastic film on the other side of the cannon produces sound waves that make the paper strip move backwards. With every single hit we are able to observe the way of the sound waves from the one end of the cannon to the piece of paper exactly.

Experiment 3: This experiment demonstrates that sound waves are not only transferable via air, but also via other materials. We take two cardboard tubes and attach a tightly stretched piece of paper at one end of them. Then we stitch a small hole into the paper covering and thread a thin long cord through the holes. We fix the cord with a paper clip in the tubes and stretch the string. Now we try to conduct telephone conversation from one cardboard tube to the other. The sound waves cause the vibration of the paper and

the string which continues over the length of the line transmits the voice of the "caller" directly to the ear of the "recipient".

C. Discussion questions

How can sound waves move objects? Why does the volume sometimes change during this process? Does the transfer also work if we are in different rooms? What different instruments can be made out of waste?

D. Conclusions

Tones and sounds create vibrations that are transmitted to the air and carried on by it. Vibrations carry on as waves in the air and hundreds of thousands of air vibrations can be heard as sound. Sometimes vibrations can be recognized as breeze or can be specifically transferred by a string.

E. Assessment

Children showed great interest in the production of musical instruments out of waste material or household appliance and came up with many ideas. Almost every object has been studied for its suitability as a musical instrument.

Further investigations:

Further investigation was made on the echo of sounds and the production of "bang-bags". Children were also fascinated by the accurate examination of different tone pitches produced by tubes and sticks of different lengths. A "Sound-Memory-Game" finally completed our series of experiments.

Inquiry and creativity elements:

It was great fun to make music with our self-made instruments together at the end of our experimental units. Although too little time remained to compose our own song, the new instruments have often been used with great enthusiasm at various festive occasions.

Teacher's notes:

By reason that the children really liked the idea of producing their own musical instruments, we set up an "instrument workshop" with simple products at the entrance of the kindergarten. Children were allowed to use them independently over several months and spontaneous concerts and performances were regularly given by them. They also invited friends as guests to the foyer of the kindergarten in order to show how they can play on their self-made instruments.

School: Szkoła Podstawowa Nr 2 in Siewierz, Poland
Subject: Integrated Science, Music and Art, Age group: 5-6 years old
Teacher: Joanna Gornisievicz

Musical bottles

Introduction:

These activities are part of the theme **Can I play on this**. The children love music. They can dance, play and listen to music. But do they know where it comes from? What is sound? Can we create it? A poem by E. Zechenter can be a wonderful introduction to the topic. (This poem is written in Polish, but you can use any other poem describing music and sound).

Muzyka jest wszędzie – Music is everywhere.

Muzyka jest jak powietrze,
jest wszędzie: i w tobie, i we mnie
i w zbożach na wietrze.
Jest w dźwiękach, które słyszysz na ulicy,
w stukocie kół, na drodze wśród pól.
I w kołysaniu drzew jest muzyka i śpiew.
Tyle jej w głosie ptaka
i w słowach, jakie na dobranoc mówi matka.
Tylko posłuchaj,
ile jest piękna w tych zwyczajnych dźwiękach.
Weź je do ucha, weź je do serca.

Background:

Every kind of sound is produced by vibration. The source of the sound may be a violin, an automobile horn or a barking dog. Whatever it is, some part of it is vibrating while it is producing sound. The vibrations from the source disturb the air in such a way that sound waves are produced. These waves travel out in all directions, expanding in balloonlike fashion from the source of the sound. If the waves happen to reach someone's ear, they set up vibrations that are perceived as sound. Sound, then, depends on three things. There must be a vibrating source to set up sound waves, a medium (such as air) to carry the waves, and a receiver to detect them. Sound waves cannot travel through a vacuum.

(http://kids.britannica.com/comptons/article-9277144/sound)

Purpose:

- to make and play musical bottles
- to explain where the sound comes from

Aims:

The children will:

- make musical bottles
- play musical bottles
- describe observations
- listen to the sounds of different pitches

Vocabulary / Key words:

Sound, sound waves, sound pitch, vibrational frequency

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, draw conclusions, communicate observations, information and conclusions

Time / Duration:

45 min.

Materials and resources:

- 8 identical glass bottles
- water
- paints
- wooden stand
- string

- metal stick

Questions:

Why do we hear a sound when we hit the bottle with a metal stick? Why do we hear sounds of different pitches? What does it depend on?

Procedure:

A. Preparation:

Talk with children about music. Ask them some questions: Where can we hear music? Can we play music on bottles?

B. Exploration:

Place the bottles in a line. Fill them one-by-one until the water level is staggered. For example, fill the first bottle with a small amount of water. Fill the second bottle with more water than the first one. Fill the third bottle with more water than the second one, and so forth and so on until all of the bottles have a varying amount of water (the first bottle should have the least amount of water and the last bottle the most). Now take a metal stick and strike the tops of each bottle one after the other and listen to the different pitches. Try to make a musical scale by removing or adding water to some of the bottles.

Tint the water in each bottle with a different colour to make a colourful musical scale.. Hang the bottles on the wooden stand.

Hang the bottles on the wooden stand.

Ready, steady, go! Let’s play music☺

C. Discussion questions

Discuss the questions with children: Why do we hear sound when we hit the bottle with a metal stick? Why do we hear sounds of different pitches? What does it depend on?

D. Conclusions

When you tap a bottle of water with a metal stick the water molecules vibrate and create sound waves through the water. The bottle with the most water has the lowest pitch and the bottle with the least water has the highest. And this is what the children noticed during classes☺.

E. Assessment

The children really liked the classes. They enjoyed carrying out an experiment with musical bottles and couldn't believe their ears and eyes! It was quite easy for the teacher to observe children working. They enjoyed communicating with each other and shared their observations spontaneously. The teacher appreciated children's involvement, creativity and curiosity.

Further investigations

All the experiments with sounds and music inspired us to create musical instruments.

Inquiry and creativity elements:

Our musical instruments:

„Bat pipes"

Bat pipes provide a unique sound as the bat hits the end of the pipe .

„A card box guitar"

A rattle made of paper tubes and wooden bracelets.

Other colourful rattles.

A drum.

School/Kindergarten: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Language and Music, Age group: 5-6 years old
Teacher: Cristina Vacaru

Green musical instruments

Introduction:

Why *green* musical instruments? Because this activity, part of the theme **Can I play on that?,** is about manufacturing musical instruments from reusable waste. In a funny looking band, we played them in a video-clip of our preschool.

Background:

Just watch the musicians in a classical orchestra! Don't they look very smart and intellectual? This is probably because playing music leads to an overall development: physical, social, emotional and intellectual.

When we talk about children, playing music helps in learning other subjects like literacy and enhances skills that are used in altogether different areas. For example, when we play an instrument, we develop our small muscles and this helps us in writing. Moreover, playing an instrument is a rich experience implying multiple skills working together: I have to *read* the musical notes, to coordinate eyes and hands, to remember the music notes and sometimes use both hands (and a leg) to play an instrument. In addition, I listen to what I'm playing, I am singing the song *inside my heart*, I sway gently to music and…. I enjoy myself!

Science is accumulating evidence that playing an instrument helps the left side of our brain that is involved with processing language, it can increase our IQ scores, and lead to larger growth of neural activity over time. This means that we can better solve multistep problems that we encounter in math, engineering, art and working with computers. Moreover… if we connect playing instruments with reusing waste, we are twice winners!

(Source: Bright Horizons, http://www.brighthorizons.com)

Purpose:

The children will learn how to reuse waste and manufacture musical instruments. Playing these instruments will develop their imagination, hearing, motor skills and will help them express their emotions.

Aims

The children will:

- Observe, experiment and analyze different types of materials
- Observe, analyze and describe the differences and similarities between their musical instruments and the real ones from an orchestra or a band
- Develop their imagination and creativity
- Develop their hearing, express easily their feelings and emotions
- Develop their fine motor skills (preparing and manufacturing the materials) and their gross motor skills (associating the rhythm with their dance moves)
- Learn to share and work in teams
- Observe how the sounds are produced using vibrations
- Learn to reuse waste in an ecologically manner
- Learn about musical instruments from our country and from other countries, too

Vocabulary/Key words:

Trumpet, drum, guitar, rain stick, whistle, shaker, cymbals, castanets, sound, large, wide, close, strong, low, tall, sharp, musical, deafening.

Process skills: observe, examine analyze and describe, plan and conduct an experiment, gather information, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

2 days for collecting, preparing and manufacturing the musical instruments

45 min for playing and testing the musical instruments

Materials and resources:

Empty medicine boxes, plastic plates, plastic cups, syringes, metal caps, plastic caps, elastics, nails, interior screws, screws, collars, different seeds, bowls, metal boxes, cork stoppers, sticking tape, water colors, cardboard tubes from paper towels.

Questions:

Can we make functional musical instruments reusing waste?

Procedure:

A. Preparation

Discuss with the children about different types of musical instruments using images, classify them (strings, percussion, woodwinds, brass), take the children to a concert or invite an elder child to make a performance for them. If you have different types of musical instruments in your kindergarten show them to the children, name and let them touch and play the musical instruments. Then ask the children to bring some reusable waste: shoe boxes, empty medicine boxes, syringes, a birthday cake cardboard, nails, seeds, screws, bowls and invite them to manufacture musical instruments from these materials.

B. Exploration:

Gather all the materials on a table and talk over with the children what kind of musical instruments you can make. Classify the musical instruments that you want to manufacture and put the waste under separate headings. For instance, you can put a picture with a violin for the instruments with strings with the necessary materials, a drum for the percussion instruments and a whistle for the windwood instruments.

Use your imagination and start manufacturing the musical instruments. Unleash the children's creativity and let them try a wide range of materials. For example, percussion instruments can be made of metal bowls, the sticks of long nails, the cymbals of metal caps and elastics, the shakers of plastic plates or empty medicine boxes with seeds, screws or nails, the rain sticks of paper towel cardboard tubes filled with seeds, screws and nails. Windwood instruments can be made of syringes, the trumpet of cardboard tubes of different length and sizes.

A funny percussion instrument that we invented was made of a plastic hanger to which we attached long nails at different length and then we hit them rhythmically with a wooden stick. We made singing bracelets too, with metal or plastic caps.

We also made musical instruments with strings, like the guitars made of shoe boxes and the mandolin made of a round cardboard and elastics.

Regardless of the type of musical instrument created, encourage children to change a variable; for instance, how does a rain stick with seeds sound versus one with small nails / how does a wooden drum sound versus a metal one. Make it fun, and let children come with their own ideas.

After you finish the manufacturing, sit in a semi-circle like a real orchestra and play your beautiful musical instruments. Play piano, mezzo forte or fortissimo! Play per groups of instruments, play individually or all together. Play along a known song or just invent one of yours. At the end of the activity, or even while they work, children can make comparisons between the real musical instruments and yours.

By plucking, beating, blowing and shaking our musical instruments louder or quieter, faster and slower, solo or all together, the children noticed how sounds are produced using vibrations, what rhythm is and how sounds on rhythm produce music.




C. Discussion questions:

What kind of sounds make your musical instruments? Which is your favorite? What do you feel when you hear them? Would you like to play a real musical instrument? What other materials could we reuse to create more musical instruments?

D. Conclusions:

We can reuse the waste and objects that we no longer need to make creative fun, musical instruments.

E. Assessment:

The children were very happy that their home waste was useful and were excited when they saw what came out of them. The teacher appreciated their ingenuity, creativity and curiosity.

Further investigations

What other objects could we manufacture reusing waste? How could children help to keep our Earth clean? What are the three R's?

Inquiry and creativity elements:

The children were excited to experiment with different materials and objects. After we made the musical instruments, the children brought from home different objects making sounds or they transformed their toys in musical instruments.

Each class in our preschool and school made a video-clip and we proudly played the instruments we made in our clip.

We also made an exhibition for the parents to see and play them with more or less talent.

School: Ş. Jan. Uzm. Çvş. Ahmet Güngör Anaokulu, Tarsus-Mersin, Türkiye
Subject: Science, Music, Environmental education; 4-6 years old
Teacher: H. Tuğba Taşkın

I can play a musical instrument!

Introduction:

This activity was held under the topic **Can I Play On That?**

Background:

Music is a part of our daily life. We listen to it anywhere at anytime. We sometimes leave ourselves to the rhythm of the sound we hear: we dance, we snap finger, we whistle, and so on. So how is music made? What do musical instruments sound like? Through this lesson, students were acquainted with music, rhythm, sound, and musical instruments.

Purpose:

- Getting to know musical instruments and their sounds
- Emerging the sense of rhythm
- Creating your own instrument

Aims:

At the end of this lesson, children will:

- Have a broad sense of "music" concept
- Know about the rhythm and sound
- Be familiar with musical instruments and their sounds
- Use waste materials to make musical instruments

- Work with their parents
- Play the instruments they made

Key words: music, sound, musical instrument, rhythm, student-parent collaboration, communication, creativity

Process Skills: Observation, using creativity, parent-student collaboration, communication, group work.

Time:

One week

Materials:

- All kind of waste materials that can be used for making an instrument

Questions:

- ***What kind of musical instruments are there?***
- ***What kind of waste materials can we use to create a musical instrument ?***

Procedures:

A. Preparation:

In the pre-school curriculum of the Turkish National Education System, it is vital to collaborate with parents in the teaching-learning process. Parents are informed about what is taught at school and they are actively involved in the process. Thus, the goals and objectives of education are reinforced.

Related to this topic of our project, parents were asked to work with their children at home and take photos or videos. This way, communication between parents and children was strengthened.

B. Exploration:

At the beginning of this topic, children and parents were given some information about the topic and what to do.

There are many different sounds around us. This is the way people could create musical instruments: exploring the different sounds. This is the way the sense of rhythm occurs.

There are several kinds of musical instruments through which we make sounds via hitting, blowing, touching, whistling, etc.

So each child was supposed to make his/her own musical device with the help of their parents. They were asked to make use of waste materials at home and be as much creative as they can. They had one week for this activity.

After a week, children brought their musical instruments to school. They saw each other's work and tried to play it. The teacher asked them to introduce their own device and tell how it works. They talked about their sound, they kept rhythm, played altogether and work as chorus. They explained which materials they used to make that instrument.

A few days later, all the instruments made by children were collected and exhibited at school. Parents could see both their children's and others' work. Students had several ideas about what kind of musical instruments there are and what they look like, how they sound, how they are played, etc.

C. Discussion questions:

How can we make musical instruments? Which waste materials can we use? What do they sound like? How can I play it?

D. Conclusions:

Different materials were used for making musical instruments. With the instruments that they made at home or in the class, the sense of rhythm was emerged. They sang songs playing their own instruments. They were also introduced with our national/traditional Mehteran band.

E. Assessment:

Both children and their parents enjoyed the activity. They used their creativity. At the end, we made an exhibition showing all the instrument and everybody (including parents) saw their work.

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Language and Music, Age group: 5-6 years old
Teacher: Mihaela Balint

Ring the bells and beat the drums

Introduction:

This activity is part of the theme **Can I play on that?**

"Who" is in charge of collecting sounds, processing them, and sending sound signals to your brain? Yes, the ears! Our ears also help us keep our balance. When we bend over to pick up a toy on the floor, we won't fall over just because our ears, working in team with our brain, help us keep our balance. But *how does the sound travel till our ear and through it? Do we really have a drum in our ears? Sound travels better through a solid matter or through air?*

Background:

The ear is made up of three different sections: the outer ear, the middle ear, and the inner ear. These parts all work together so we can hear and process sounds.

The outer ears (the flaps) are folds of skin and cartilage. They collect sounds like your friend's whispers or a barking dog and send them into the middle ear through the ear canal.

The ear canal is a tube which connects the outer ear with the middle ear. The middle ear's main job is to take sound waves and turn them into vibrations that are delivered to the inner ear. To do this, it needs the *eardrum*, which is a thin piece of skin (a membrane) stretched tight like a drum.

When sound waves reach the eardrum, they cause the eardrum to vibrate. When the eardrum vibrates, it moves some tiny bones (the hammer is one of them). These bones help sound move along on its journey into the inner ear.

Sound comes into the inner ear as vibrations and enters the **cochlea,** a small, curled tube in the inner ear. The cochlea is filled with liquid, which is set into motion, like a wave, when the bones vibrate. The cochlea is also lined with tiny cells covered in tiny hairs that are so small you would need a microscope to see them. They may be small, but they're very important. When sound reaches the cochlea, the vibrations (sound) cause the hairs on the cells to move, creating nerve signals that the brain understands as sound. The brain puts it together and FINALLY we can hear our mother's voice or our favorite song!

Purpose:

Examine (feel, hear, see) sound vibrations. Investigate whether sound vibrations travel better through a solid matter or a gas (air).

Aims:

The children will:

- examine (feel, hear) how the larynx or voice box vibrates as they speak
- examine (hear, see and feel) sound vibrations!
- discover whether sound travels better through a solid or a gas (air)
- play on their first handmade musical instruments

Vocabulary/Key words:

Ear, sense of hearing, the parts of the ear (outer, middle and inner ear), folds, eardrum, bones, sound vibrations, signals, ear canal, brain, solid, gas (air), /higher/ lower/louder, weaker/ stronger, faster/slower vibrations, dull sound, clear sound.

Process skills: observe, examine analyze and describe, plan and conduct an experiment, gather information, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

60 minutes

Materials and resources:

Some rubber bands, rice grains or small candies, two plastic bowls, a stainless steel bowl, large and small wooden spoons, plastic wrap, stainless steel spoons or forks, thread (aprox. 70 cm each)

Questions:

Why are the candies jumping? How does my eardrum work?

Can I play music with a spoon? Sounds travels better through a solid matter or through the air?

Procedure:

A. Preparation

The children have already investigated human ears and the sense of hearing during the theme ***How does my body work?*** In these new activities the investigations are focused on the transmission of the sound through solid matter and air.

Reinforce children's knowledge about the sense of hearing, the ears, the parts of the ear (especially the eardrum).

Ask them to make a simple and funny test:

- place their hand firmly midway on their throat
- say "aghhhhhhh" for as long as they can

Did they feel the vibrations of their throat? What do they hear? Repeat the test and allowed them to say "aghhhhh" louder. Did they feel the vibrations? Were they weaker or stronger? Ask them to repeat the test but this time they have to mumble "aghhhhh" with the mouth shut. Did they hear the sound more clear or dull? Did they feel stronger or weaker vibrations on their throat?

Now, let's make some *serious* experiments…

1. How my ear detects the arrival of sound.

B. Exploration:

- Cut the piece of plastic sheet that is bigger than the top of the bowl
- Stretch the plastic sheet tightly over the bowl and secure it with the rubber bands. Tape the plastic down to keep it well stretched. Yes, it looks like a drum!
- Sprinkle o few tiny, colored candies (rice grains).
- Hold the plastic or metal bowl next to the *drum* and hit it sharply with the wooden spoon.
- Hit the *drum* with different type of spoons (metal, wooden, large, small)
- Replace the candies with rice grains, small paper scraps, small, plastic beads, big, salt crystals....
- Hit the drum with different rhythms
- Stretch a new plastic sheet over a bowl or box and secure it with the rubber band and sticky tape

- Spread a few tiny pieces of paper or some tiny plastic beads
- Put the new drum next to the speakers, switch on the computer to play some music. Turn up gradually the volume for the children's favorite song!
- See what happened with the papers/beads. Are they jumping/ moving/resting?
- Play different type of music. Change the volume of the music.

C. Discussion questions:

What happened with the candies? Why are they jumping/moving? Ask children to touch the plastic sheet with the top of their finger during the experiment. Do you feel the vibrations? Who / what make the plastic sheet vibrate? Did you touch the candies or the plastic sheet? How about touching the bowl not the plastic sheet? Do you feel some vibrations? Are they stronger? Are the candies still jumping? Who is jumping higher? The candies, the rice, beads, salt crystals…

What's your favorite song? What's the beads' favorite song? What kind of music works better? What level of the volume makes the paper/beads move?

D. Conclusions:

The bowl with the plastic sheet stretched tightly and works like a drum. Our eardrum works the same. The eardrum detects the arrival of the sound vibrations and starts itself to vibrate passing the sound to the hammer (inner ear) and so on.

The sound travels better through a solid matter (bowl, plastic sheet), than through the air.

The sound from the speakers make the air vibrate. These vibrations get stronger as the music gets louder. Paper movements depend of the volume but also of the music type. Hard rock produces a stronger effect than ballet music.

2. Ring the bells or the spoon?

A. Exploration.

- Cut a piece of thread- around 60 cm
- Tie the middle to the end of a stainless steel spoon
- Wind the ends of the thread around your index fingers
- Swing the spoon so that it knocks gently against the edge of the chair or table
- Listen to how loud the sound is. You will hear a *Bang!* like a farther bell
- Now touch your index fingers to the ears' flaps just in front of the ear channel
- Swing the spoon again against the edge of the table.
- Listen to how loud the sound is. What do you hear this time?
- Replace the stainless steel spoon with a silver one. What sound do you hear now?

B. Discussion questions:

What happened when we hit the table with the spoon? What did you hear? How can you describe the sound? How about the second sound? Was it dull or clear? Stronger/ loader/ weaker/ dull sound. What does it sound like? Which sound is your favorite?

C. Conclusions:

When the spoon hits the table it vibrates. This makes the air around it and the thread vibrate. We'll hear a dull sound. When we put our fingers close to our ears we bring the source of vibrations closer to them (closer to the sound sensors) and we can hear the *Bang!* more clearly. The sound is more clear when it travels through solid (thread, spoon) than it travels through air. A very interesting sound is produced by the silver spoon. In fact, we can recognize the silver objects through this method.

D. Assessment:

The teacher will evaluate:

- the children's involvement in the activity
- team work and communication
- the children's idea, observations and conclusions.

Assessment topics:

- The sound vibrations reach our ears and make our eardrums vibrate.
- Different types of vibrations make different types of sounds.
- Sound is created when an object moves and the air around it vibrates creating sound waves.
- Sound travels better through a solid (thread, bowl, plastic sheet, spoon), than through a gas (air).
- Creating different vibrations can help us make musical notes.

Further investigations:

In the next activities the children will make a lot of musical instruments from recycled materials and investigate how can play on with them, how can we hear more clearly a sound, a stronger sound, a pleasant sound. They will make connections between their handmade instruments and real instruments.

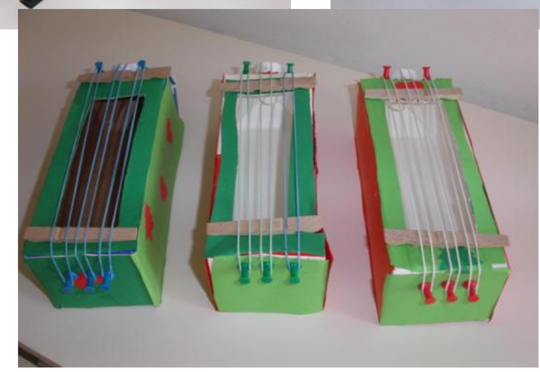
Inquiry and creativity elements:

Making noise is one of the children' favorite job. Dealing with all that noise is part of the teacher's job. By making *sound vibrations* children understand what sound vibrations are and how they travel through different objects. The sound intensity was also introduced through these activities. Key words like: louder, stronger, dull, clear become more familiar to the children.

Teacher's notes:

These experiment kits were their first musical instruments (first drums and bells). When they finished the investigation the show began.




Eggs-periments – Lesson Plan Synopsis

Lesson plans	Partner Country	Synopsis
Eggs-periments	Austria	A fun, easy-to-do experiment to learn how raw eggs behave when they are heated up.
What can I do with an egg?	Turkey	Two experiments with egg shells to demonstrate the importance of brushing our teeth.
The birth of a chick	France	Children learn about and supervise the process of eggs developing into chicks.
Jumping eggs – bouncing eggs	Poland	A two day experiment to learn what happens to an egg when put in vinegar.
Eggs-periments	Romania	A series of activities which allow children learn the parts of an egg and find out about the different ways the eggs are present in our daily lives.
Egg shell on test	Romania	Put four hen eggs in four different types of liquids (water, Coke, Fanta, vinegar) for one week and watch what happens.
Growing crystals on egg shells	Romania	A colorful experiment on the phenomenon of sedimentation.

School/Kindergarten: Kindergarten der Volkshilfe Rosental a. d. K., Austria
Subject: Integrated Science - Chemistry, Biology, Physics, Language, Literacy & Storytelling
Age group: 3-6 years old
Teacher: Sabine Hirschmugl-Gaisch

Eggs-periment

Introduction:

This activity is part of the theme **Eggs-periments.**

Background:

The "egg" is a life-giving research object that can be viewed from many different angles and should therefore be the centre of these series of experiments. We want to have a close look at this valuable and high-quality food product and especially the responsible use and handling of this staple food should be in the foreground.

Purpose:

Many various areas dealing with the egg should be covered: Storytelling and narratives about the egg (Storytelling-literacy, picture books and the use of the book release "Researching with Fred"); Experimentation and cooking with eggs in order to explore its characteristics from different perspectives (chemistry, physics, biology)

Aims:

Children should learn a conscious and responsible use of this high-quality food product and should realise what various qualities eggs have. Furthermore, they are provided with answers to the questions: "What happens when I cook an egg? What does an egg consist of?"

The children will:

At the end of the experimental series they will know how to deal with food products like eggs in a responsible manner, they will know physical characteristics, the components of an egg and also about ways of using eggs for cooking in the kitchen. They are also informed about the dangers that can be brought about by an inconsiderate use of eggs (salmonella, high blood cholesterol) and the importance of proteins for the human body.

It was very important for us to point out how necessary a responsible way of dealing with creatures / animals (chickens) is and what negative effects intensive livestock farming has on the animals, which suffer from pain and disease in the food production as well as on the health of human beings, who stand at the end of the food chain!

Vocabulary/Key words:

Egg, eggshell, albumen, amnion, yolk, egg white / protein, egg foam, proteins, cholesterol, salmonella, lime, vinegar, calcium carbonate, pressure distribution, vacuum, thermometer, chicken, hen, rooster, nest, feathers ...

Process skills: observing, analyzing and describing, planning, conducting an experiment, gathering information, collecting data, interpreting data, drawing conclusions, communicating observations, information and conclusions.

Time/Duration:

Approximately 45 minutes.

Materials and resources:

Per child: 1 raw egg, 1 tea glass (heat-proof), a small plate, a saucepan (half filled with water), a heat-proof thermometer.

Questions:

What happens when we boil eggs? Can we make a boiled egg liquid again? Is there a parallel to processes in the human body? What happens to the proteins in the human body at very high fever? Why is that dangerous?

Procedure:

A. Preparation:

All materials provided are explained and discussed and the young researchers have to agree to certain rules. This is especially important, because hot water and raw eggs are part of the experiment.

B. Exploration:

Two raw eggs are broken, the yolks are separated from the whites and each is emptied into a tea cup. These tea cups are then placed in a pot of lukewarm respectively in a pot with boiling water. Then the cups and their contect are observed closely. – While no changes could be documented in the glass with lukewarm water, the egg white in the boiling water began to change after only a few moments. Starting at the outer edge of the glass, the egg white changes into solid state with white discolouration.

C. Discussion questions:

What happens to the proteins (egg white) when it is heated? At which temperature becomes an alteration observable? Are there similar processes in the human body? What should therefore be considered for more safety?

D. Conclusions:

The egg contains a high percentage of protein. These proteins have a special structure, similar to a long thread. If the protein is heated up, these structures start to decompose at a temperature of 42 ° C and are transformed into a solid state. If the "threads" coagulate and the protein denatures, these parts lose their mobility and the egg is hard at the end of this process. This process cannot be reversed.

E. Assessment:

The effect described above occurs everywhere, where protein is contained - also in the human body, in which proteins perform vital tasks. Therefore, it is important that fever never rises to a higher temperature than 42 ° C. As also burns on our skin mean a denaturation of protein, it is important to cool such injuries quickly so that the overheating is not able to destruct more cells.

Further investigation:

Further investigation we made on the stability of the egg-shell, their viability, the influence of acid (vinegar) to the egg shell and dealt with positive and negative pressure in bottles and boiled eggs.

Inquiry and creativity elements:

Within the idea of educational cooking we dealt with different recipes for preparing dishes with eggs: cooking, baking, preserving (scrambled eggs, salads, spreads, cakes,…). It was important to me to have a very critical look at the keeping of chickens and the "egg production" in order to promote animal welfare! - Philosophical conversations with the children about the necessity of a loving and responsible dealing with animals were also an important part of this topic!

Teacher's notes:

Dealing with food of daily use and the chance of learning so much about it as well as the work with eggs in the kitchen, provided an valuable source of experience for all the children. It might become more and more important in the future to teach children about food, because the domestic cooking is often increasingly pushed into the background. The egg offers an incredibly wide range of possibilities how to explore – and also to enjoy - natural food products.

School: Ş. Jan. Uzm. Çvş. Ahmet Güngör Anaokulu, Tarsus-Mersin, Türkiye
Subject: Scıence, Health education, Chemistry, Art, 4-5 years old
Teachers: Gamze Güleryüz, Melek Osmanoğlu, Hülya Sümer, Tuğba Taşkın, Medine Yıldırım

What can I do with an egg?

Introduction:

The activities in this plan are parts of the theme **Eggs-periment.**

Background:

When we think about an egg, we can imagine a white round shape, an early chick, yellow and white, a good choice for breakfast, an omelette, and so on. Most of the children see the eggs in their breakfast either boiled or fried. But what about giving another dimension to eggs from the sight of children? In this lesson, we want to see what can we do with eggs or eggshells. Experiments? Observation? Painting? Let's see!

Purposes:

- Observing the changes on eggshell
- Effects of acid on calcium
- Focusing on the importance of brushing our teeth
- Raising creativity

Aims:

At the end of the lesson,

- Children will be able to tell the structure of an egg and eggshell
- They will be able to talk about the effect of vinegar on calcium
- They will see what happens if we don't brush our teeth
- Use their creativity about what to do with eggshells
- Make decorations on eggshells

Key words:

Egg, eggshell, experiment, vinegar, toothpaste, calcium, decay

Process Skills: observation, experiment, drawing conclusion, question-answer activities

Time:

45 minutes.

Materials:

- Two boiled eggs
- A bottle of vinegar
- A bottle of still water
- Toothbrush and toothpaste
- A lot of eggs and egg-shells for different purposes

Questions:

- ***What happens if we put egg in vinegar?***
- ***What happens if we put egg in still water?***
- ***What happens if we don't brush our teeth?***
- ***How can food acid give harm to our teeth?***

- ***What can we do with eggs?***

Procedures:

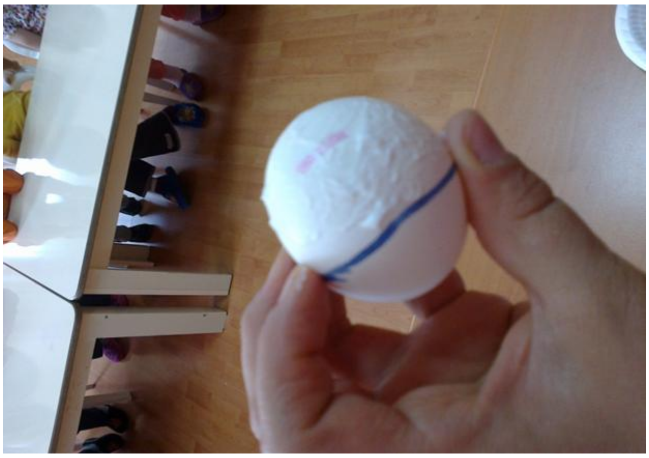
A. Preparation:

The teacher explained the benefits of eggs for our health and gave the children the opportunity to observe its physical structure telling them that its shell also contains calcium. Then, she explained they would do 2 experiments with eggs.

B. Exploration:

Experiment 1: We put one egg in vinegar and another one in water. We observed the eggs for a week. There was no change with the egg in the water but the egg in the vinegar first got thinner, then got rid of its eggshell totally.

Experiment 2: We explained in the class that just like our teeth, the shell of an egg contains calcium. We had an experiment showing what happens if we don't brush our teeth because most of the food we have contains acid, which causes tooth decay.



In the experiment, we put the egg in vinegar but brushed half of it regularly. Children saw what would happen to their teeth if they didn't brush their teeth regularly: tooth decay!

C. Discussion questions:

- What does an egg shell contain?
- How much calcium is there ?
- What can we do with egg shells?

D. Conclusions:

Children made several experiments with eggs and egg shells. They planted gross inside, they made drawings and decorations on, they made an egg-robot and eastern eggs.

Assessment:

Children enjoyed all the activities. They realized that eggs are not only for eating.

Further investigations:

This lesson can be enriched and studied further through making investigations about the eggs of other animals and different size of eggs. Furthermore, craft with real eggs allows children to expand their explorations on eggs.

School/Kindergarten: Ecole Maternelle J.JAURES Brignoles, France
Subject: Integrated Science, Chronology and art, Age group: 3-6 years old
Teacher: Marie-Agnès Lahougue

The birth of a chick

Introduction:

This activity is part of the theme **Eggs-periments.**

Background:

One of the objectives in "Discovering the world in preschool" for the children is to be able to know the manifestations of animal life. Conduct breeding in class is a privileged way to discover the major functions of animal life: growth, nutrition, locomotion and reproduction.

Throughout the year, children are invited to discover different animals: farm animals (rabbits, donkey, chicken), marine animals (fish, crustaceans, shellfish), small animals (snail, caterpillar, butterfly ...) so they perceive different characteristics and begin to realize classifications.

Purpose:

Observing the birth and growth of the chicks.

Doing a literature search to find other animals that lay eggs.

Aims:

The children will:

A. Observe eggs
B. Place in the incubator and control the important parameters: humidity, temperature, egg turning
C. Record observations on a calendar: counting the incubation days

D. Observe and describe the birth of the chicks

E. Grow chicks (feed), observe their growth

Vocabulary/Key words:

The children will learn key words concerning this experiment: egg incubator, laying, hatching, shell, white, yellow, chick, down, legs, beak, feather, crest, oviparous, animals in the farmyard (chicken, duck, goose, guinea fowl, pigeons, turkey), male, female.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions

Time/Duration:

1 hour a day during 7 weeks

Materials and resources:

- fertilized eggs, incubator, thermometer, cage, grains of wheat, straw, watering,
- writing paper, pencils, colored pencils, camera

Questions:

What can we find in a hen egg ?

Procedure:

A. Preparation:

A farmer brings eggs in a basket to school one day. The teacher asks the children: "What is it?", " What shall we do? ", " What do we find in a chicken egg?" The children make assumptions.

Then the farmer entrusts the children with the eggs to care for them.

B. Exploration:

In turn, every day children check the temperature inside the incubator, the moisture, optionally adding water and drawing comments on a calendar. After 21 days, we discover the first hatches. The children can observe how the chick inside the egg begins to break its shell by making a small hole with its beak. The shell then cracks right through and the chick comes out all wet and very tired. Enthusiasm is observed on the faces of all children.

Then the chicks are placed in a cage under a heat lamp and children give them food and drink.

They discover that the chicks are autonomous: they know how to feed themselves.

Using a magnifying glass, they observe the down that covers the body of the chicks, the little hook on the end of the beak that allowed them to break their shells, the ears, nostrils and legs. Soon the chicks are covered with their first feathers on the wings and on the whole body. The ridge begins to grow.

C. Discussion questions:

What do the chicks eat? (Children will grind using wheat mills to make flour and feed the chicks.) Where are these eggs coming form? What animal laid them? Children watch different eggs (hen, cane, goose, ostrich) and note differences in color and size.

Are there other animals that lay eggs like the hen? Children discover a documentary with other animals laying eggs (fish, frogs, penguins, butterflies, turtles, crocodiles...)

D. Conclusions:

In an egg there is a yellow yolk and the white but these can develop in a chick that grows quickly and becomes a hen (female) or a rooster (male). There are not only birds (feathered animals) that lay eggs.

E. Assessment:

- *Science*:
  - identify the parts of an egg and a chick

  - understand the sequence of the chick's life cycle
  - establish families (male, female, baby)
- *Art*: children use drawings and pictures as representation of their observations
- *Language*:
  - Use everyday language to describe activity
  - Use everyday language to communicate with peers


Further investigations:

- How are other animals born?
- Observation of documentary to explore other ways of breeding then develop an initial classification from photos (oviparous / vivipara)
- How do animals make their babies? (For most animals, it is a sexual reproduction that requires a male and a female).

Inquiry and creativity elements:

- Reading albums and documentaries about eggs and chickens
- Making Chick costumes for the school Carnival
- Making a small basket in the shape of a chicken

Teacher's notes:

Raising chicks in the class is a particularly rich activity that gives children the opportunity to acquire a lot of knowledge about animal life

Costumes for the Carnival

School: Szkoła Podstawowa Nr 2 in Siewierz, Poland
Subject: Integrated Science, Age group: 5-6 years old
Teachers: Joanna Gornisievicz

Jumping eggs/Bouncing eggs

Introduction:

These activities are part of the theme Eggs – periments.

Background:

Eggs - are laid by female animals of many different species. They have been eaten by humans for thousands of years. Egg yolks and whole eggs are full of protein and choline, and are often used in cookery.

Purpose:

Children know the anatomy of an egg.

Children discover the power of the vinegar.

Aims:

The children will:

- Learn the anatomy of an egg and its properties
- Touch and describe an egg
- Share their observations

Vocabulary / Key words:

Egg, white, yolk, shell, calcium, vinegar

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, draw conclusions, communicate observations, information and conclusions

Time / Duration:

30 minutes

Materials and resources:

- 2 eggs
- vinegar
- water
- 2 jars
- a lamp

Question:

- ***What happened inside the jar filled with water? What happened inside the jar filled with vinegar?***
- ***What happened with the egg immersed in vinegar for 24 hours? What happened with the egg immersed in water for 24 hours?***
- ***Which egg is transparent?***
- ***Is the yolk damaged after having a vinegar bath?***

Procedure:

A. Preparation:

Describe an egg to the children. Show it to them. Use a hard boiled egg to present its anatomy. Let the children touch an egg, smell it. Draw the children's attention to the shell.

B. Exploration:

Place two raw eggs carefully into the jars. Cover one of the eggs completely with vinegar (at this point you will notice that the egg is covered in little bubbles), the other one with water. Wait and observe the eggs for two days. After two days, drain off the vinegar and the water. Remove the eggs from the jars and rinse them gently with water.

After two days, drain off the vinegar and the water. Remove the eggs from the jars and rinse them gently with water.

Now:

- touch the eggs, try bouncing them on a hard surface
- hold the eggs against the light from the lamp and see through them

C. Discussion questions:

Let's discuss the questions: What happened inside the jar filled with water? What happened inside the jar filled with vinegar? What happened with the egg immersed in vinegar for 48 hours? What happened with the egg immersed in water for 48 hours? Which egg is translucent? Is the yolk damaged after having a vinegar bath?

D. Conclusions:

The eggshell is made of calcium carbonate which makes the shell hard. Vinegar is an acid. When calcium carbonate is exposed to an acid it reacts. Vinegar dissolves the calcium in the eggshell and produces carbon dioxide (these are the bubbles we can see on the egg immersed in vinegar). Because of that, the shell is weak enough to be rubbed away but the membrane that surrounds the egg remains intact (the yolk and the white are safe). The result is a rubbery and translucent egg. Water doesn't dissolve calcium carbonate. The egg in the jar filled with water didn't change. The shell is still hard.

E. Assessment:

The children discovered the power of vinegar and really liked the eggs - periment classes. They enjoyed carrying out experiments with eggs and were fascinated with the results! It was quite easy for the teacher to observe children working. They enjoyed communicating with each other and shared their observations spontaneously. The teacher appreciated children's involvement, creativity and curiosity.

Inquiry and creativity elements:

You can use blown eggs to create little pieces of art.


KINGA BIALAS


Oliwia Antkiewicz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Kindergarten/School: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Math and Sensory
Teachers: Cristina Preduca, Irina Prejbianu

Eggs-periments

Introduction:

Eggs-periments is part of the eponymous project which tries to familiarize the children with the egg world as this is one of the main topics around Easter time in most Christian countries.

The custom of giving eggs at Easter celebrates new life. Christians remember that Jesus, after dying on the cross, rose from the dead. This miracle showed that life could win over death. For Christians the egg is a symbol of Jesus' resurrection, as when they are cracked open they stand for the empty tomb. No-one actually knows when eggs were first used as symbols at festival times but it was long before Jesus' time.

Eggs were always thought to be special because although they do not seem alive, they have the promise of new life in them, especially at springtime when chicks hatch out. Long ago, people gave gifts of eggs carved of wood or precious stones. The first sweet eggs that were eaten were made in the last 100 years from sugar or marzipan. Since then, chocolate eggs have become popular and these are given on Easter Sunday. In some countries parents tell their children the Easter Hare or Bunny has hidden chocolate eggs and they race to *hunt* them round the house or garden. Children in our country decorate hard-boiled eggs at Easter time by painting or dyeing them. In some other countries such as the United States egg rolling is a popular Easter game. This is usually done with colored eggs. One of the most well-known events is held in America on the White House lawn. Children and parents push the eggs along through the grass with wooden spoons.

Background:

Many different types of animals lay eggs, including birds and fish. Eggs come in a variety of colors, shapes and sizes. Some animals build nests to lay their eggs, but not all do so. Some animals lay eggs in water. Sometimes both males and females care for their eggs. Male seahorses carry fertilized eggs in a pouch until their offspring hatch. The male king penguin has a pouch of fat that helps to keep his egg warm in very cold weather. Sea turtles lay up to 200 soft, round eggs at a time. An ostrich egg is one of the largest eggs and can weigh more than 3 pounds. Hummingbird eggs are the size of a jelly bean, or smaller. Scientists have found fossilized dinosaur eggs in nests from long, long ago. Everything an animal needs to develop is in an egg. Not all eggs have hard outer shells, but they all have membranes to protect their insides. A bald eagle builds one of the largest nests for its eggs. Nests can be 10 feet across. Hard-shelled eggs are mostly made of calcium carbonate. This is the same material as chalk and pearls.

(Source: The Science of Eggs, http://www.eurekalert.org/eggs/)

Purpose:

Playing around with eggs gives children the opportunity to find out and learn as many interesting things as possible about eggs and life in general.

Aims:

The goal of this activity was to have children learn the parts of an egg and show them different ways the eggs are present in our lives on a daily basis.

The children will:

- Observe, touch, weight and compare different eggs.
- Observe the shape and color of the eggs.
- Analyze and name of the substance used to see if eggs can float.
- Use their senses to give characteristics of the eggs.

- Name the components of an egg.
- Compare the color, shape and texture of the parts of an egg.

Vocabulary/Key words:

Egg, shell, yolk, white, break, hatch, hard, soft, small, big, delicate, strong, boiled eggs, scrambled eggs, fried eggs, sink, float, water, salt.

Process skills: observe, analyze and describe, predict, plan, conduct an experiment, draw conclusions, communicate observations, compare results, information and conclusions.

Time/Duration:

20 minutes for activity

Materials and resources:

Empty, transparent jars; raw, uncooked eggs; salt; water; hot frying pan; boiled eggs.

Question:

What kind of experiments can we do using eggs?

Hypothesis:

Eggs are a wonderful resource to use during experiments.

Procedure:

A. Preparation:

Give children a short introductory presentation on what eggs are and their components. Give them raw, uncooked eggs and let the kids study them by using their senses. The children can also test the eggs' resistance by trying to break them by pressing the eggs in their hands. Ask children to remember if they ever saw their parents break some eggs in the kitchen for some scrambled eggs during breakfast or when baking a yummy cake. If so, let them show you how they did it and ask the children to explain why it was possible to break the eggs like that but not by pressing them in their hands.

B. Exploration:

Invite children to put some row eggs in tap water and observe what happens to the egg. Then invite them to do the same thing but this time give children boiled eggs.

Explain the phenomenon using density. Take the boiled egg out of the jar and add some salt. Ask children if they recognize the white crystals that are going to be added in the water and if they don't, ask them to use their senses in order to discover the name of the substance. Put back the boiled egg in the salty water and ask children to watch what happens. Ask them to explain the phenomenon. Break a raw egg in a bowl and compare it with a boiled egg sliced into two. Bring a hot frying pan in the classroom and break a raw egg in it. Ask children to observe what happened to the egg and compare it again with the raw egg from the bowl and the sliced boiled egg. Ask children to identify the yolk and white in all three cases.



C. Discussion questions:

What is an egg made of? What shape is an egg? Which animals or birds lay eggs? How can we break an egg using only our bare hands? Have you ever seen someone in your house cook some eggs? How did they break the eggs? Can you try breaking an egg like that? Can you say which egg is raw or boiled just by holding them in your hands? Do you know what these white crystals are? What senses can you use in order to find out more information about the white crystals? Why does the boiled egg float in the salty water? Can you identify the yolk and white in these three types of eggs: raw, boiled and fried? Why does a scrambled egg look all yellow?

D. Conclusions:

Even though the egg shells were very delicate they were also very strong as the children were able to break them only by hitting them to some hard objects. Most of the children were able to identify the yolk and white in all three types of eggs presented during the experiments, however they had difficulty in explaining what happened with the boiled egg that sank in tap water, but floated in salty water. Also, most of the children understood why there is no white part in scrambled eggs. All of the children were able to recognize the white crystals after tasting them.

E. Assessment:

The children listened carefully the teacher's indications on what the experiments were about. They all made predictions about what was going to happen to the eggs when put into water. It was quite easy for the teacher to observe children working. The teacher appreciated their involvement, curiosity and creativity. Some of the kids made interesting connections between the salty jar and the Dead Sea they heard about in a documentary.

Further investigations:

Eggs may seem like an ordinary part of your world, but by developing some more experiments children can find out that in fact eggs are extraordinary. Children learned that eggs are almost unbreakable, but what if we could make them bounce by using vinegar. Or what would children think and say when making an egg's shell disappear or making an entire egg shrink!

Inquiry and creativity elements:

An Easter egg decorations exposition can be organized with crafts made entirely by children using real eggs. Here are some pictures from our exhibition called *Easter Bunny's Kindergarten:*








GRĂDINIȚA
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DE PAȘTE

School/Kindergarten: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Age group: 5-6 years old
Teachers: Cristina Vacaru, Stefania Roman

Egg shell on test

Introduction:

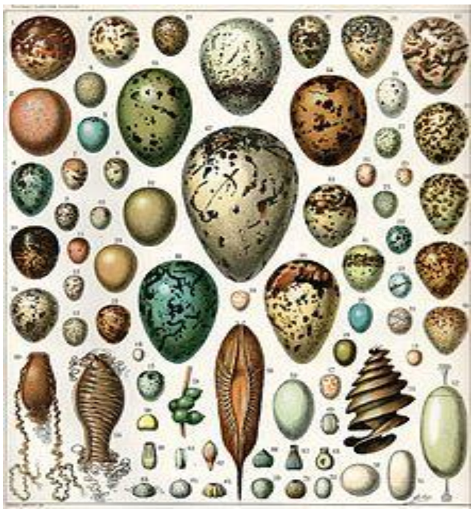
This activity is part of the theme **Eggs-periment** during which we studied and tested egg shells.

As we know, birds, bugs and reptiles lay a variety of eggs which differ in styles, shapes and color. Some have gelatinous or skin-like coverings, others have hard eggshells. Eggs-shells range from soft to really hard. While insects or arachnids eggs are covered only in an embryonic membrane, eggs which must survive in dry conditions usually have hard eggshells, made mostly of dehydrated or mineralized proteins with pore systems to allow respiration. Hard or soft, the egg-shell has the important mission to protect the inside of the egg and offer the conditions for a new life to begin.

(Source: Wikipedia, https://en.wikipedia.org/wiki/Eggshell)

Background:

An egg contains the zygote in which an animal embryo develops until it can survive on its own, at which point the animal hatches. An egg results from fertilization of an ovum.



Most arthropods, vertebrates, and mollusks lay eggs, although some do not, such as scorpions and most mammals.

Purpose:

By investigating and experimenting, the children realize the disadvantages of drinking carbonate drinks and vinegar which affects our health.

Aims:

Experience and explore the characteristics of eggs.

The children will:

- Observe and analyze the shape, the size and the color of the eggshell
- Experiment how the eggs react in different liquids (water, coke, vinegar, Fanta)
- Notice, compare and describe how acid changed the color, the surface and the strength of the shell

Vocabulary/Key words: eggshell, yolk, egg white, shell, calcium, acid, teeth.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

40 minutes.

Materials and resources: eggs, coke, Fanta, water, vinegar, spoon, labels, glasses, smartboard.

Question:

How do the carbonated drinks / fizzy drinks and vinegar affect our health?

Procedure:

A. Preparation

Start by projecting images of on the smartboard and asking the children about the characteristics of eggs. They will soon talk about them. Give them some eggs to study. Show them different types of eggs (hen, duck, dove), what's inside the egg, why the shell is important and ask them which one of them is more resistant. Did you know that the eggshell has calcium just like our teeth? Calcium is essential for healthy and strong teeth and bones. Long-term calcium deficiencies can lead to numerous medical conditions and problems. High sources of calcium exists in milk, cheese, and other diary products. Some people, however, are lactose intolerant or avoid milk-based products for ethical and health reasons (such as Vegans). Fortunately, there are many good sources of calcium that exist beyond dairy products. These sources include seeds and nuts (like almonds), kelp and wakame (types of seaweed), oranges, figs, okra, and calcium fortified products such as orange juice or soy milk. One other source that's high in calcium that is often overlooked is the eggshell, which can be ground into powder and mixed with other foods.

(Source: science-fair adventure, http://www.sciencefairadventure.com/)

B. Exploration

Give the children four hen eggs, study them (yolk, membrane, the zygote in which an animal or bird embryo develops, the importance of the shell). After this start the experiment: pour some water, coke, Fanta, vinegar in four glasses and gently introduce the eggs inside. Ask the children to make assumptions of what will happen. Also ask them to give reasons for their hypothesis. Then, let the eggs in a cool place. The eggs will float. Observe the eggs each day, notice the bubbles formed on the surface of the shell. After seven days the result can be really amazing.

One week later, take out the eggs carefully and rinse them with water. Ask the children to compare the eggs and talk about the differences. They will soon notice that the carbonated drinks colored the eggshell in pink and brown while the egg in vinegar became translucent and the calcium in the shell was gone! The only thing that remained was the delicate membrane of the egg.

In the end, ask the children how they connect the results of this experiment with nutrition and what parts of our body have a structure similar to the egg shell.

C. Discussion questions:

What happened with the eggshell? Which of the four liquids affected more the shell and why? Why is calcium important?

D. Conclusions:

The kids learned that eggshells contain calcium just like our teeth and bones, carbonated drinks are double or triple responsible of tooth decay because they attack and dissolve the tooth enamel. The acid content of these drinks can dissolve the mineral content of the enamel, just like the vinegar *melted* the egg shell. This can lead to tooth sensitivity appearance and even to dental cavities. The acid in drinks harms our teeth more than the sugar found in solid candy. The children noticed in astonishment the yolk in vinegar turned into a kind of gelatin. Really yucky!

Assessment:

The children were very curious and they showed a great deal of interest in this activity. They were happy and enthusiastic about the experiment but at the same time patient to see the results. They shared their ideas and drew their own conclusions.

Further investigations:

- How nourishing are eggs for humans?
- Egg in the kitchen: what can you cook with eggs?

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science and Art, Age group: 6-7 years old
Teacher: Mihaela Balint, Laura Popescu

Growing crystals on egg shells

Introduction:

This activity is part of the theme ***Eggs-periments.***

Every years, the children in Happy Kids Kindergarten and Discovery Kids Primary School organize an Easter exhibition with natural eggs crafts. At the end of the art activities we still have some eggs shells. So, what can we do with them?



An experiment, of course, said one of the children. And we did it. We already grew crystals on different kinds of objects (stones, sea shells, glass, pipe-cleaners, strings). The next question is: *can we grow crystals on eggs' shell?*

Background:

A crystal is a hard, solid substance made of molecules that bond together in specific patterns to form a shape with straight edges and flat surfaces. If we grew more than one type of egg crystals, you would see that not all crystals have the same shape or size. The site where a crystal begins to grow, called its nucleation site, determines its size: fewer nucleation sites mean larger crystals, and many nucleation sites produce smaller crystals. A few molecules of alum, ammonium or borax (or any other substance you may use) find each other in the solution and join together in a crystal formation. More molecules join until enough gather to form a visible crystalline solid. If you leave these crystals in the solution, they'll continue to grow.

Borax and alum powder are white. Adding food coloring or egg dye we can grow beautifully colored crystals.

Purpose:

To observe crystals growing on eggs shells.

Aims:

The children will:

- Observe some solid (powder) and liquids substances: alum, borax, ammonium, food coloring
- Make a solution and a saturate solution
- Observe how a substance is dissolved in hot water
- Observe the evaporation of the water
- Formulate predictions/ hypothesis and conclusions
- Observe how the crystals are growing on a special support (egg shells in this case)
- Work in pairs, communicate

Vocabulary/Key words:

Egg, raw egg, fresh egg, boiled egg, shell, white, yolk, hard, soft, crystallization, crystals, solid, liquid, solution, powder, dissolve, evaporate/evaporation, sedimentation, crystallization, saturated solution, question, prediction, hypothesis, conclusion.

Process skills: observe, analyze and describe, predict, conduct an experiment following the instructions, gather information, collaborate, draw conclusions, communicate observations, information and conclusions, learn to wait a result (have patience), enjoy.

Time/Duration:

first day-20 minutes

second day-50 minutes (with waiting time)

last day-15 minutes

Materials and resources:

Raw eggs, a bowl, 1 jar for each team, teaspoons, alum powder, borax powder, ammonium powder, hot water in a thermos, food coloring (different colors) liquid or powder, fiber pens and labels, liquid white or transparent glue and paintbrushes, paper towels, pushpins, scissors, optional magnifying glasses.

Question:

Can we grow crystals on egg shells?

Procedure:

A. **Preparation** *If you already have eggs shells skip the first two lines.*

Use a pushpin to carefully poke a hole in each end of the egg. Put your mouth on one end of the egg and blow the yolk out through the other hole. Blow the yolk into a bowl. Cover the bowl and put in the refrigerator for a later use.

Carefully cut the shell in half, down the egg's length, with a pair of scissors. Wipe out the inside of the egg with a paper towel. Get the interior surface of the egg as clean and dry as possible without cracking it.

B. **Exploration:**

First day: each team has two half of egg shell, glue and a paintbrush, one of the substances in a powder state, a fiber pen and a white sheet of paper. Each child will drop a small amount of glue into his egg shell and use a paintbrush to spread it around. He should try to cover the entire interior surface, all the way up to the edges of the egg with glue. Add more glue if needed.

Quickly, before the glue dries, cover it generously with powder (alum, borax or ammonium). Let the shell dry on the sheet of paper till the next day. The children will write their name on the paper (or the name of the team).

Second day: each team has a jar, some substance (the same as in the previous day), a teaspoon, food coloring, a fiber pen and a label.

The children will write on the label their names (the name of the team), the date and the name of the substance they use. Then they stick the label on the jar. Fill the jar by half with hot water (aprox. 200ml).

Safety Note: Be careful with the hot water! Adult supervision is necessary!

Add a few drops of food coloring.

Gradually, one by one, stir in 6-8 teaspoons of alum until it is dissolved. At some point the alum is not dissolving anymore. Now the solution is saturated. Add more alum (borax, ammonium) if it is necessary. Let the colored alum solution cool for around thirty minutes. Once the colored alum solution has cooled, place the egg, opening up, into the solution. Push the egg to the bottom of the jar with the teaspoon and allow the egg to sit in the solution till the next day. The next day check out on your egg. It's grown crystals! Carefully remove the egg and place it on a paper towel to finish the crystals-creation process.

Special note: Usually Borax crystals grow faster than alum or ammonium crystals. For a better (visible) result you can leave the shells in the solution for 1 or 2 more days. The last day of the experiment could be the 4th or the 5th day. In fact is a good example for what really means science research. You can easily think that the children will be reluctant with the idea to wait for something. In fact, it was easier than expected. They were anxious but they waited. We obtained spectacular alum crystals big as a thumb nail in 6 weeks waiting time. Please, believe me! It worth it!

C. Discussion questions:

What does liquid/solid mean? What substances dissolve in water? What color does the borax/alum powder have? What is a solution? What is a saturated solution? Why do we use hot water? What food coloring did you use? Powder or liquid food coloring? Did it matter how much powder are we stirring in? Can we get a similar result if we use cold water? What do crystals look like? How big are they? What color they are? Are they shining? What's the color of the substance/powder we used? Why do we have to wait to see the result?

What other crystals experiments did we make in the past? What substances did we use? What did the crystals look like in that case?

D. Conclusions:

Our egg's crystals are formed through a process called sedimentation. The heated alum solution contains suspended particles of alum powder and as the solution cools, these particles of alum begin settling. When the alum particles settle towards the bottom of the beaker or glass, they begin crystallizing. With the alum-covered egg at the bottom, the alum particles from the solution begin attaching themselves to the egg. Covering your egg in alum powder beforehand gives the suspended alum particles a surface to which they can more readily attach themselves. The particles that settle onto the surface of the egg crystallize, and you will also see crystallization on the bottom and sides of the beaker or glass.

E. Assessment:

In the first place children involvement in the activity should be taken into consideration.

The teacher also can evaluate:

- children questions and answers
- the using of the scientific vocabulary
- the scientific accuracy of their observations, predictions and conclusions
- communication and collaboration with peers.

Further investigations:

Growing borax crystal on a red heart shaped pipe cleaner is a very exciting activity and also an amazing gift for Mother's Day.

Experiment with different kinds of eggs dyes. The market offer is very generous before Easter time. Children like to explore these dyes as they are and also to combine different solutions and colors.

Inquiry and creativity elements:

During this activity children conducted an experiment following the instructions. It wasn't an investigation planned by themselves but it was a hands - on activity. Children observed very attentively processes like: dissolving, evaporation, sedimentation, crystallization, trying and combining different kinds of *magic powders*, adding various types of food coloring. Their interest in crystals, gems and rocks increased fostering new ideas for further investigations.

The teacher encouraged children's questions & answers providing support during their investigations only when it was necessary. She also provided help in the formulation of the predictions / hypothesis and conclusions, guiding children in better understanding the differences between a prediction, a hypothesis and a conclusion.

Teacher's notes:

It takes some time to watch the crystals grow, but it is worth it. Some crystals are quite awesome and big enough to produce the *wow* effect.

Usually young children are not patient people. Be prepared to have some fun and challenging activities for the waiting time. Anyway, it is a good opportunity for them to understand that sometimes you simply have to wait to get something.

Enclosure 1

Data worksheet:

Name………………………………………………………….Date……………………………..

Activity ***Growing Crystals on Egg's Shell***

Our solution:

……

Nr.	Substance	Quantity	Special notes
1			
2			
3			

Example:

Nr.	Substance	Quantity	Special notes
1	water	200 ml	liquid, transparent colorless, odorless, tasteless temperature: 65ºC
2	borax	12 teaspoons	white powder dissolve easily in water
3	food coloring	6 drops	dark red liquid rapidly mix with water

If I were – Lesson Plan Synopsis

Lesson plans	Partner Country	Synopsis
Dinosaur steps	Romania	A fun activity focused on comparing and measuring the size of a T-rex foot print using the children's foot prints.
Earthworm investigation	Romania	Children observe and study the life of earthworms for a couple of weeks.
If I were a…	Turkey	A series of outdoor and indoor lessons on different kinds of animals.
If I were…	Romania	A showcase of a series of kids' home-made projects focused on enhancing their empathy towards nature.
The potato logbook	Romania	An investigation of how we can grow plants from other parts of a plant than seeds, like roots, stems or leaves.
Take a look at my kindergarten. Storks – an aerial view of the area!	Poland	A fun science activity focused on storks to teach children about these birds' behavior and how they see the world from the sky.
A(nt) research	Austria	Find out how you would live if you were an ant and what is the connection between an ant and the Phenakistiscope.
If I were	Romania	The recipe for a successful project activity with the parents' participation

School/Kindergarten: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science and Maths
Age group: 5-6 years old
Teachers: Cristina Vacaru, Stefania Roman

Dinosaur steps

Introduction:

This activity is part of the theme ***If I were…*** We know that dinosaurs have fascinated the kids since ever, maybe because of their size, of their behavior, the way that they were feeding or perhaps because became extinct. They lived between 250 to 65 million years ago in many eras. Why and how did they disappear? There are some hypotheses submitted by the specialists with a great impact for kids and not only. Some of them are: changes of the climate conditions, volcanic eruptions, the consequences of the impact of a big meteorite, different viruses etc.

Background:

Paleontologists are the scientists who study dinosaurs fossils and with their help we can find out how tall or long was a dinosaur. Also we know what kind of food they ate by studying the fossilized leftovers in their stomach and, above all, the shape of their teeth. However, can we find out how big was a dinosaur foot print? Well, yes, we know that some of them had large feet just like the length of a 5-6 years old child while others had very small feet.

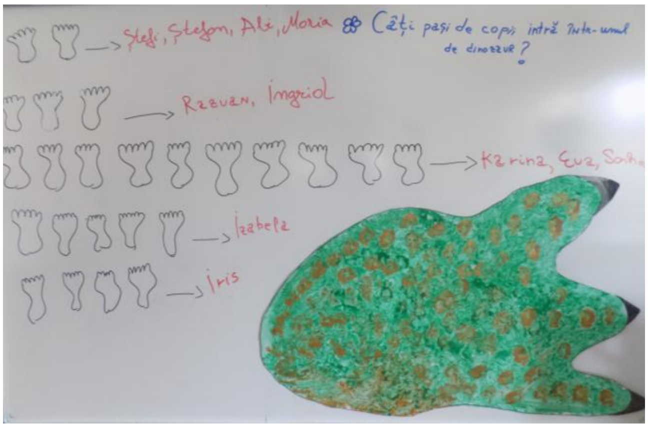
How about the T-Rex, the king of the dinosaurs, how big was his foot trace? And how many children's foot prints are required to fill in a dinosaur foot trace? This was the starting point of this project.

Purpose:

Measure the size of a tyrannosaurus rex foot-print thus helping them realize the size of this dinosaur.

Aims:

By doing this experiment on a concrete object (dinosaur foot print) the children learned math by playing. I asked them how many of their footprints placed one next to the other will cover the size of a dinosaur foot print? Some of them said 5 steps, 2 steps, 15 steps… and, in the end, the result was unexpected (25). Next, we used plaster to imprint the shape of a dinosaur, just like the traces imprinted in mud and "frozen" like this for centuries. This way, the kids developed fine motor skills and discovered properties of different types of materials.



The children will:

- Notice the shape and the size of a dinosaur foot print
- Compare the size of a dinosaur foot print with a child's foot print
- Count how many of the children's foot prints fill in a dinosaur foot print
- Compare the numbers of steps estimated before the measurement with the final results and analyze who was closer to the truth
- Work in teams and develop their team spirit.

Vocabulary/Key words: tyrannosaurus rex, fossil, paleontologist, number, numeral, pair, amount, to compare, more, less, small, shape, size etc.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.

Time/Duration: 40 minutes

Materials and resources: large sheet of cardboard, pens, watercolors, painting sponges, scissors, whiteboard.

Question:

- ***How many of the children's footprints are required to cover the size of a dinosaur foot print?***

Procedure:

A. Preparation:

First draw a tyrannosaurus foot print, paint it using sponges and then ask the children to estimate how many of their footprints would be necessary to cover the size of the dinosaur foot print.

B. Exploration:

Write the children's estimations on the whiteboard. (In our case: 3 children voted 5 steps are enough, 4 children 2 steps and so on, continuing with all the children.) Then ask the children to draw the outline of their foot, one next to each other without empty spaces. Finally, count the foot prints and compare the results with the their prior estimations.

C. Discussion questions:

How many of your foot-prints do you think will cover the length of a tyrannosaurus footprint? How can you trace your footprint? Compare the final number (25) with your estimated numbers. Is it smaller of bigger? Which estimations were closest to the final answer? What if you would count the pair of footprints, how many footprints in total will cover the size of the tyrannosaurus footprint?

D. Conclusions:

This activity offered us a good way to know more things about dinosaurs, their life, what they ate, different species, fossils etc. It also combined number estimations and comparisons with science. We realized how important the experience and the age of the children was when making the estimations (see teacher's notes).

E. Assessment:

The children participated with pleasure, they worked together, they shared new ideas and in the end we drew conclusions. The teacher appreciated their involvement, curiosity and creativity.

Further investigations:

Using non-standardized measurement, children can measure the length of different dinosaurs thus getting a real image of their size.

Inquiry and creativity elements:

After we were done with the measurement, the children took the plastic dinosaurs and they made different footprints on sand, flour and play-dough and compared their size. For example, they noticed that in one big dinosaur foot print, more small dinosaur foot print fit it.

Most of the children were very curious how it was possible that after such a long time, dinosaurs traces still exist in our days. So we continued our activity modeling dinosaur prints in plaster. We let them dry and then we painted them.

Teacher's notes:

It was very interesting to follow the capacity of analysis and appreciation of the children when they estimated the numbers of foot prints. The ages of the children ranged between 5-7 and the older children made better estimations than the younger ones (the little ones estimated 2 footprints while the older ones estimated 15). This thing demonstrates once again, how experience matters in the intuitive thinking of the little ones.

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Language and Sports, Age group: 6-7 years old
Teacher: Mihaela Balint

Earthworm investigation

Introduction:

This activity is part of the theme **If I were…**

Background:

It is really interesting to learn about earthworms! You can set up a worm home and use it to watch them closely. A lot of questions could be ask, like: *How long is the earthworm? What does it look like? How does an earthworm move? Does it have bones? What do earthworms eat? How do earthworm breathe? How do earthworms see underground? Are they useful?* The children can watch the earthworms in an environment close to their natural one and find some answers to their questions. A short visit in your garden and a little shovel will help you get an answer at your first question: *Where do earthworms live?* or *Where can I find earthworms?*

Purpose:

Observe the life of the earthworms for a couple of weeks in an "earthworm home" set up by children. Observe how the earthworms move.

Aims:

The children will:

- Observe earthworms in their natural environment and in an *earthworm home* specially set up by them
- Gather information about earthworms through direct observations and from alternative resources (books, encyclopedias, internet)
- Communicate observations an information
- Collaborate
- Reproduce earthworm moves practicing some physical exercices

Vocabulary:

Earthworm, soil, burrows, lawns, meadows, worm casts, cylindrical body, kitchen waste and compost, decompose, nutrients, segments or rings (annuli), contracting and relaxing, muscles.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, collaborate, communicate observations, information and conclusions, enjoy, have fun trying to reproduce earthworm moves.

Time: 2 weeks/ around 10-15 minutes a day

Materials:

A glass or clear plastic container, a small amount of garden soil, some leaves and grass, a small amount of sand and gravels(different colors), black paper, a few earthworms, plastic food wrap, magnifying glasses, paper, pencils, colored pencils, ruler.

Question:

How do earthworm move?

Procedure:

A. Preparation:

Fill the container with the garden soil, colored sand and some small gravel, alternating the materials. Each layer of sand or gravel will be approximately 2 cm deep. First start with a layer of soil 2-3 cm deep in the bottom of the container. Lightly tap and fatten the soil, however do not pack too tightly. Then add a layer of sand. Build up layers finishing with a layer of soil. Fresh garden soil should be damp enough for worms, however, after adding a layer of sand you can sprinkle some water drops. To make the earthworms feel like at home you can add some leaves and grass. Cover the container with a plastic sheet or lid and make some holes with a nail for fresh air.

B. Exploration:

- Earthworms are easy and fun to find. They are found everywhere in the soil, where they live in their underground burrows. Let the children use the shovel and I'm sure they'll find one in the next minutes.
- Take the worms and put them in the container. Cover the container. Don't forget the holes! Don't worry. The earthworms are not going anywhere. They will spend almost all the time underground.
- Wrap a black paper around the container.
- The worms will soon get used with their new home and tunnel underground.
- Ask the children to draw what they see. They can keep a record of their observations helped by their drawings, sketches and short notes.

- When they are not looking at the worms keep the black paper around the container. Protect the worms from daylight, they do not like it.

C. Discussion questions:

Who make these tunnels in the soil? How do they do that? How do earthworms move? Do they have bones/ a skeleton? Can you reproduce the earthworm move? Why we can't move like an earthworm? Do we have muscles? Can they jump? How long is an earthworm? What do earthworms eat? How do earthworms breathe? How do earthworms see underground?

D. Conclusions:

- The worms feed on nutrients in the soil but we can also see them pull down leaves or grass into their burrows. Here the plant parts will decompose, releasing more nutrients on which the worms can feed.
- If you look closely at an earthworm (you can use a magnifying glass) you can see that its body is made up of many segments or rings. These rings are called

annuli. Underneath the annuli there are muscles. These muscles help the worm to move. By contracting and relaxing its muscles in turn, the worm is able to wriggle along.

- When a worm moves it stretches its head forward, becoming long and thin and then contracts, pulling the hind part of its body up.
- Earthworms feed on the remains of dead plants found in the ground. They eat soil as they tunnel, extracting their food from it.
- Earthworms do not breathe like we do as they have no lungs. However, they need air. The air is absorbed through tiny pores in their skin.
- Earthworms have no eyes. They also can't hear or smell. Yet they are extremely sensitive to vibration in the soil. Also they can "feel" the light.
- Earthworms mix everything up as they make their burrows. It's great for the garden, as the mixing adds air to the soil and the burrows make channels for water. So, the earthworms are the gardener's friends.

E. Assessment:

The teacher evaluates:

- children's questions and answers
- the scientific accuracy of the information about earthworms gathered by the children using various sources: their own observations, books, encyclopedias, internet, educational computer software
- children's drawings, sketches and notes
- communication between them and with the teacher
- collaboration and involvement in the activity

Further investigation:

Feed the worms on vegetable peelings and grass cuttings. Try all sorts of plant material to see what your worms like the most.

Put an earthworm on a sheet of paper and listen to its walk. Using a pencil and a ruler try to measure the length of the worm.

Place an earthworm in your hand. The skin of the worm is it dry or wet? Can you feel the slime? Can you see it?

How do earthworms reproduce? What animals feed on worms?

What materials can we use to make an earthworm model - a craft which can reproduce the earthworm moves?

What other creatures move like earthworms?

Inquiry and creativity elements:

At the beginning of this investigation many children didn't like earthworms. They even didn't want to touch them. Very soon, watching them, they understood how useful the earthworms are for the gardeners and the fact that earthworms are harmless for the human beings. Reproducing the earthworms' moves they had a lot of fun and also understand much better the advantages and the drawbacks of a skeleton. Earthworms do not have a skeleton or bones. They can move only by contracting and relaxing their muscles.

Teacher's notes:

- Be careful not to add too much water as your worms may drown.
- Do not expose worms to direct sunlight and always keep the black paper around their home when you are not studying your earthworms.
- After two-three weeks return the earthworms to their natural habitat.

School: Ş. Jan. Uzm. Çvş. Ahmet Güngör Anaokulu, Tarsus-Mersin, Türkiye
Subject: Motor skills, Language development, Creativity and Drama, Age group: 3-4 years old
Teacher: Atiye Taş

If I were a…

Introduction:

This plan includes the activities related to the theme **If I Were A .....**

Background:

Children can use their imagination very well when you ask them about their wishes in an unreal world. Animals are sometimes the heroes of their imaginative world. In this topic, we wanted to see their perspectives towards animals in their own world.

Purposes:

- Getting to know animals and telling where and how they live
- Realizing the similarities and differences among animals
- Increasing children's language and communication skills
- Using drama technique, imitations, role-play
- Promoting their imaginative intelligence

Aims:

At the end of this lesson, students will:

- Talk about different kinds of animals and their lives in nature
- Use their imagination and put themselves in the place of an animal they want to be
- Express themselves freely in their own world
- Visit the zoo and make observations on the animals

Key words:

Animals, wild animals, domestic animals, fairy tales, zoo, drama

Process Skills: observation, imagination, interview, communication, dramatization, drawing conclusion

Time:

All day.

Materials:

- Animal posters and masks
- Animal sounds, tape recorder
- Animal songs

Questions:

- **How do animals live?**
- **How do animals feed?**
- **Where do they live?**
- **What do they do?**

Procedures:

A. Preparation:

Students discussed with the teacher about their favourite animals: where they live, what they eat, their environment, way of life

B. Exploration:

After introducing different kinds of animals – both wild and domestic and those in nature - they talked about their lives, sounds, etc. They listened to animal songs, acted animal sounds and made a pantomime show.

Chidren were taken to the zoo to observe the animals. Then, they were asked which animal they would like to be if they could. They said: *A bird, because it is free and flies everywhere / A cheetah because it runs very fast (Metehan). /A kangaroo because it carries its baby in its pocket.*

C. Discussion questions:

- If I were an animal, which animal would I be?
- Why?
- Where would I live?
- What would I do?
- What would I eat?

D. Conclusions:

The teacher interviewed the children about the animal they would like to be if they had a chance. The interviews were recorded. They made roleplays and acted out some stories related to animals.

They gave different and various animal names: *If I were a ...Bear, I would eat all day long./ Giraffe, I could see everything. / Wolf, I would eat fruit. Butterfly, I would walk on the ground.......*

E. Assessment:

Children could imitate the sounds and actions of animals in their mind. When they watched the recordings of themselves and other friends, they enjoyed it and laughed a lot.

Further investigations:

Animals can be divided into groups: land animals, sea animals, domestic animals, wild animals. A bulletin board can be prepared with photos according to this classification.

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Language and TIC, Age group: 6-7 years old
Teacher: Mihaela Balint

The potato logbook

Introduction:

This activity is part of the theme ***If I were...***

It all starts with a potato. Yes, a simple potato transformed in a *hedgehog* during an art activity. Some toothpicks became spines and some spices like black pepper and juniper became eyes and nose. Our *hedgehog* spend the entire winter in a little greenhouse, in the classroom. In the middle of February some greenish stuff appear on it. "What's this, miss? Is the potato rotten?". "Well, I said, our potato decided to grow a new plant. The potato sprouts. It doesn't want to be a *hedgehog* anymore. Do you want to plant it and to watch what will happen? "*Will we have more potatoes?", "Can we eat fried potatoes?" "I don't know… We can try!"*

Background:

Some plants only grew once from a seed. Many perennials can die then grow again and again from parts of a root or stem. Potatoes have tubers and the tubers are *underground stems*! Hard to believe? Mark this! Onions, garlic, hyacinth, crocus, tulips grow from bulbs and bulbs are *underground leaves*! Tubers and bulbs are "storage organs"; they provide food to sustain the plant through the winter and to feed the new shoots when they reemerge the following spring.

So, the seeds are not always the starting point.

Purpose:

Observe a new plant's (a potato plant) evolution starting from a tuber. Make a video file based on the photographic records of the entire process.

Aims:

The children will:

- Observe the plant's evolution starting with the tuber and finishing with the new tubers - the entire life cycle of the plant
- Record on a camera the different stages of the potato plant growth
- Communicate with peers and the teacher
- Describe their observations using the proper vocabulary (key words)
- Use a special software to organize photographic records in a short video presentation

Vocabulary/Key words:

Plant, the parts of the plant (root, stem, leaves, leaflets, veins, fruits, seeds, sprout, shoots, flowers, tubers, bulbs, buds), the life cycle of the plant, the plant's needs (food, water, air, oxygen, carbon dioxide, glucose, sugar, light), the life processes in a plant (photosynthesis, chlorophyll, cells, respiration, breath in/breath out, energy, transportation).

Process skills: observe, collect data (with a camera), analyze data, communicate data, observations, draw conclusions, organize and present data using TIC (a specialized computer program – *animoto)*.

Time/Duration:

- 10 minutes sessions, 2-3 times/a week as long as the children are interested of the subject
- 50 minutes for the presentation

Materials and resources:

Potatoes, pots, some soil, some water, camera, garden, computer, internet connection, animoto account.

Question:

Will our potato change into a new plant with roots, stem, leaves and so on? Can we plant something different than a seed to proliferate?

Procedure:

A. Preparation:

Pick up all the toothpicks. Ask children to draw and to color on a paper what are they see at the potato in this stage.

B. Exploration:

Put some soil in a pot and place the potato on the soil. Then cover the potato with soil. Add some water at room temperature. Keep the pot in the room. It is still winter outside!

Watch the evolution of the plant. Next week we already noticed the sprouts above the soil. Twice a week draw or/and record with a camera the evolution of the new plant. Make a photo-journal. At some point you can transfer the pot's content in the garden. On this occasion the children can observe the new roots of the plant.

Using special computers programs like PowerPoint or animoto with a little help from the teacher, children can realize a PowerPoint presentation or a video file using their best photographs.

C. Discussion questions:

How do plants grow? What is a tuber? Can new plants grow from the parts usually found under the ground? What are the plant's needs? What is the life cycle of the potato? What are the differences between the life cycle of the potato and the life cycle of the …? The seeds have different needs from tubers to grow? What is a tuber? How is a tuber different from a seed? When it's the right time to replant the potato in the garden?

D. Conclusions:

Many plants die in autumn then grow again from parts of the plant (root, stem or even leaves). The potato plant grows from a tuber, not from a seed. New roots develop from the tuber. Then the new plant sprout and grow into a new plant with stem, leaves, and flowers. New tubers form and grow under the soil. The old tuber shrink little by little till a small dry cover remains. The tuber's mission was complete - it provided food supplies to the new born plant (till the new plant was capable to produce its own food through photosynthesis).

E. Assessment:

The assessment is based on:

- The level of scientific information about plants (life cycle and life process) quantitative and qualitative. The usage of the scientific vocabulary (key words)
- The communication with the peers and the teacher
- The presentation or video file, drawings and written records
- The usage of the camera, the computer and computer programs.

https://animoto.com/play/S0fDPQXPwYSxJzEeBsQZkQ

Further investigations:

Shall we try again with another part of a plant? What about a carrot or a pineapple? A Saint Paulia leaf?

Inquiry and creativity elements:

Children observe the entire life cycle of a plant. That means a longer period of observation and a rigorous form of data recordings. The children make drawings of the different stages of the plant growth, take pictures with a camera, organize and present their observations using the computer and a special computer program.

School: Szkoła Podstawowa Nr 2 in Siewierz, Poland
Subject: Integrated Science, Age group: 5-6 years old
Teachers: Dagmara Malota-Machura

Take a look at my kindergarten. storks - an aerial view of the area!

Introduction:

These activities are part of theme If I were… One of the first signs of spring is the return of the storks. They build their nests close to human habitations: on the roofs, chimneys or telegraph poles. Because of that, we can observe them and learn something about these birds. After a few days of observations we started wondering about what does Siewierz look like from a stork's eye view?

Background:

Storks are large birds with long legs, necks, and bills. They are wading birds, which means they typically walk or stand in shallow water while feeding. There are 17 species, or types, of stork. The most famous type is the white stork. In some European countries it is said to bring good luck. Storks are related to herons, ibises, flamingos, and New World vultures. Most storks live in warm regions in Africa, Asia, and Europe. They can also be found in the Americas and Australia.

Storks usually stand about 2 to 5 feet (0.6 to 1.5 meters) tall. Storks commonly have black and white feathers. Some species have no feathers on the head and neck, only red, pink, or black skin. Most storks eat insects, frogs, fish, and other small animals. They catch their food in fields or shallow waters. The marabou and a type called the adjutant stork feed on carrion, or dead animals. The stories about storks bringing good luck have led many people to treat the birds well. In some places, however, storks have been hunted and killed for food or for their feathers.

(http://kids.britannica.com/elementary/article-353816/stork)

Purpose:

To observe the storks in the neighbourhood: what do they eat, when do they lay eggs, what do they see when they are flying over our town.

Aims:

The children will:

- See differences in the storks' behaviour
- Know what they eat
- Know where they look for food
- Know when they lay eggs
- Show on the map where the storks overwinter
- Know an aerial view of our area
- Know better the area they live in

Vocabulary / key words:

Storks, flying, a nest, birds, a map, perspective, a view, food, frogs, area, road.

Process skills: observe, analyze and describe, gather information, draw conclusions, communicate observations, information and conclusions.

Time / Duration:

2 x 45 minutes

Materials and resources:

Storks' pictures, a camera, binoculars, map of the world, interactive whiteboard and Google Maps, stiff paper, paints.

Question:

What does Siewierz look like from a stork's eye view?

Procedure:

A. Preparation

The children watch the storks for a few weeks. They observe their behavior, the way they build or fix their nests and the process of laying eggs. They look for the places in our neighborhood where you can find frogs in order to get to know where the storks are looking for food. They also go for a few long walks to explore the local area. After that the teacher shows them this area using satellite map.

The children are observing a stork's nest.

The teacher is showing the nest on the map.

B. Exploration:

The children point at the places (on the satellite map) they have visited during the walks: the river, the road to the stork's nest, the building of the kindergarten. They start to see the differences resulting from different perspectives of observation (from land and from the air).

C. Discussion question:

What does Siewierz look like from a stork's eye view?

D. Conclusions:

During the classes the children have noticed that storks see our area in a different way than we do. Everything they see from the air is much smaller than in reality. For a summary of the classes, the children made the map showing an aerial perspective of our area.

E. Assessment:

The children liked the classes. They really enjoyed to observe the storks, go for long walks and make a map. The children know better the area they live in.

It was quite easy for the teacher to observe children working. They enjoyed communicating with each other and shared their observations spontaneously. The teacher appreciated children's involvement, creativity and curiosity.

Inquiry and creativity elements:

Team work: *Storks' Land.*

Storks made of paper plates and paper tubes.

School/Kindergarten: Kindergarten Rosental a. d. K.
Subject: Integrated Science - Biology, Bionics, Optics, Fine Motor Skills, Language Training, Creativity
Age group: 3-6 years-old
Teacher: Sabine Hirschmugl-Gaisch

A(nt) Research

Introduction:

This activity is part of the theme: **If I were…an Ant.**

Background:

Ants are insects and they have been living on our world for 100 million years. We know about approximately 12 000 species and only a few of them are seen as pests by humans. 400 species that live in Europe are partly under protection and play an important part in the conservation of nature and ecology. Ants can get almost anywhere - including our playroom in the kindergarten. That motivated us to have a closer look at these interesting animals.

Purpose:

A dead ant, found in our kindergarten playground let the children`s interest in these tiny animals grow rapidly and arose the following questions: Where does the ant come from? Where and how does it normally live? Do ants live alone? What do they eat? How did it get into our kindergarten? What special skills does an ant have?

Aims:

- Becoming familiar with the different species of ants
- Learning how ants live and what social structures they have in their community
- Getting to know and observing the construction of the homes of ants
- Exploring the trails of ants (setting scent marks, e.g. with sweet apples)
- Getting to know the tasks of ants in a forest
- Learning about the natural enemies of ants
- Introduction to magnifying glasses, binoculars and microscopes
- Physical education (movement course that represents the typical ant trails is built up) and development of the topic "lead and follow" - be considerate of others, respect each other in order to improve social behaviour.

The children will:

Build a "Phenakistiscope" (also known as "Wonder Wheel" or "Life Wheel") to imitate the movement of ants (first moving images - the precursor of animated films).

Vocabulary/Key words: Ant, anthill, ant state, ant queen, ant lion, worker, army ant, honey ant, predatory ant, soldier, hunter, male, nurse, construction worker, gardener, harvest-worker, carnivorous ants, flying ants, vibration, egg, larva, cocoon, pupa, to eclose.

Process skills: Observing, analyzing and describing, planning, conducting an experiment, gathering information, collecting data, interpreting data, drawing conclusions, communicating observations, information and conclusions.

Time/Duration:

1 hour / 6 children

Materials and resources:

Cardboard, disc with spirally running ants drawn on - crayons, needle, scissors, cork, glue

Question:

How did the ant manage to get into our house?

– How do they orientate?

Procedure:

A. Preparation:

Firstly, we looked at the dead ant with magnifying glass and described its appearance in detail. Then we discussed the topic on the basis of information given in some picture books and set out to find ants or an ant road in the garden.

B. Exploration:

All materials that are necessary for the production of a "Phenakistiscope" were prepared (painted, foiled and cut) by the children and then attached to the cork with a pin. First attempts to rotate the picture and to observe the movements began. However, it is advisable to do that experiment in the front of a big mirror: If you hold the painted side towards the mirror and let the disc rotate, you could observe the moving of the ants around the disc almost perfectly.

C. Discussion questions:

Are ants useful animals? Can they become a plague? What can you do to get rid of them, without having to kill them? What can we learn from ants? How do they manage to carry heavy weights? What does an anthill look like? How does it look at the inside? How does an ant nest grow?

D. Conclusions:

Army ants are predatory insects and constantly in search of food. Army ants build their nest only at night and then continue with their foraging. They run across everything and often follow a scented road. Whether this is the "fragrance" of food, of man or of their own species - the ant follows that track and creates an ant road in case one animal is followed by her countless fellows.

E. Assessment:

How do individual ants differ in appearance and function? How can ants increase their number? Why can some species fly and some not? Why does it burn so terribly when formic acid gets on our skin?

Further investigations:

We have been searching for big anthills in the woods and observed them over a longer period of time. Photos of them helped us to document changes and our individual observations.

Inquiry and creativity elements:

We collected many materials necessary for the construction of an ant nest in the garden and built up our own anthill out of paper. It was fascinating for us that such small animals are able to build such great buildings and got an idea how important teamwork is.

Teacher's notes:

The topic of ants and their living environment is especially interesting for children. Although they feared the animals a bit at the beginning, their attitude towards these animals changed to fascination, astonishment and desire for more information about the ants and their way of life.

School/Kindergarten: Happy Kids Kindergarten, Discovery Kids Primary School, Ramnicu Valcea, Romania.
Subject: Science, Echology, Art, Language development, Age group: 5-7 years old
Teacher: Vacaru Cristina, Roman Stefania, Balint Mihaela, Dicu Georgiana, Popescu Laura

If I were…

Introduction:

For the theme **If I were,** the children attending the Happy Kids Kindergarten and Discovery Kids Primary School were engaged into a number of activities:

- In class, themes and topics like dinosaurs, insects, birds, life cycles were approached
- At home, they made posters with family participation
- Children were trained in documentation and research activities
- A set of video-presentations made by children with their *If I Were* posters.

Background:

Children at an early age are not known for their empathy. They have a hard time walking in another persons' shoes, imagining other peoples' needs and way of life. This was the reason for the theme **If I were…** . Knowing that children like animals and plants very much, we took these topics as our starting point for an empathy lesson.

Purpose:

- Enhance empathy for animals and plants.

Aims: the children will:

- Know types of animals and plants
- Learn about his favorite animal / plant's habitat, way of life, feeding process, breeding, special abilities and fun facts
- Try to imagine how they would live and what would they feel if they were the chosen animal / plant
- Become more environmentally friendly.

Vocabulary/Key words:

Poster, habitat, breeding, search information vocabulary describing animal and plant life.

Process skills: observe, analyze and describe, plan, gather information, select information, draw conclusions, make a poster, present in front of an audience, dramatize, draw conclusions.

Time/Duration:

One - two weeks (depends on the number of children).

Materials and resources:

- Posters with: drawings, painting and prints of animals, craft, written notes, real objects, photographs
- Light projector, video-camera
- Internet resources.

Questions:

How would I live and feel if I were a….?

Procedure:

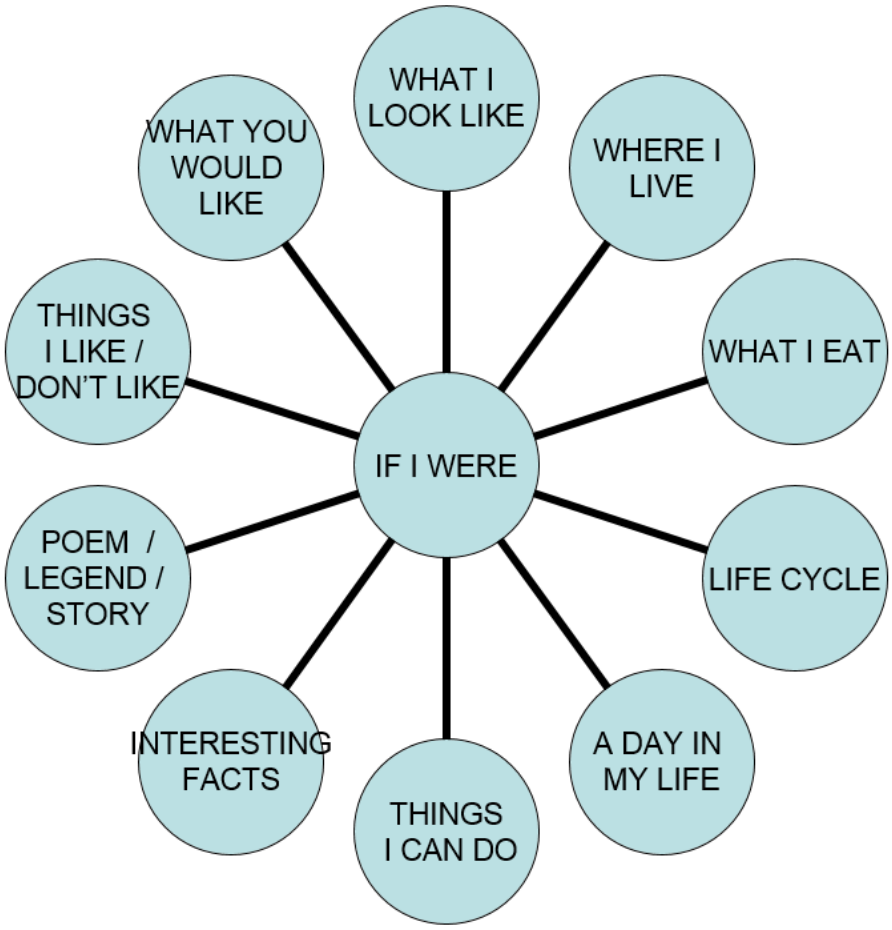
A. Preparation:

First we introduced topics such as dinosaurs, insects and bugs, birds, reptiles, mammals, plants. We classified them, talked about characteristic features, abilities, feeding and breeding. Now it was time to think with our hearts.

B. Exploration:

Each child picked an animal, plant he or she would like to be. We discussed together what sources of information are there and how to search for information. Next, we made a poster project outline which looked like this:

PROJECT OUTLINE



The teachers wrote a letter to parents explaining them the Comenius theme, what they are invited to do along with their children and the outline of the project.

When the children came back with their project, they presented it in front of their classmates. Most of the children who were proficient in English, presented their project in English. Most of the presentations were videotaped and shown to other children and to parents during general meetings.

While the children presented, they were asked to have a logical order like:

- Habitat
- Description of the animal / plant
- What it eats
- How does it breed, life-cycle
- Enemies
- Special abilities

- Interesting facts
- Literary and cultural references
- Why they would like to be that animal / plant
- What would a day look in their life if they were this creature
- Who helped them in the project and how they worked on it.

C. Discussion questions:

In what habitat can we find you / where do you live? What do you look like? Do you have a skeleton? What do you eat? Do you lay eggs or give birth to living babies? What enemies do you have? What can you do? What books / cartoons / art work / music is there about you? What does a day in your life look like? Who did you work with for the project? Where and how did you look for information? Who had the idea of making this craft?

D. Conclusions:

The project presentations were very nice indeed. It is very useful for children to be videotaped and then to see their presentations. Some of them asked us to tape them again because they wanted to have a better performance. Parents were also amazed how fluently children aged 6 could speak freely in English. These projects were very useful not only for the content and intrinsic information but for enhancing the children's ability to organize information and present it in a catching way.

E. Assessment:

The assessment was done two ways:

- The assessment of the poster-project: layout, informational content, references, pictures / drawings / craft and of course if it fulfilled its purpose

- The assessment of the poster presentation: logical outline, fluency, knowledge and understanding of work presented, personal input, quality of voice, ability to answer questions.

Further investigations:

A display of the posters can be done in the corridors of the school and parents should be able to access their children's presentations on line.

Teacher's notes:

As teachers, we felt that the making of the poster-projects strengthened the relationship of the parents with their children's school program. Another effect was that children became more concerned about their environment.

Creative superheroes – Lesson Plan Synopsis

Lesson plans	Partner Country	Synopsis
Plastic Man, the superhero	Romania	A lesson on ecology and an example of how to reuse plastic bottles.
Solar detective are on the way	Austria	Kids experiment with the power of sun and explore generating energy from solar power.
Making robots	France	Children learn about robots and create a dog robot out of reused materials.
The avengers saving the Earth	Romania	A summary of the activities done by the kids before and during the summer show on ecology.
I am the environmental hero of my future	Turkey	A series of indoor and outdoor activities to raise awareness about nature and environment.
A water treatment plant	Poland	Kids learn how to purify water by using different layers of natural filters.
Recycled paper	Romania	Can we make new paper from scrap paper? This is the question.

School/Kindergarten: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Age group: 5-6 years old
Teachers: Cristina Vacaru and Stefania Roman

Plastic Man, the superhero

Introduction:

The Saviour Plastic Man – a name you should remember. It's the name of a new type of hero, one that has real powers to protect us, our life and the entire planet. This activity about him is part of the project **Creative Super Heroes.**

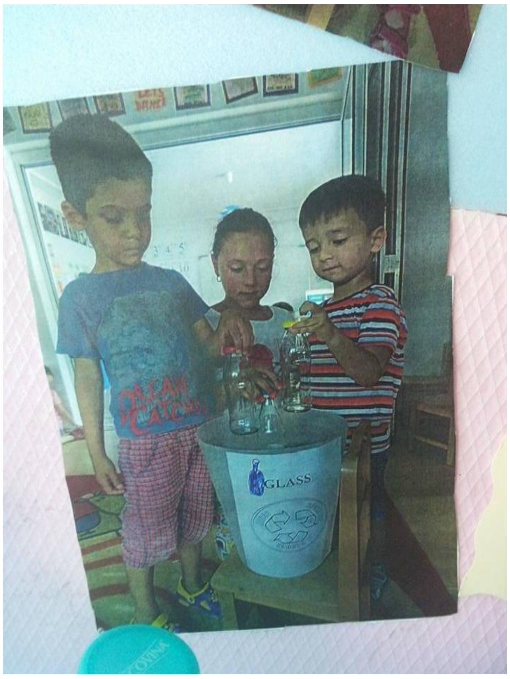
This is a hero created by the children to help people save the world. You may wonder how? Well, Plastic Man is here to remind us that we can do things only together: if we recycle, save our resources like water and evergy, reuse waste we help our hero, ourselves, and also the planet Earth.

Background:

Ecology is the relationship of living things to each other and to what's around them. The word ECOLOGY comes from Greek words meaning "study of the household." That means that ecology is the study of the "household" of living things: their neighbors and neighborhood.

Ecology includes not only how living things interact with each other, but how they interact with their physical environment: things such as climate, water, and soil.

(Source: Learn about ecology, http://kids.nceas.ucsb.edu/)



Purpose:

- Raise the children's awareness about the importance of recycling, reusing waste and reducing the waste of natural resources

Aims:

- Identify materials that can be reused rather than simply deposed of for recycling or waste
- Combine different reused materials
- Learn about what we can recycle and what sources can we reduce
- Describe step by step how the superhero was made.

The children will:

Learn about the power of a superhero, have the chance to explore individually and in groups what ecology means.

Vocabulary/Key words:

Ecology, recycling, plastic bottles, metal caps, recharge, compost.

Process skills: observe, analyze and describe, plan, build reusing materials, communicate observations, information and conclusions.

Time/Duration:

35 minutes /one part of activity

Materials and resources:

Huge pannel, plastic bottles, colored metal caps, glue – stick.

Questions:

- ***Why is this important for us and for our planet?***
- ***How can we protect the natural resources of the planet Earth?***
- ***Why is necessary to learn about ecology?***

Procedure:

A. Preparation:

Start by introducing the term ecology. By connecting it to other words like eco, and to their earlier experince, the children could come with a reasonable definition of the term. Now present them the reusable things that have been prepared to build the hero and ask them to give you other ideas of things that can be re-used. Explain that Plastic-Man wants to remind people how important is to reduce, recycle and reuse. Next brainstorm examples of what they do in school or at home in order to help the Saviour Plastic Man.

B. Exploration:

Let the children plan and build Plastic Man. Encourage them to come with creative ideas about how they can use one or the other of the materials. Encourage them to work as a team and find their own solutions to problems. Our children first made a plan, made some measurements, then they built the head, neck and trunk and the next day they continued with the rest of the body. While still planning, encourage the children to think about the size, the abilities and personal features of this hero. It helps them know that usually, superheroes have one or more special powers that make them different from the rest of the people. Discuss with the children what special powers could Plastic Man have.

C. Discussion questions:

How tall could The Saviour Plastic Man be? How many plastic bottles and metal caps do you think we need to build it? What special powers could our her have? Why is our superhero important to us? What can you do to help our hero?

D. Conclusions:

At the end of activity, the children were very happy to see their hero come into being. They learnt a new and funny way to make use of plastic bottles and enjoyed the whole process of planning and making it.

E. Assessment:

The teacher appreacitated the demonstrations of creativity and problem solving skills. The children demonstrated a positive and constructive attitude towards ecological issues.

Further investigations:

Create a book *The Adventures of The Saviour Plastic Man* or describe a day in the life or The Saviour Plastic Man.

Teacher's notes:

The ecological education is achieved only if is disseminated in society, if the local community is responsive to the environmental problems and understanding the necessity of an ecological behavior. Knowing these things, we consider that it is our duty, the teachers of today and tomorrow to promote the values of the ecological education in the community where we live.

School/Kindergarten: Kindergarten der Volkshilfe Rosental a. d. K., Austria
Subject: Integrated Science - Physics, Solar-Energy, Renewable Energy, Climate Protection
Age group: 3-6 years old
Teacher: Sabine Hirschmugl-Gaisch

Solar detectives are on the way

Introduction:

This activity is part of the theme **Creative Super Heroes.**

Background:

In the context of our large-scale project "Climate protection in the Kindergarten", we set a special focus on renewable sources of energy, such as wind and hydropower and in particular on the production of solar energy.

Purpose:

We have done research on the issue of climate change and alternative energy as well as alternative power generation. Therefore, we have built models like wind turbines, water wheels, solar cookers and solar models. Shortly after the completion of the project we were awarded the "Climate-Alliance-Kindergarten"-certificate from the "Climate Alliance Styria".

Aims:

The main goal of our experiments was to experience the power of the sun and to explore energy generation from solar power.

Vocabulary/Key words: solar-energy, power generation, photovoltaic, solar cell, solar cooker

Process skills:

Observing, analyzing and describing, planning, conducting an experiment, gathering information, collecting data, interpreting data, drawing conclusions, communicating observations, information and conclusions

Time/Duration:

Approximately 50 minutes – 6 children

Materials and resources:

4 plastic cups of two different sizes, 4 black and white paper cylinders, 4 cups for covering, thermometer, water, 4 cardboard pads coated with silver tinfoil, 2 thermometers and one white and one black piece of paper, magnetic board, identity cards for the evaluation.

Question:

What colour can heat things up most effectively? Can solar power heat up water until it boils? Can we heat or cook with sun power?

Procedure:

A. Preparation:

In the beginning try to feel the sunrays on our skin. Then prepare a course of cut out hands and feet in the following colours: white, yellow, gold and black. These hands and feet out of paper are placed in the sun and after a short time we can feel what colour is able to store and reflect most of the heat (black). In addition, we prepare finger warmers and solar cookers in order to heat up water for tea, to dry slices of apple and to melt chocolate.

B. Exploration:

After feeling the power of the sun on the skin and on the cut-out hands and feet, place a white and a black sheet (each provided with a thermometer) in the sun in order to observe, if the temperature rises or not. At the same time place 4 cups in 2 white and 2 black cardboard cylinders, fill them with water and cover them with the remaining 4 plastic cups. Then the question is: "What do you think will happen now?" – An evaluation of our experiments is done with identity cards on the magnetic board. Finally, the process of water heating is closely observed (fog, water droplets, which settled on the cup). Finally perform a "detector test" with your fingers and with the thermometer (in order to feel, respectively to measure how warm the water has become in the meantime).

C. Discussion questions:

What happens to the water in the cups? Will the water in the black or in the white cylinder heat up faster? - What else can be watched and observed? - What paper will heat up faster (the white or the black paper)? Does that have an effect on the thermometer?

D. Conclusions:

After very short time children realised that the dark colours respectively the water in the black cups heats up more rapidly while the bright and white colours hardly warm-up. Explanation: The white colour reflects most of the sunlight (reflection) while the black paper absorbs most of it (absorption).

E. Assessment:

The fast warming of the dark colours as well as the other processes in the solar cookers (heating water, drying apple slices and melting chocolate) were perfectly comprehensible for the children.

Further investigations:

Other experiments were then made with solar cells and solar-powered vehicles: moving solar vehicles (train and turtle) in sunlight; setting small motors (equipped with flowers or creatively designed round slices) in motion with the help of a solar cell.

Inquiry and creativity elements:

Researcher`s question: Do solar cells only function when the sun shines? Can the sun-energy in the solar cells be saved for dark days? In order to widen children`s experience with solar energy, they were given the opportunity to build houses, figures, etc. on their own with the help of solar cells, Lego-materials and small motor engines, that could be run by sun-power.

Teacher's notes:

To learn about the technology and the application of solar energy was a great experience for the children! Especially the cooking with our solar cooker made them enthusiastic about this topic and the work on their self-made solar Lego-models stimulated their creativity. The solar course with the cut-out hands and feet was very impressive, because we were all surprised how fast the power of the sun becomes palpable.

School/Kindergarden: Ecole Maternelle J. Jaures Brignoles, France
Subject: Integrated Science, Technology, Literature and Art, Age group: 3-4 years old
Teacher: Christiane Coumoul

Making robots

Introduction:

This activity is part of the theme **Creative Super Heroes.**

In modern popular fiction, a *super hero* is a type of heroic character possessing extraordinary talents, supernatural phenomena or superhuman powers. The superhero is dedicated to a moral goal or protecting the public. Even if the word *superhero* dates to at least 1917 the superhero fashion started spreading with the American comic books in the 30'. Archetypes appeared before like Robin Hood who wore distinctive clothing and saved those in need. By the 1940, the golden age of comic books, superheroes took over television and cinema. Today, a number of highly profitable franchises help children dream that they are Batman, Spider-Man, Captain America or Iron-Man with special powers.

Many superhero characters display the following traits:

- *Extraordinary powers or abilities, exceptional skills and/or advanced equipment and technology*. Superhero powers vary widly: superhuman strength, the ability to fly, enhanced senses and the projection of energy bolts are all common.
- *A strong moral code*, including a willingness to risk one's own safety in the service of good without expectation of reward. Such a code often includes a refusal or strong reluctance to kill or wield lethal weapons

- *A motivation,* such as a sense of responsibility (e.g. Spider-Man), a formal calling (e.g. Wonder Woman), a personal vendetta against criminals (e.g. Batman), or a strong belief in justice and humanitarian service (e.g. Superman).
- *A secret identity* that protects the superhero's friends and family from becoming targets of his or her enemies, such as Clark Kent (Superman), or to protect themselves from getting arrested by the police, like Spider-Man .

A robot is "A machine or device which operates automatically or in response to a remote control." The robot is primarily an heir machine machinery that we all know, but we want to give him ways and sometimes an appearance that mimics those of living beings and man. *Robotics is a science and a new technology*. Only few domestic robots exist, because it is more difficult to make a mobile robot that includes its environment than an industrial robot fully programmed in advance.

In movies some robots have the traits of super heros: power and abilities, a moral code and a strong belief in justice and humanitarian services: Star Wars, Wall-E.

Background:

Children love animals and especially dogs; we can find animal robots as toys and pets; it is easier to have a pet robot than a real pet at home or in the classroom: it does not eat, does not have to go out, it does not get sick!

Purpose:

To make a dog robot.

Aims:

The children will:

F. watch the movie "Wall-E", see documentaries and images of different robots and their functions
G. describe robots: make the comparison with the living beings (humans and dogs). The robots are machines that can be animated with a motor and / or a remote control
H. build a dog robot with collected objects: which objects will he / she use? How will assemble them?
I. make a dog robot as the class mascot
J. participate in a competition on "robots" at the Medialibrary of Brignoles

Vocabulary/Key words:

Robot, machine, living, human body, animals, non-living, animated object, depending on the robot; hero, heroic act, environment, waste, ecology, planet preservation, programme, collected objects: bottles of milk, water, caps, plastic cups.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

30 minutes each session

Materials and resources:

DVD " Wall-E"; documentaries about robots and humans and animals, dogs; books; pictures, different collected things, scissors, glue, paint, brushes

Question:

How to make a dog robot, our class mascot?

Procedure:

A. Preparation:

Watching the film "Wall-E", proposing documentaries and pictures about robots. Discussion: "What is a robot?" Where can you find robots in everyday life? How is it made? What are the different parts of its body? Is it a living thing? How can it move? What can it do? Can it think?

B. Exploration:

The children make assumptions of how to make a robot dog: the body, legs, muzzle, ears, tail; How to assemble the various parts of the body? What color should they be? How will it move? Next, they choose the materials: collected things and things they brought from home like water and milk plastic bottles, caps, little plastic boxes, pompons, cardboard. They paint some of the parts sliver to give them a metallic look. They stuck the different parts of the body; they add eyes.

After discussions they decide that it is for them to put an "engine" so that the robot could move. They call it "TOBY".

C. Assessment:

- *Science*: the children made the comparison between human beings and objects; they used pictures, documentaries.
- *Technology*: the children appoached robotics - they learnt what robots are; what are they made of and what they are used for.
- *Literature*: the children discovered books (and a film) on robots and super heroes.
- *Art*: they realized an artistic production with collected things: paintings, sculpture
- *Language*: they used everyday language to describe the activity / process, they used everyday language to communicate with peers.

Conclusion:

The children understood that a robot was not a living being but an animated object; we can find robots in everyday life (toys, appliances); in reality robots cannot think or act by themselves; they have become heroes in books, movies or video games (science fiction).

The children took a real pleasure in building a dog robot for the class; they have not managed to make it move but were very proud of their achievement.

Further investigations and creativity elements:

Participate in a contest on the theme of robots, perform other animal robots or androids or create a robot that can move.

The children at the robotic exhibition. The dog robot at the exhibition among other robots.

Enclosure:

WALL-E (stylized with an interpunct as ***WALL·E***) is a 2008 American computer-animated science-fiction comedy film produced by Pixar Animation Studios and released by Walt Disney Pictures. Directed by Andrew Stanton, the story follows a robot named WALL-E, who is designed to clean up an abandoned, waste-covered Earth far in the future. He falls in love with another robot named EVE, who also has a programmed task, and follows her into outer space on an adventure that changes the destiny of both his kind and humanity. Both robots exhibit an appearance of free will and emotions similar to humans, which develop further as the film progresses.

SYNOPSIS In 2805, Earth is covered in heaps of garbage due to decades of mass consumerism facilitated by the megacorporation Buy n' Large ("BnL"). In 2105, BnL evacuated Earth's population in fully automated starliners, leaving behind WALL-E (Waste Allication Load Lifter — Earth class) trash compactor robots to clean the planet. Eventually BnL abandons its plan and shuts down the WALL-E robots, except for one which develops sentience after 700 years of life-experience. He manages to remain active by repairing himself using parts from other units.

One day, WALL-E discovers a growing seedling !

(Source Wikipedia, the Free Encyclopedia https://en.wikipedia.org/wiki/WALL-E)


Disney · PIXAR
WALL·E
JUNE 27

School/Kindergarten: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Ecology, Drama, Art and Literature, Age group: 2-6 years old
Teachers: All teachers

The Avengers Saving the Earth

Introduction:

The activity described below is the dramatic representation of our environmental beliefs and it is an example of creative way of approaching the theme **Creative Superheroes.**

Background:

Shaping environmentally friendly behavior is a continuous endeavor in the Happy Kids Kindergarten and Discovery Kids Primary School. We are trying our best to let the children understand that the future of the Earth depends on how this new generation will treat our planet. We also thrive to make children understand that, even if are small, we can really protect the Earth with little things that we can do every day like recycling, biking or walking instead of driving, using less water, plant flowers and trees etc.

Now, we know that children are very receptive to environmental issues. How about their parents? Unfortunately, in our generation of adults the awakening did not yet fully occur. This is why, by means of our end of the year summer show, our children wanted to reach to their parents' hearts and show them that *children care*!

So, teachers and children altogether wrote a play called *The Avengers saving the Earth.*

This is the story of real heroes who can save the world from pollution and deforestation. It all starts in the rainforest where the flower fairies, the animals and exotic fruit reveal their wonderful world and then, it is shown how this amazing world is destroyed by deforestation, day by day. Home to over 2.5 millions insect species and 2000 types of birds and mammals, cradle of ancient human civilization, the rainforest disappears on a quick pace. Next we see the world of the seas with beautiful mermaids and fascinating coral fairies, speaking of their world of breathtaking beauty but this world is also threatened by excessive pollution. Polar bears and snow queens take over the stage next in a heartbreaking dance, but the melting of the ice caps at the poles will make their survival impossible in the future.

Green-house effect and killing of animals makes us, humans, the most destroying species on the planet.

The direct effect is that the weather becomes unstable and big storms and hurricanes hit the world.

A number of heroes want to save the word: from cartoon heroes like Paw Patrol, to the fairy-tale characters like Snow White, Tinker-Bell and medieval princess and even superheroes try to save the Earth. Unfortunately, in spite of their bragging with their special powers, they cannot help because the real hero who can really save the world is in each of us! We can do small things every day to make this a safer and cleaner world! And then we showed how Happy Kids Kindergarten and Discovery Kids Primary School do this day by day!

The end of the year show gave us the opportunity to:

- Discuss with the children about the three R's
- Make literary and film references
- Change daily behaviors
- Make children aware of the way humans affect the Earth
- Talk about animals and plants in their natural habitat

Purpose:

- For the future of our world, the children need to be able to identify types of pollution, habitats it can affect, and how they can protect the environment with simple, daily actions.
- Encourage creative thinking and environmental awareness.

Aims: the children will:

- Know types of pollution like deforestation, water pollution, green house effect
- Associate habitats with different types of animals and plants
- Know how to reduce water, electricity waste
- Know that we can reuse materials for crafts
- Recycle paper, plastic, glass, metal
- Talk about different kinds of heroes and heroines (from literature, cinematography) and their powers
- Change daily behaviors to become more environmentally friendly

Vocabulary/Key words:

Rainforest, deforestation, pollution, green-house effect, garbage, save the world, superpowers, clean, reduce waste, reuse, recycle paper, plastic, glass, metal.

Process skills: observe, plan an event, communicate and draw conclusions.

Time/Duration:

About three weeks.

Materials and resources:

- Children's drawings to be projected as a background during the show.
- Scene set, lights, music, sound and light systems.
- Special costumes and outfits.
- Internet resources on pollution

Questions:

What can we do to be the superheroes who save the planet?

Procedure:

A. Preparation:

1. Teachers along with children outline the story (the superheroes mentioned in the script will be the children's favorite characters, cartoon and film heroes).
2. Some of the teachers write the scripts, others come along with the proper music, while teacher assistants prepare the costumes.
3. The children make the drawing that will be projected as a background during the show.
4. Films on deforestation, water pollution and melting of the ice at the poles are downloaded from the internet and prepared to be projected during the show

5. Photos of how the children reuse, reduce and recycle in the preschool and school are made

B. Exploration:

Scene I: The story begins with the rainforest where fairies of all animals, birds, of exotic fruit or the spirit of the forest talk about the amazing and the colored life in the rainforest.

I am the spirit of the forest
Of all trees, plants and birds in the nest
Of bunnies and lizards and even snakes
Of clear springs and mountain lakes
All leaving creatures and every tree
It's magical and fabulous, you see?

When the fairy of all animals calls on the beast of the forest to come to her, two-year-old babies dressed as wild animals marched in the scene.

When the flower fairy asks for the flowers to open, two year old baby girls sway on gentle music:

While the children are still on the stage, a video of deforestation is projected on the background screen. The images and the music are meant to raise awareness and awaken the environmental spirit in the parents' souls.

Next, the world of seas with beautiful mermaids and coral fairies dance with waving arms.

The messages that every creature sends out talks about facts, characteristics, abilities of each creature. For example, this is what the coral fairy said:

We have lots of shapes and colors

And yet we are not flowers

Green, orange, yellow and blue

We are wonderful creatures, it's true

We love salty and clear water

To small fish we are shelter

We are like a natural fence

When sharks around begin to dance.

The other coral fairy talks about its friendship with the anemones, about their living in the shallow waters, about people coming to see them from far away places and about how fragile they are when the water is polluted. Thus, from each set of lyrics, children learn lots of important information about the character.

The scene ends with a video on water pollution. Some parents and grandparents begin to cry!

Next, the audience is taken to the North Pole, where polar bears have a touching dance with snow queens and fairies.

The polar bears are drowning because the ice-caps melt. Is this the world we want for our children?

Because of the climate changes the weather goes upside-down: the sun is too hot at the poles, there are strong winds and hurricanes or very dry seasons. This is what Icy tells the Sun:

What are you doing here, my friend?

You should be hot in the desert where it's sand!

Don't you know that too much sun

Harm to this land has done?

The icebergs have been melting

And polar bears have been starving.

It is clear! We have to do something to save the world. A call of help is answered first by the environmental cartoon heroes Paw Patrols. They are funny looking pups which turn into police, fire-fighter, worker and life-guard heroes. But in spite of their training, there is too much pollution for such little pups. (Because our pup-boys don't like dancing too much they gave us an insight of their training sessions – crawling, running, gliding etc.)

Next, fairy-tales princes and princesses (The Winks, Tinker-bell, Snow-white, knights in silver armor), known for their big hearts and caring for the nature try to help:

Flora: We are the girl's united and I have the powers

That come from the plants and flowers

It's all for one and one for all

Our special powers will make evil fall.

This is the way we will try to make

The earth a much better place.

In such a desperate situations, we need our superheroes (Superman, Spiderman, Ironman, Turtle Ninja).

Superman: I am super strong and tall

I can see even though the wall

I can fly into deep space

With the rockets I can race

We are amazing superheroes with powers

We will save this planet of ours.

Finally, we realize that all these superheroes cannot be of real help because the real hero who can save the world lies in each of us. We shared with the parents photos of how the children take care of the environment through their daily actions. We also give the parents some suggestions of little things they can do: walk more than drive, let the children play with natural materials, save electricity, recycle etc.

C. Discussion questions:

How does the activity of the humans put the Earth in danger? Which are the animals and plants that live in the forest / rainforest / seas and oceans / colder regions? How does pollution affect them? What can you and your family do to make Earth a better place?

D. Conclusions:

The parents, grandparents and members of the community who attended our shoe were very impressed. They told us that they had never seen the things this way and they would change things for the better. The children taught them a very important lesson to follow in life.

E. Assessment:

The children liked the show very much. They understood the message and they sent it from all their hearts. They even said their parts and danced their dances a long time after the show was performed.

Further investigations:

The videos and photos used for the above described event were used by the teachers to further reinforce friendly attitudes towards nature.

School: Ş. Jan. Uzm. Çvş. Ahmet Güngör Anaokulu, Tarsus-Mersin, Türkiye
Subject: Nature, Environmental education, Language development, Creativity, Drama
Age group: 4-6 years old
Teacher: Nilüfer Keskin

I am the environmental hero of my future

Introduction:

The activities in this lesson were organized under the theme **Creative Superheroes.**

Background:

Our environment is not only a heritage from our elders, but it is also a trust treasure to keep for the future generations. From this starting point, we thought that it was our responsibility to raise the consciousness for keeping/saving our world.

We approached this topic from 3 dimensions:

- Sea
- Forest
- Environment

Time: 5 days

Purposes:

- Raising awareness about nature and environment
- Focusing on the importance of protecting sea and environment
- Focusing on the importance of forest for the world

Aims:

At the end of this lesson, children will:

- Be aware of the threats for the environment

- Know about environmental pollution, water and air pollution
- Search for the reasons for the pollution
- Search for the ways to fight against pollution
- Act out role-play activities for sea animals
- Know about the importance of saving our nature and environment for a healthy future

Vocabulary/Key words: protect, keep/save our sea-forest-environment, pollution, placards, slogans

Process skills: observe, analyze and describe, plan, act, play, drama, gather information, collect data, interpret data, draw conclusions

Questions:

- ***How can we protect our environment?***
- ***What can we do to raise consciousness for keeping the environment and nature?***
- ***What happens if we don't care about the sea?***

Procedure:

A. Preparation:

During the week, children watched videos, slides and cartoons about our natural richness in their classes. We talked about our values in nature. Students were motivated to make brainstorming about what to do to save our environment and what will happen if we don't care about natural heritages.

B. Exploration:

We used drama technique for teaching the importance of keeping the sea for ourselves and other sea creatures. Our slogan was "OUR CHILDREN SHOULD ALSO SEE THE SEA BLUE!"

Saving the forest: Children could learn a lot from the fairy tales and stories that they listen to. So we used this method for teaching the importance of forest for our life.

We started of with the slogan «CLEAN ENVIRONMENT, CLEAN SOCIETY!» Wıth our placards in our hands, we walked through the most crowded street to make people hear our voice.

C. Discussion questions:

- What can we do individually and as a society to protect our environment?
- Why is sea important for us?
- Why are the forests important for our future?
- What happens if we don’t care about our environment?
- What kind of precautions can be taken against pollution?

D. Conclusions:

We must raise the awareness and consciousness of our children about the threats of environmental, air and sea pollution. Children are our future and they need fresh air, clean water and clean environment. Our environment is not only a heritage from our elders, but it is also a trust treasure to keep for future generation.

E. Assessment:

Drama activities related to water pollution and sea animals were very attractive and children were impressed by the role-plays they acted.

The protesting against pollution arouse the consciousness towards environmental awareness. They were very enthusiastic about showing their reaction against pollution.

In-class activities were very useful for contributing to their knowledge about our natural sources and their importance for their future life.

Further investigations:

There are many organizations and foundations fighting against environmental pollution, forest protection, etc. A collaboration can be made with these institutions and some trips can be organized to these places to see what they are doing within this frame.

Inquiry and creativity elements:

Our future is in our hands.

SAVING THE WORLD IS THE BEST GIFT TO GIVE OUR NEXT GENERATION!

School: Szkoła Podstawowa Nr 2 in Siewierz, Poland
Subject: Integrated Science, Age group: 3-4 years old
Teacher: Dagmara Malota-Machura

A water treatment plant

Introduction:

These activities are part of the theme **Creative Super Heroes***.* Together with the children we were looking for ways to save our planet. Apart from waste sorting and gaining green power the children got to know how the water treatment plants work.

Background:

Water purification is the process of removing undesirable chemicals, biological contaminants, suspended solids and gases from contaminated water. The goal is to produce water fit for a specific purpose. Most water is disinfected for human consumption (drinking water), but water purification may also be designed for a variety of other purposes, including fulfilling the requirements of medical, pharmacological, chemical and industrial applications. The methods used include physical processes such as filtration, sedimentation, and distillation; biological processes such as slow sand filters or biologically active carbon; chemical processes such as flocculation and chlorination and the use of electromagnetic radiation such as ultraviolet light.

(Source: http://en.wikipedia.org/wiki/Water_purification)

Purpose:

To purify contaminated water.

The children will:

- know the water cycle
- understand the importance of saving water
- be familiar with the effects of water pollution
- know how to purify contaminated water

Vocabulary / Key words:

Water, water purification, contamination, water cycle.

Process skills: observe, analyze and describe, conduct an experiment, draw conclusions communicate observations, information and conclusions.

Time / Duration:

45 minutes

Materials and resources:

Water cycle diagram, jar, coffee filter, flower pots, activated carbon, bird sand, grit, water, bread crumbs, garden soil

Questions:

How to purify contaminated water?

Procedure:

A. Preparation

Explain the water cycle to the children and show them the chart. After that tell them about the water contamination. Help the

children to make their own contamination – sewage (mix some water with bread crumbs and some garden soil).

B. Exploration

It's time to make a sewage treatment plant (a filter column). Put a coffee filter in a jar. On the top of the jar put three flower pots. One should be filled with activated carbon, the second one with bird sand and the third one with grit. When the construction is ready pour the sewage inside, wait and observe what happens.

After the filtering process contaminated water becomes clean.

C. Discussion questions

How to purify contaminated water?

Filtered water.

D. Conclusions

The children noticed that the process of water purification is complicated. Each section our water treatment plant (the filter column) removes dirt particles from the water, purifying it. The different filters remove particles of different sizes and the clean water drips down into the jar.

E. Assesment

The children really liked the classes. They enjoyed carrying out an experiment with sewage treatment plant and couldn't believe their eyes! It was quite easy for the teacher to observe children working. They enjoyed communicating with each other and shared their observations spontaneously. The teacher appreciated children's involvement, creativity and curiosity.

Further investigations:

You can carry out another ecological experiment with children – a lemon battery. Stick two wires (one copper and one steel) into the lemon. After that put a tongue against the wires and the eco current is ready.

Inquiry and creativity elements:

In order to sum up all the ecological activities carried out at our school we organized Ecological Fashion Show.

Ecological Fashion Show. Costumes made of waste.

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Language and Art, Age group: 6-7 years old
Teacher: Mihaela Balint

Recycled paper

Introduction:

This activity is part of the theme **Creative super-heroes save the planet**. The children are aware about the importance of the forests, try to identify problems related to deforestation and find solutions to those problems according to their age and interests.

Background:

Paper is made of cellulose fibers which comes from plants (trees); millions of fibers tangled together in a thin layer. The fibers naturally bond to one another. Water breaks down this bond. When we cover scrap papers with water the fibers in the paper loosen their hold on each other; they can be separated out and re-used to make new paper - recycled paper.

Purpose:

Making new paper- recycled paper from scrap paper.

Aims:

The children will:

- understand the nature of the paper-cellulose fibers
- observe, analyze and describe different types of paper
- observe how the scrap paper soaks the water
- observe how the water evaporates from the pulp and the fibers stack together again to form the new paper

- understand that recycling paper is a good method to save the trees
- discover new recipes for home-made paper
- use these new pieces of paper in creative ways

Vocabulary/Key words: strands of wood-cellulose fibers, tiny, long, thin, small, bond together, paper scraps, pulp, recycled paper, mixture, soak, break down, bind/steak together, dry, evaporate/evaporation, recycle, recycled.

Process skills:

Observe, analyze and describe, plan, conduct an experiment, gather information, draw conclusions, communicate observations and conclusions, using the creativity to discover new "recipes" for (recycled) home-made paper.

Duration:

3-4 days. It depends of a few factors like the paper scraps type, the temperature of the air, the humidity of the air, so on.

Materials and resources:

Paper scraps, a bowl, some hot water, a rolling pin, cornstarch or/and PVA glue, newspapers, aluminum foil or plastic bag.

For a special home-made paper: glitter, food dyes, cotton wool balls, pieces of cotton threads, confetti.

Also very useful: IWB, computer, cellulose fibers images, (internet link), different pieces of wood, books and encyclopedias for children.

Question: ***Can we make new paper from scrap paper?***

Procedure:

A. Preparation:

Now it is the perfect time to use what's inside the scrap paper bin. Can we make new paper from all those scraps or at least from some of them? Let's take a look. All kinds of paper: thin paper, thick paper, cardboard, tissue paper, colored paper, white paper, glitter paper, simple paper, paper with different kinds of patterns and textures. Let the children explore the content of the waste-paper bin. They love to tear everything into small pieces.

Show the children on the IWB some images with cellulose fibers and explain them how the paper is made of thin, long, tiny strands of wood-cellulose fibers, squashed together. The fibers can be separated and rearranged into new paper. A visit in a paper/cardboard workshop/factory is useful, too.

The children work in small groups. Each group will make his own recycled paper. The basic recipe is based on a thick mixture of scrap paper soaked in water (the pulp) and glue. The cornstarch (or PVA glue) we added helped bind the cellulose fibers together again.

B. Exploration:

- Tear thin scrap paper into small pieces and put them into the bowl.
- Pour enough hot water to cover the paper. Let the paper sit and soak water for a few hours. When it looks and feels like cooked oatmeal it is ready.
- Add a few tablespoons of cornstarch or PVA glue and a little more hot water. Mix it all up again. This is the **pulp**.
- Make a strainer out of a piece of aluminum foil. Punch lots of small holes in it with a sharp pencil. Put the aluminum foil on top of a pile of newspaper. Cover the aluminum foil with a thin layer of pulp. Place another sheet of aluminum foil on top and press down to drain the water. Use a rolling pin. Lift the top sheet of foil and make sure there are no gaps in the mixture. Replace the top sheet of foil. Place some heavy items on top of the pulp to press it flat. Remove the top layer of foil and lay the pulp on some fresh newspaper. Leave it to dry.
- After a day or two carefully peel the new paper from the foil. You just created paper!
- You can use a plastic bag instead of aluminum foil.
- For a special home-made paper children can add to the pulp confetti, glitter, cotton threads, cotton wool balls, food dyes. Let the children explore and find new recipes.

C. Discussion questions:

What is cellulose? What does it look like? Where we can find cellulose fibers? Is it an ongoing resource? Can we make new paper from scrap paper? Does the new paper look like the older ones? What does the new paper look like? What colors/patterns can you notice in the new paper? Can you touch it? How does it feel? Can you notice any differences between the paper made with cornstarch and PVA glue? Is recycling paper a good method to save the trees? What can we do with the new paper? Give me some ideas about that. Would you like to try some of these ideas?

D. Conclusions:

- The recycled paper can have different properties from the older one. The properties of the recycled paper depends of the properties of the paper scraps (colors, thickness, patterns).
- Recycling paper is a good method to save the trees; it is a simple and interesting process and we had fun doing it.

E. Assessment:

The children are delighted to make their own papers for crafts. The teacher can easily appreciate their enthusiasm and involvement in the activity, their ideas related to the new paper fabrication and utility. The final products are very useful, too. Also, it is very important if the children *really* collaborate during the working process.

Further investigations:

If we add some cotton wool balls in the pulp the new paper will be stronger or softer? What about cotton threads? What else can we add in the pulp to make a new paper? Can we make recycle paper from newspaper? What color has this recycled paper? Why? How can we make this paper white?

Can we make a thicker sheet of paper just adding one more sheet to the first one? Can we reuse the recycled paper? Can we make perfumed paper? What do we need for that?

Inquiry and creativity elements:

The children worked in small groups which encouraged dialogue and collaboration. Children collaborated in sharing and discussing different ways to make new special paper. The context of the activity provoked children's imagination and motivated the children to become engaged in the process.

They use and develop science skills such as *observing, analyzing and describing, planning an activity, conducting an activity and searching for new ideas* about paper crafts. Adding food dyes, glitter or confetti the children can make some special paper for crafts. Children use IWB and internet links to search for information.

Teacher's notes:

This activity was a great opportunity to do something really wonderful with a big box filled with paper scraps. The activity wasn't as messy as I thought before. The children loved to make paper, especially to tear the scrap paper into small pieces.

The recycled paper is very good to make marble paper.

Our home-made paper process is similar to what happens in paper recycling factories. There they add chemicals instead of glue or cornstarch to break down the paper and have huge tubes to soak the paper in and heavy rollers to press and roll it. Printed paper is cleaned with bleach chemicals to make it white.

Science in a box - Lesson Plan Synopsis

Lesson plans	Partner Country	Synopsis
Turn on the light bulb!	France	A simple and effective lesson on electricity and closed circuits.
The green earth breathes out clean water	Turkey	A 3 week experiment for kids to learn that plants clean the air by producing oxygen.
About magical heads & dancing stars	Austria	A hands-on, fun activity on electrostatics and static electricity using a plastic stick and different other common materials.
My box of magnets	Romania	A typical inquiry-based lesson on the attractive power of magnets for young discoverers

School/Kindergarten: Ecole Maternelle J. Jaures Brignoles, France
Subject: Integrated Science and Technology, Age group: 5-6 years old
Teacher: Carole Preulier

Turn on the light bulb!

Introduction:

This activity is part of the theme **Science in a box.**

Background:

All atoms contain electrons. The movement of the electrons causes electricity. Electricity can be static (if the electrons jump short distances in a random fashion as in materials such as plastic, rubber and nylon) and current electricity which results from an orderly flow of electrons moving along a conductive material, just like water moves through a hose or pipe. This patch that electrons follow is called an electric circuit. The circuit usually includes three main parts: 1.The source of electrical energy which can be a battery. The source is the one that supplies the electrons. 2. The object that makes use of the energy which can be a light bulb and 3. A conductor that connects the two together and makes it possible for the electrons to "travel". The conductor is usually a wire. An uninterrupted path through which electrons flow is called a complete or closed circuit. A circuit can include one or more paths. If this is the case, electrons will go through all the available paths.

Purpose:

Prove that electricity exist and it can flow through closed circuits.

Aims: the children will

- Learn that batteries supply electricity
- Become aware that electricity flowing in circuits can produce light

- Construct close and open circuits
- State cause and effect relationships between the battery, the wire and the electric bulb and describe the interaction of components in the electric system
- Raise awareness of everyday appliances which use electricity like the light bulb, heat up or technology that produces sound and move
- Formulate predictions based on observations
- Demonstrate save behavior and appropriate procedures in science inquiry
- Conduct an investigation and record data in an organized and appropriate way
- Communicate verbally or in writing the results of an inquiry, compare the results with the other peers
- Give examples of how science and technology are used in appliances nowadays and how they have improved the lives of people.

Vocabulary/Key words:

Light bulb, battery, wire, connection, circuit, electricity, electrons, drive, connect / disconnect, turn on / off.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

30 minutes

Materials and resources:

- 1 electric bulb
- 2 electric cables
- 1 battery

Question:

How can we turn on the electric bulb?

Procedure:

A. Preparation:

The teachers turns on and off the light and asks the children what is happening. The teacher explains that what goes into the bulb is electricity. It can be extremely harmful but "today, we are going to play with safe electricity". The teachers announces that they are going to turn on the light bulb by connecting a wire, a battery and the electric bulb. The materials are presented to the children and safety regulations are put into practice. The teacher explains the task: to connect the three parts so that the bulb lights. Next she handles the children the worksheet to be completed during the first week (worksheet no. 1). The children get into small groups of 3-4 and get the materials.

B. Exploration:

The children manipulate the materials and try out different combinations till they find the proper way to connect the three parts. Communication within the group is essential. Let the children work independently even if it takes much more time. Ask them what the battery stands for (source), next do the same with the wire (conductor, way) and light bulb (the one that benefits from or "eats" the electricity). The experiment should be followed by discussions about the use of electricity in everyday life and the way appliances and electricity driven things improve the quality of our life.

C. Discussion questions:

From your experience, what happens to a toy that does not have batteries? So, in our case, which of the three parts produces electricity? How does electricity travel? Where on the bulb do we connect the wires so that the bulb turns on? Which things in your home work with electricity? What happens when there is an electric blackout, what are the things that you cannot use/ do at home? Your mom and dad have more time to play with you because there are things in your house that work with electricity and help them do their chores faster. Which are some of these things that improve people's life? How did people wash the clothes in the past, when there were no washing machines, for example? How long did it take for a mom to do the laundry?

D. Conclusions:

In order for the light to be lit up, the wires have to be connected to the battery on one side and to a specific part of the bulb on the other side. Life in the modern society means using a lot of things that work with electricity starting from the electric bulb up to the electric car.

E. Assessment:

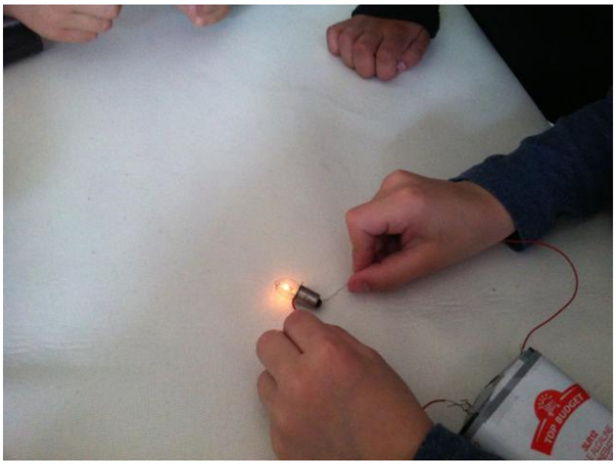
Even if it seems quite challenging to work on electric circuits with preschoolers, the children complied very well with the purpose of the lesson and participated with great enthusiasm, especially since they saw the task as one for "older" kids.

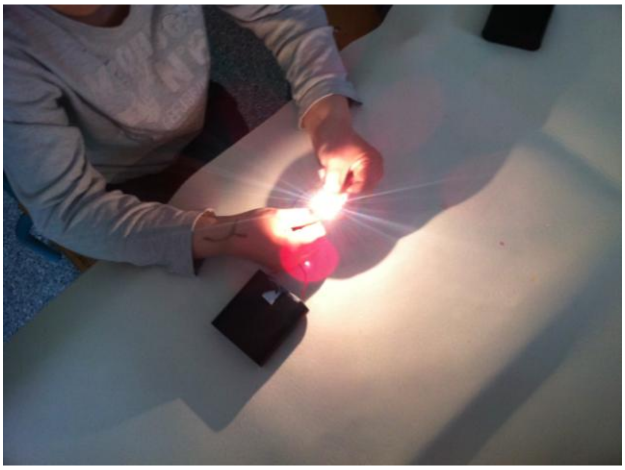
Further investigations:

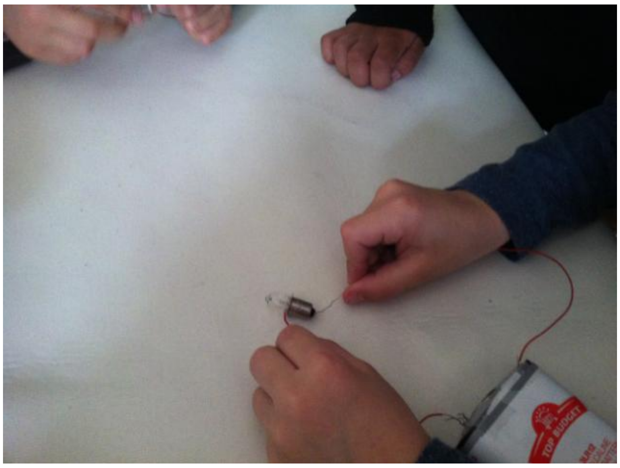
Try to turn on two bulbs with more cable and one battery or make a collage-booklet on household appliances.

Teacher's notes:

The children were very active during the experimentation. They participated with a lot of enthusiasm. They all tried until they succeeded to turn on the light. The discussion after the experimentation was interesting because it helped them to organize their mind and finally they explained what a circuit is: "all the parts need to be connected".



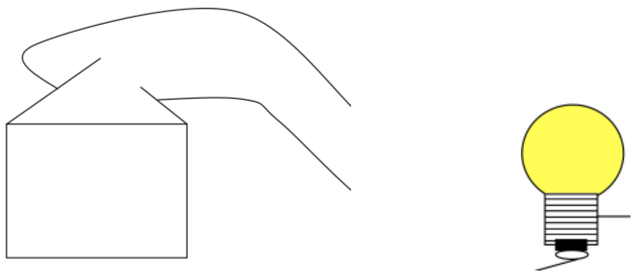




Enclosure 1

Domaine: découvrir le monde les objets **Compétences:** découvrir l'électricite				
lundi	mardi	mercredi	jeudi	vendredi

Défi 1: je sais allumer une ampoule avec une pile et deux fils.



J'ai réussi: OUI NON

Je dessine exactement mon expérience pour que l'ampoule s'allume.

Enclosure 2

Domaine: découvrir le monde les objets **Compétences:** découvrir l'électricité				
lundi	mardi	mercredi	jeudi	vendredi

Défi 2: je sais allumer deux ampoules avec une pile et trois fils.

J'ai réussi: OUI NON

Je dessine exactement mon expérience pour que les ampoules s'allument.

Enclosure 3

<table>
<tr><td colspan="3">Domaine: découvrir le monde les objets

Compétences: comprendre le fonctionnement d'un circuit électrique simple.

Consigne: colorie les ampoules si le circuit est correctement monté.</td><td colspan="2"></td></tr>
<tr><td>lundi</td><td>mardi</td><td>mercredi</td><td>jeudi</td><td>vendredi</td></tr>
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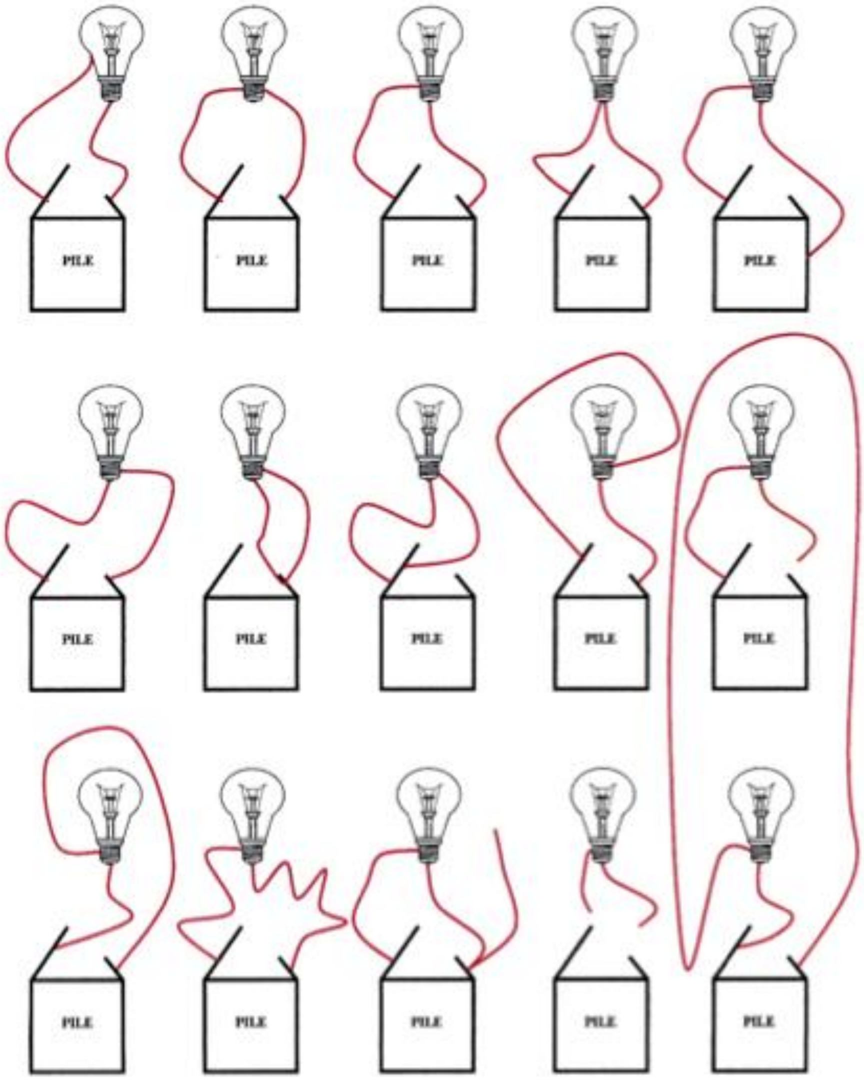


School: Ş. Jan. Uzm. Çvş. Ahmet Güngör Anaokulu, Tarsus-Mersin, Türkiye
Subject: Climate and environment, 5-6 years old
Teacher: Zehra Okur, Nihan Avcı, Nilüfer Keskin

The green earth breathes out clean water

Introduction:

This experimental work was done under the theme **"Science In A Box".**

Background:

Oxygen is very important in our life; not only for us but also for all other living being and the earth itself. In our environment, many things produce oxygen such as plants, and many includes it inside such as water.

Purpose:

- Showing how plants produce oxygen underground and protect the earth.
- Explaining the importance of plants for producing oxygen

Aims:

Throughout the activities of this lesson, children will:

- Make an experimental work with soil, water and plants
- Know about the importance of plants in the soil for producing oxygen
- Explain the reason for this
- Explain why planting is important for earth

Key words:

Oxygen, plants, experiment,soil, water

Process Skills: observation, experimenting, questioning

Time: Three weeks

Materials:

- 3 plastic bottles
- Water
- three kinds of soil:

1. Ordinary soil
2. Soil with wood shavings
3. Soil with grass seeds

Questions:

- ***How do plants produce oxygen underground?***
- ***How do plants protect the earth?***

Procedures:

A. Preparation:

The importance of oxygen was discussed with the children: Why we need it and why the nature needs it. We gave examples around us to focus on the importance of the need for oxygen. We wanted to show children how plants produce oxygen with an experimental work.

B. Exploration:

Children were taken out to the garden with the experiment materials. 3 plastic bottles were cut into half horizantically and filled with soil for this experiment. We filled them with three kinds of soil:

1. Ordinary soil
2. Soil with wood shavings
3. Soil with grass seeds

We watered them regularly, until our grass grew and we could see the grass on the surface of the soil. We had to wait for 3 weeks. After the bottle with grass seed was full with green grass, we made our observational experiment. We hanged transparent half bottles in front of other bottles to see the water coming through the soil and we put water in all the bottles. It was amazing to see the three colours of the water filtered through the three bottles. While the water filtered through the bottle with ordinary soil was the dirtiest, the water filtered from the bottle with planted soil was the cleanest. We observed that the grass was cleaning the soil because it was producing oxygen.

C. Conclusions:

We know that plants clean the air by producing oxygen.

Our objective for doing this activity was to show that planting is not only important for the air but also for the earth.

Further investigation:

These experiments can be enriched with different plants. The importance of planting can be explained further through some geographical events such as earth-sliding, etc.

Inquiry and creativity elements:

It is a clear fact that children like learning by doing. This experiment taught children the importance of oxygen for nature and that we need to plant in order to produce oxygen. This was a nice step for arising their environmentalist mind.

School/Kindergarten:Kindergarten der Volkshilfe Rosental a. d. K., Austria
Subject: Integrated Science: Physics – Electrostatics, Storytelling
Age group: 3-6 years olds
Teacher: Sabine Hirschmugl-Gaisch

About magical heads & dancing stars

Introduction:

This activity is part of the theme **Science in a Box**.

Background:

Invisible forces such as electrostatic ones fascinate children and adults over and over again. As a preliminary task to the topic of electricity the following experiments provide lots of exciting experiences and many opportunities for children to explore these forces independently.

Purpose:

We took a toolbox and packed it with material for several different experiments focusing on electrostatics. There is also a researcher`s manual available [Title: *"Von magischen Köpfen und tanzenden Sternen"* (About Magical Heads and Dancing Stars")] with short stories and the instructions for the experiments.

Aims:

The aim of this experimental series is to give children the chance to experience the phenomenon of "electrostatics" and to investigate the mystery of static electricity actively.

The children will:

The children can choose from the materials in the tool box, our Science-Box, which experiment they would like to try and explore in more detail. Documentation sheets (the kids can record their experience and put it into their personal portfolio) are also available for the children.

Vocabulary/Key words:

"Invisible powers", electricity, electrical charge, attraction and repulsion, frictional electricity.

Process skills: observing, analyzing and describing, planning, conducting an experiment, gathering information, collecting data, interpreting data, drawing conclusions, communicating observations, information and conclusions.

Time/Duration:

30 minutes; 2 – 4 children

Materials and resources:

Plastic sticks, balloons; fur, wool, or cloth; template of paper stars, sailors made by tissue paper; Animation: http://phet.colorado.edu/en/simulations/translated/de (Balloons and Electrostatics)

Question:

What happens when a stick is charged and is able to drive a paper star or even a tin?

Procedure:

A. Preparation

"Dancing Star": template of the paper star; scissors; cork; toothpicks; plastic stick; fur, wool or cloth

„Save the Sailor": sailors made out of tissue paper; tin; plastic stick; fur, wool or cloth

„Tin Race": tin; plastic stick; fur, wool or cloth

B. Exploration:

Each body has a positive and a negative electrical charge. If an item has both in equal amounts, it behaves electrically "neutral". Under such circumstances, all negative particles in the body are movable while all positive particles are static and immovable. The ambition of all bodies and substances is to be electrically neutral. But if e.g. a plastic stick or tube is rubbed on fur, wool or a cloth, both items are getting electrically charged due to the friction between the objects.

The fur gives off negative electrons to the stick so that the stick is "negatively charged" and has too many electrons. This "majority" of negative electrons push back the electrons in other objects (as you can see in experiments "Dancing Star" and "Tin Race") and only the static positive particles remain effective.

Differently charged bodies attract each other in order to regain their electron balance.

To us it appears that the balloon attracts the neutral hair, the plastic stick sets the paper star in motion and the tube makes the tins roll. The charging effect lasts as long as the energy budget is balanced again. Then the stick or the tube must be "re-charged" through the friction again.

C. Discussion questions:

Can all materials be charged or not? Does electric current flow through all materials or not? When is electric current dangerous? Why do we have to be especially careful when experimenting with electricity? Which rules to we have to follow?

D. Conclusions:

The plastic stick is "charged" by rubbing on fur, wool or the cloth and then moved around the paper star, the tissue paper sailors or the tins. Due to the charge of the stick, the objects are set in motion until the charge has neutralized itself completely.

E. Assessment:

The theme electrostatics with the experiments we selected was perfectly suitable to introduce the Science-Box for the first time. After a very short time, the children could work independently with it.

Further investigation:

Experiments concerning the electric circuit: build a circuit with batteries, alligator clips and lights; exploration using the battery-light bug, which items can conduct electricity and which not.

Inquiry and creativity elements:

After the first experience the children can create their own variations with the materials.

Teacher's notes:

Putting together a science-box with different experiments on a special subject has proved to work very well and met not only the children with great enthusiasm. Many parents also borrowed the Science-Box and tried these experiments at home with their children.

School/Kindergarten: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Language and Math, Age group: 4-6 years old
Teacher: Mihaela Balint, Vacaru Cristina

My box

# of magnets

Introduction:

Usually we have a lot of magnets in the classroom: in some toys, games, letters and numbers, shapes, magnetic accessories for the whiteboard and so on. Magnetic attraction between some objects is unquestionable. It is something we can see and play with every day. Prepare a kit for experiments to plan and conduct science investigations with magnets. Here are some ideas that you can put into practice with such a kit (project theme **Science in a box**).

Background:

Magnets are objects that produce a magnetic field around them, an area which is invisible to the human eye. Magnets only attract some types of metals while other types of materials such as wood, plastic, glass are not attracted to magnets. Not even all the metals are attracted, for instance gold, silver or copper are immune to the attraction. Like in any love relationship, magnets can attract but may also push away objects. This happens because a magnet has a north and a south pole. Different poles attract each other while the same poles repel or push away. There is also an area for the magnetic field: the further the magnet, the less force of attraction. Magnets can attract through plastic or water but their force is less intense.

Purpose:

- to plan and conduct experiments based on observation. To formulate a prediction.

Aims:

The children will:

- formulate a prediction
- observe what magnets are and how they work
- test what materials are attracted by magnets

Vocabulary/Key words:

Magnet, magnetic attraction, magnetized, magnetic poles (north and south), iron, steel, alloy, metal, materials, natural materials, wood, paper, fabrics, plastic, glass.

Process skills: observe, analyze and describe, conduct an experiment following instructions, gather information, collect data, interpret data, draw conclusions, communicate observations, make an art craft, information and conclusions.

Time/Duration:

40-45 minutes

Materials and resources:

Magnets, small pieces of wood, plastic, glass, paper, cardboard, cotton fabric, wool fabric, paper clips, steel nails, steel needles, push pins.

Question:

What kind of materials are attracted by the magnets?

Procedure:

A. Preparation:

Tell the children about a girl, let's say Maya, who swallowed a magnet. Yes, a magnet! Here is her experience in lyrics:

I ate a magnet, tasted good, mom got mad,

I knew she would
"Let's get the magnet out!" she cried,

"Magnets aren't good inside!"

We tried to fish it out with wood, rubber and glass

But nothing would attach! At last....

(Source: Mr. R.'s world of math and science,
http://sciencepoems.net/sciencepoems/magnets.aspx#.VevxYBGqqko)

Kids love this poem! They are eager to help the little girl. The task is to see what type of material is the magnet attracted to so that we can "*fish*" the magnet out of the little girl.

B. Exploration:

The children can work in pairs. Each team gets a box with magnets and a large variety of small objects made from different materials. First tell them check the materials then ask them to make predictions about the attraction to each of the chosen objects. Each child in the pair will test the magnetic attraction with the same magnet and the same objects and he/she will record on a datasheet his results. Then they compare it with their partner's to see if the results are the same. Finally, they will draw conclusions about which type of material is attracted to magnets. For each result in accordance with the prediction they can get a smiley face sticker.

Here is a type of table that you can use with the children:

No.	Object/ Material	Prediction The object will be attract by the magnet Yes /No	Result The object was attracted by the magnet Yes /No
1			
2			
3			
4			
5			

The children write on the datasheet their name, the date and the name and the material the object to explore is made of. It works if they use different colored pencils for prediction and result. First they write their predictions. Then they test if their objects are attracted by the magnets and record the results (with yes or no). Each child compares his/ her result with that of the pair and then they communicate their results with the other teams.

C. Discussion questions:

What objects are attracted to the magnets? What materials are they made of? Did anybody get different results? If so, why? How can

we "fish" a magnet out of a box? Can we really fish out a magnet out of the human body? Why? Can you test if the magnet attracts through let's say your hand / arm / chest?

D. Conclusions:

The children will formulate the conclusions: only the objects made from iron (steel) are attracted by the magnets. The objects made from wood, plastic, paper, glass, fabrics, gold, silver are not attracted.

Now, it's time for the last part of the poem:

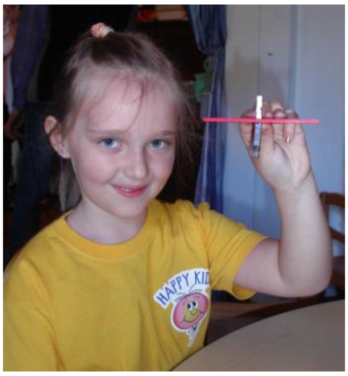
Dad said "Here is the trick, to metal will magnets stick
Things with iron are the key, you can get it out, you see?
Listen! Don't eat magnets, and in fact
Stick to food, that won't attract.

Warning! If you use this poem, please emphasize that we eat only food. Swallowing magnets can be followed by surgical interventions or even death.

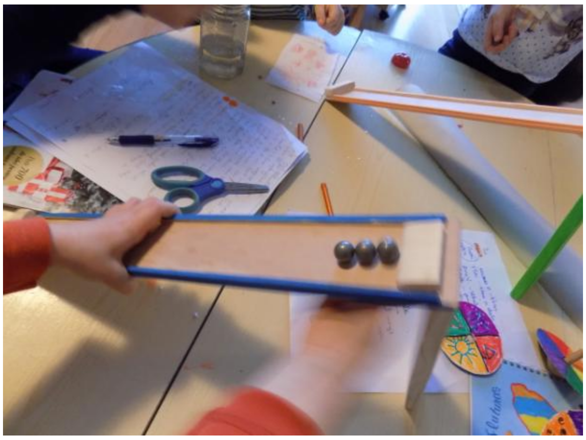
E. Assessment:

Children do love magnets. Due to their special property to attract things, children play with magnets since they are very young.

Further investigations:



- Explore the magnetic attraction through some materials (substances) like water, wood, paper, fabric, plastic. Can a magnet attract a nail or a coin found in a glass of water? Can you pull out a coin from your pocket using a magnet?
- Some toys with magnets show us a different reaction. It is not an attraction it's a rejection. Why's that?
- Combine magnets with inclined plane and defy gravity!



Family herald - Lesson Plan Synopsis

Lesson plans	Partner Country	Synopsis
My class coat of arms	France	An introductory activity on coat of arms.
A family coat of arms	Romania	The activity focuses on the most common types of Romanian families and how to put together a family coat of arms.
Family links	Romania	A scientific investigation of the DNA and its subtraction from onions and strawberries.
The little detectives	Romania	A hands-on activity on finger prints and how they can be taken and analyzed.
Discovering my family	Turkey	An activity built as a questionnaire to find out more information about one's family.
Who lives in my house?	Poland	A smart, easy-to-do chart to compare the number of members in a family.
How old is my family?	Austria	A visual, fun activity to compare using beads and strings the ages of the members of one's family.

School/Kindergarten: Ecole Maternelle J. Jaures Brignoles, France
Subject: Integrated Science, Language and Art, Age group: 3-4 years old
Teacher: Christiane Coumoul

My class coat of arms

Introduction:

This activity is part of the theme **Family herald.** Historically, each family of lords had its image with its coat of arms. Cities also have their symbolic image.

Nowadays, groups (schools, associations, organizations) have a crest or logo that represent them and show their belonging to a group. The family has an essential role in building the child's education; the family is the first place where the child will take its cues to grow: emotional cues, cognitive and cultural one. When he is three years old, the child comes to preschool and discovers a new environment in which he will stay 24 hours a week; he meets many people (teachers, childminders, mates). The link between school and family is essential for the child to succeed his adaptation to this new environment and continues to "grow" the best. At school he will be part of a group with the mistress, the childminder and his classmates.

Background:

The child should know himself (body schema), be aware of belonging to a family (parents, grand parents, brothers, sisters) and know the links between the family members.

At preschool, children will realize that they are part of a group class (teacher, nursery assistant and friends); wearing the badge of the class will identify this group class at the school party.

At our preschool English language and culture is introduced to the children; in English schools children wear an outfit with a badge on their shirt or t-shirt.

Purpose:

To produce the badge of the class for the school show in which children will sing and mime an English song: "The wheels on the bus".

Aims:

The children will:

K. Discover they belong to a family and round up a family concept: say their first and last name, include family members (parents, siblings, grandparents) and quote their name

L. Discover they also belong to the class with friends, the teacher and the childminder

M. Discover that some groups are represented by a logo or badge to communicate like in English schools (video, pictures)
N. Represent their class group with a badge: choosing a badge shape from those presented; discuss on the image and the words that will be registered
O. Achieving class badge: color, cut.

Vocabulary/Key words:

Family: mother, mum; father, daddy; parents; baby; sister, brother; grandmother, grandma; grandfather, grandpa; first name and surname.

Group: school, class, teacher, teacher assistant, friends, boys and girls. Picture, coat of arms, image, badge, to communicate.

Process skills: observe, analyze and describe, plan, gather information, collect data, interpret data, communicate observations, information and conclusions, realize a painting.

Time/Duration:

30 minutes each session

Materials and resources:

Drawing paper, images; pens, pencils; scissors, glue.

Question:

How can we produce the class coat of arms (badge) ?

Procedure:

A. Preparation:

First, children study the body scheme (know and draw different parts of the body), then the structure of the family (parents, siblings, grandparents) and the structure of the class group: teacher, childminder, comrades (friends).

B. Exploration:

During the introductory part of the English lesson, the teacher will show pictures of English schools which show the students wearing outfits with a badge on the jacket or shirt; as for the feast of the school, the children of this class will sing and mime an English song, they will wear a "'dark blue skirt (girls) or Bermuda shorts (boys) and a white shirt or t-shirt" with the class badge. How can we make this badge? What shape should it be? What will we choose as the picture to represent our class, what motto/slogan would be appropriate? After seeing badge models, children have picked one: it will be red and yellow (the colors of Provence), the words "JEAN JAURES SCHOOL" will be written and we will put the image of a turtle because this animal was investigated this year in the classroom. The children colored the crest; the oldest have cut them.

We pasted them with tape on shirts or t-shirts for the school show.

- **Conclusion:**

The children participated enthusiastically throughout these activities and they were proud to wear their badge for the school show. They are now conscious that they have their own identity and they are part of a family and a school group.

Further investigations:

- The making of the family tree using artistic trees like Gustav Klimt's "the tree of life"
- The making of the school logo.

English school badge model

Class 4 badge

Happy Kids Kindergarten, Ramnicu Valcea, Romania, Age group: 4-5 years old
Subject: Integrated Science, Math, Sensory, Practical Life and Art
Teachers: Georgiana Boaza, Cristina Preduca

A family coat of arms

Introduction:

A Family Coat of Arms is part of the **Family Herald** project. In this activity we studied the various kinds of families that exist in our own communities, states and world. The basic structure of the family has changed drastically throughout the years. Some examples of the families that now exist are: traditional families, single parent families, cultural families, multi-generational families, mixed families, and same-sex parent families. Diversity is present in every individual and in every family. Both children and adults need to understand and learn to respect and tolerate this diversity.

Background:

Historically, European family crests and coat of arms originated in the 11th century. They were designed by artists who were directed and influenced by family members. Gradually, the family crest evolved into the coat of arms. Elements used in the art represented cutting-edge technologies and popular symbols of the day. A diversity of elements in a family crest represented the family's role in society as well as their particular interests. Weapon designs such as shields, axes, armor and swords were very popular. Anvils, agricultural tools and anchors were also used to embellish the image. Animals as universal symbolic expression of strength and courage such as lions, bears, eagles and wild boars broadened the subject material represented in a crest. A verbal slogan / statement to stand for the family creed also appeared on the coat of arm.

Purpose:

Playing around with the coat of arms of their family gives children the opportunity to know better the structure, values and traditions of their family. Through this project, the children will acknowledge the fact that each family is different from the others, but can also have similar characteristics.

Aims:

The kids will gain an understanding of the different structures of families and the diversity and cultural similarities/differences found within families.

The children will:

- Write their name and their family name.
- Count the number of members there are in their own family.
- Identify reasons why their family is important to them.
- Create representations of their families and share them with the class in order to see and discuss the diversity of families within their own classroom.
- Describe characteristics of oneself and one's family.
- Demonstrate an understanding of family roles and traditions.

Vocabulary/Key words:

Mother, father, sister, brother, different adjectives that describes people and personal qualities such: beautiful, generous, mature, hearty, curious etc., examples of their favorite food such: pizza, hamburgers, fries etc., examples of favorite artists, examples of how the family spends free time together, examples of favorite sports etc.

Process skills: observe, analyze and describe, plan, gather information, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

30 minutes

Materials and resources:

Markers, poster board, crayons, watercolors, images and pictures, glue, different stickers, family photos.

Question:

Why is your family special?

Hypothesis:

Families can be very diverse and different even for people that live in the same area. However, they are held together by the interests and feelings.

Procedure:

A. Preparation:

Lead a discussion about family crests and talk about what they were originally used for and what kinds of things were found on them.

B. Exploration:

Show the class examples of family crests in history and talk about the symbolic meaning of the visual representations. Create a classroom coat of arms including information about favorite stories, animated characters, colors, qualities, wishes and favorite toys.

Brainstorm ideas for what they might put on their family crests. Afterwards, talk with the children about families and what makes a family. Have your kids create a poster about their family. Encourage them to share as much about them as they want. They can add yarn for hair, fabric for clothes, stencils of the family's favorite things to do, etc.

Have kids take home a piece of poster board and work with their parents to create a family poster. Some children may have a difficult time with this project depending on their home life so be prepared to help those who do not want to share more about their family. When the projects are ready, invite parents to come to kindergarten with their child in order to present it. They present together, in front of the class, share and describe their family symbol, traditions, personal qualities, favorite artists and the slogan of their family.

C. Discussion questions:

How many people are there in your family? How many children are there in your family? Who do you live with? What is your family name? What symbol did you choose? Why do you think this symbol can stand for your family? What is the motto of your family? Who is your favorite artist? What is your favorite food as a family? What are the personal qualities of your family? What do you like to do with your family in your spare time? What sports do you practice with your family members? What kind of movies/TV shows/cartoons do you watch at home with your family? What kind of celebrations do you have at home? What do you like to do the best when you are at home with your family?

D. Conclusions:

In our country there are different kinds of families: single parent families, traditional families, families of people who may not be biologically related, but who live with you or extended families. The children became more aware of the differences and similarities of family customs and traditions. They learned about their own identify as a family and that the thing that keeps all families together is called *love*.

At the very end, the board of teachers analyzed all the projects and made the profile of the Romanian family with favorite activities, pastimes, food, colors etc.

E. Assessment:

It was really great to see how the families contributed to this project. It made them think about the things that connect them and give them a specific family profile.

The teacher appreciated that many children tried to present the coat of arms without the help of the present parent.

After the presentations were done, we exhibited the coats of arms on the walls of our classrooms to better observe them and to let the children discuss them freely during playtime.

Further investigations:

The coast of arms can be assembled in a book, so that when children sit in the reading corner they can take it and study it more, know their colleagues' families better and also share their own coat of arms with others. They can better notice the differences and similarities between the families.

Inquiry and creativity elements:

Children enjoyed doing the projects with their parents. They easily learnt about the traditions and values of their families. They also enjoyed playing with markers, crayons and watercolors, stickers, imagines and photos to create colorful posters that in end represented who they were as a family.

School/Kindergarten: Discovery Kids Science Club, Ramnicu Valcea, Romania
Subject: Integrated Science, Mathematics and Art, Age group: 7-10 years old
Teacher: Mihaela Balint

Introduction:

This activity is part of the theme **Family Herald**. When we look at our family pictures we often notice the similarity between members of the family even when they are different generations. Why's that? Why grandfather looks so cute and so similar to his grandson who is 4 years old? Why does my little sister have the same beautiful green eyes as our mom and grandma? Because of the family links (ties) - the DNA. DNA is found in every cell of all plants, animals and human beings and determines the genetics of the individual organisms.

Background:

All the substances are made of molecules. The molecules are made of atoms. The number and the arrangement of the atoms in the molecule is different for each substance. The life forms are made of cells. One of the most important fact about the cell is that each cell contains *genes (DNA)*. The genes are the database of the cell- the sum of all the information about the cell itself. DNA is invisible; it is too small to be seen by our eyes, but the information it carries inside decides the characteristics of each living thing. The molecule of DNA looks like a twisted ladder. The human beings, like all the other living creatures inherit their characteristics from their parents through DNA. Each personal feature like the color of the eyes, of the skin or of the hair, the shape of the ears is inherited from your parents. The DNA is the link between all the members of the family.

Purpose:

In the next activity the children extract, isolate and observe the DNA of the strawberry or/and of the onion. Also they realize a DNA model using recycled materials.

Aims:

The children will:

- Observe different substances, mixtures, solutions
- Make mixtures, solutions
- Separate a component from a solution
- Communicate observations
- Work in teams
- Draw conclusions
- Realize a DNA model using different kinds of materials
- Present their work and craft in front of the classroom

Vocabulary/Key words:

DNA, genes, cells, molecules, family ties/links, features, substance, mixture, solution, extraction, isolate, layer, liquid

Process skills: observe, analyze and describe, gather information, interpret, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

60 minutes for DNA extraction around 30 minutes for the DNA model and presentation.

Materials and resources:

Onion (fresh strawberries), washing-up liquid, salt, tablespoon, jar, sieve, 2 bowls, measuring utensils, isopropyl alcohol, water, a knife, tweezers, IWB, computer, DNA images from the internet.

Special notes:

We can't see with our own eyes the cells, the DNA cells. They are too small. Using specific methods scientists can extract from a plant (or other living things) DNA cells. More cells put together become visible. Imagine some sand grains. You hardly see a sand grain but when we put together more grains the sand becomes visible. Remember the *DNA is like a database;* the extract contain all the information about that life form. This is why from an apple seed will grow an apple tree and from a duck egg will hatch a duckling and not a chicken or a penguin.

Question:

Would you like to see a DNA extract? You will work like a scientist in his / her lab. This time we'll not imagine our own way to test hypotheses but follow a set of specific instruction, a routine. **Are you ready to follow the instructions?**

Procedure:

A. Preparation:

Chop an onion very fine. You can use a knife or a kitchen robot. Extra care needed! Put the small pieces in a bowl for each team/pair. Another team can work with smashed strawberries.

B. Exploration:

- Please observe the onion using all your 5 senses. Formulate inferences and communicate with your peers.
- Pour enough washing-up liquid to coat but not cover the onion.
- Add half of spoon of salt and two tablespoons of water.

- Stir gently to avoid making foam or bubbles.
- Leave the mixture for 10 minutes. *In the meantime let's see some DNA models from the internet made by children. In the last part of the activity we'll think about our own model.*
- Stir the mixture again.
- Use a sieve to strain off the liquid into another bowl.
- Pour the liquid into the glass jar.
- Use a teaspoon to scrape off any foam or bubbles from the surface.
- Pour isopropyl alcohol gently down the inside of the jar. Look what is happening! *The alcohol will form a separate layer.* Don't stir the layers!
- You have to wait for 20 minutes, so go back to the IWB to see other DNA models and think about your own one. What materials can we use? At the art center you have a lot of materials you can try. Decide with your team what materials you will use for your DNA model.
- After about 20 minutes take a look in the jar. A stringy white substance appears in the top layer. This is onion's DNA.
- Well done! You are a geneticist, now.
- Craft the DNA model and present it in front of your colleagues.

C. Discussion questions:

What is a solution? What is a mixture? Give us some examples of solutions and mixtures. What color is the liquid soap? What color is the mixture? What color is the alcohol? How does it smell? What materials are you going to use for a DNA model? What materials have you finally used?

D. Conclusions:

A hands-on activity, a scientific investigation conducted by yourself is always interesting and cool. Yet, scientific research also means *repetitive operations* and *strictly following the steps* of experiments. All of these activities are part of the job for every scientist.

E. Assessment:

The teacher observed and appreciated:

- children's involvement in the activity
- team work and collaboration
- the accuracy in following the instructions
- the conclusions and observations
- children' s DNA models. The presentations of the DNA models.

Further investigations:

This activity works well with **Little Detectives.**

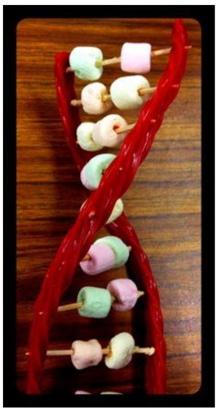
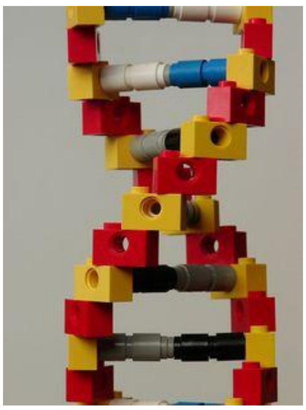
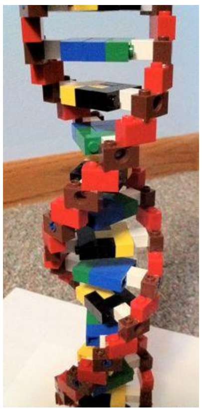
Inquiry and creativity elements:

In this activity the children follow the steps of the scientific method. The activity is a teacher led activity, yet the students will enjoy it. The final product of the activity doesn't look like the DNA colorful image but children are already excited by the idea that this small, white, stringy quantity of "something" is stuffed with detailed and important *information.* DNA models will also challenge children's imagination and handy craft abilities.

Teacher's notes:

When extracting the DNA, each component of the extraction solution plays a part: the liquid soap helps to dissolve the cell membranes. The salt is added to break up protein chains that hold nucleic acids together, releasing the DNA strands. Finally, DNA is not soluble in isopropyl alcohol. The alcohol works even better if it is ice cold.

Here are some DNA models from the internet:

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science and Personal development, Age group: 6-7 years old
Teacher: Mihaela Balint

The little detectives

- **Who ate the last cake?**
- **The fingerprints of my family' s members**

Introduction:

This activity is part of the theme **The Family Herald.**

I left my cake, the last cake, on the plate. Somebody ate it! I know it was one of you. I found a finger print on the plate. Can I find the thief using this finger print?

Background:

The skin on the ends of your fingers has tiny ridges in it. These ridges form a pattern. Usually the patterns look like a whorl, a loop or an arch. Yet, every fingerprint is different. This is a good chance for police detectives to catch criminals. Forensic experts lift prints from the crime scene and check them against criminal records. When they find a match, they know for sure that person was at the *crime scene*.

Purpose:

Let's do some detective work, lift some fingerprints from shiny surfaces and analyze them.

Aims:

The children will:

- Produce fingerprints on a shiny surface (a mirror)
- Lift the fingerprint off the mirror
- Identify the pattern of the fingerprint: arch, whorl or loop

- Record the fingerprints of all the children from the classroom/school and make a data base/ a graph
- Repeat the process for the members of the family
- Compare these fingerprints
- Explore and discover new methods to produce fingerprints and to transfer fingerprints on paper

Vocabulary/Key words:

Fingerprints, detective work, glass surface, shiny, clean, clear, dirty, grease, powder, brush, press, lay, lift off, peel.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

2x50 minutes

Materials and resources:

Mirrors, white and colored chalk powder or baby powder, cocoa powder, plastic plate, some colored paint, wet tissues, small brushes, sticky tape, tissues for glass cleaning, magnifying glasses, data sheets, white paper, black paper.

Question:

How do the detectives lift the fingerprints from different surfaces at a crime scene? How do they record/analyze the fingerprint?

Procedure:

A. Preparation

Show the children some fingerprints on a mirror or a clean glass. You can use the data sheets from the previous year, too. Show them on the IWB the main patterns that we can observe in a fingerprint. Ask them if they want to do some detective work and learn how to lift a fingerprint off a surface.

B. Exploration:

- Press the finger onto a clean shiny surface (a mirror). Good news! You don't need to wash your hands before. In fact, it helps if your fingers are sticky or greasy!
- Sprinkle some white chalk powder (or baby powder) on a paper plate. Dip the brush into the powder and dust it on the mirror. Brush away any extra powder.
- Put a small piece of sticky tape on the fingerprint. Peel away the tape.
- Press the tape on a piece of black paper, then peel it away.
- Now, you have a white fingerprint on the black paper. Look closely at the fingerprint pattern. You can use a magnifying glass.
- Now look carefully at the materials on the table. Can you find another way to transfer fingerprints on the paper?

C. Discussion questions:

- What kind of fingerprint do you have? Do you have the same type of fingerprint like your colleagues/ parents?
- What about your brothers or sisters, grandparents?
- Which fingerprint is clearly: the powder one or the paint one?
- Which fingerprint is easier to analyze: a white one on the black paper or a blue one on the white paper?
- Do we have the same pattern on the thumb and on the other fingers?
- Do we have the same pattern on the left thumb and on the right thumb?

D. Conclusions:

- Fingerprints show more clearly on glass, metal or plastic surfaces.
- Paint prints are also clearer than white powder prints.
- We don't have the same pattern on the thumb and on the other fingers.
- Some fingerprints are similar but not identical.
- A magnifying glass helps us see the fingerprint much clearer.

E. Assessment:

The teacher observed the activity of each child and provided support only when was necessary. The children were encouraged to explore all the materials and to experiment different methods to produce fingerprints and to transfer them on paper.

Further investigations:

Can we lift a fingerprint off a rough surface using this technique? Does a dirty finger produce a clearer fingerprint than a clean finger? Can we identify a person if we have only half of a fingerprint or less?

Inquiry and creativity elements:

Kids leave fingerprints on all kind of surfaces in the classroom: windows, computer screen, mouse, keyboard, mirrors, door, desks, whiteboard, note-books without even realizing it. By playing "detectives", the number of fingerprints increased rapidly: children simply tried all kinds of surfaces for fingerprints and all kinds of methods to transfer the fingerprints from those surfaces on the paper. Kids also used fingerprints to draw some funny figures.

Enclosure 1

Name.................................   Date.............................

This is my fingerprint :

Which type of fingerprint do you have ? Circle the picture that looks the most like yours.

Arch	Loop	Whorl
		

Conclusion:

I have a.....................................fingerprint.

Let's make new drawings with our fingerprints:

Enclosure 2

My family fingerprints records :

No.	My family's member	The fingerprint	Type of fingerprint A L W
1	Mom		
2	Dad		
3	Grandpa		
4	Grandma		
5	My sister/brother		

Conclusions:

School: Ş. Jan. Uzm. Çvş. Ahmet Güngör Anaokulu, Tarsus-Mersin, Türkiye
Subject: Social studies, journalism, 5-6 years old
Teachers: All teachers

Discovering my family

Introduction:

The activity in this lesson plan was held under the topic **Family herald.**

Background:

Family has an important place in children's life. It is their first school that help children learn things about life and about the world around. Especially, parents have specific roles for their children. Although they live altogether, it is a matter of question how much children know about their parents? What is the overall frame of our parents?

Time: 5 Days

Purpose:

Getting children to know more about their families socially and economically.

Aims:

At the end of this activity, children will:

- Make a research on their families
- Know about their point of views towards some issues
- Increase communicative skills with their parents
- Feel like a journalist who is interviewing

Key words:

Family, family members, social life, economy, relationships, questionnaire.

Process Skills: collecting data, question-answer, drawing conclusion

Materials:

A questionnaire consisting of 11 questions prepared by teachers and students to be applied by children to their parents.

Questions:

- ***What do our children know about their parents?***
- ***What do they want to know more about them***?

Procedures:

Preparation and exploration:

First of all, all the teachers talked with their students about families and family profiles. Children were asked to give some information and talk about their families. Then, they asked which questions they would like to ask if they were a journalist interviewing their parents. Teachers took notes of children's replies and prepared a common questionnaire accordingly. Then, they made copies for their pupils and asked them to give them to their parents.

60 students' parents replied to the questions in this questionnaire. The questions aim at getting a general idea about the families, their economic status, relationships with their children and their social life. Accordingly, we got some data about:

1- The number of working mothers,

2- The number of working fathers,

3- Children with or without sisters or brothers,

4- Whether they know their fathers' phone number in case of emergency, 5-7-8- Whether parents are good examples in terms of behavior and habits,

6-9- Whether fathers participate in social activities with their children,

10- Whether parents take into consideration their children's ideas in some cases,

11- Whether parents know their children's needs.

Conclusions:

The following table shows the numeric results of the questionnaire which aims to emphasize different aspects of family life.

Q.NO	QUESTION	YES	NO	SOMETIMES
1	Does your mother work?	31	29	
2	Does your father work?	55	5	
3	Do you have a sister or brother ?	37	23	
4	Do you know your father's phone number?	2	58	
5	Does your mum read newspaper?	11	35	14
6	Does your father play any musical enstrument?	6	53	1
7	Does your mum brush her teeth twice a day?	46	9	5
8	Does your dad brush his teeth twice a day?	45	8	7
9	Do you go to the cinema with your dad?	21	33	6
10	Does your mum ask your opinion while doing shopping for you?	33	22	5
11	Do your parents buy whatever you like in a short time?	24	21	15

Assessment:

This questionnaire gave a general idea to the teachers about their children's families and parents. As it was a communicative activity, it was a good way of communicating with their fathers and mothers because they interviewed their parents. They acted as journalists/reporters, which they liked the most.

Further investigation:

Many other activities such as a Family Coat of Arms, other questionnaires asking for other things including the interests of family members, activities that they like doing together, their dreams, future plans, etc.

Inquiry and creativity:

This journalist reporter activity can be enriched and enlarged with adding different dimensions. For example: food, favorite activities, relatives, etc. It is a very good way of increasing communication skills with parents and other family members.

School: Szkoła Podstawowa Nr 2 in Siewierz, Poland
Subject: Integrated Science, Art and Mathematics, Age group: 3-4 years old
Teacher: Dagmara Malota-Machura

Who lives in my house?

Introduction:

These activities are part of the theme **Family herald**. Family is the most important thing in the world. Even the youngest know that. Families are different. Some people have small, others have bigger families. It is very important to talk with children about these differences to help them understand unclear issues.

Background:

Everyone has a home and relatives who live there. But why grandma Magda lives at Kasia's home? Why Marek's dad doesn't live in his house? Why Małgosia lives in Children's Home? It isn't easy to explain all these things to young children. That is why, we have to find the easiest way to help them understand it. They have to know that families may differ from one another, they can have different number of members but still they are just as important.

Purpose:

The purpose is to explain the children that families may differ from one another and they may have different number of members.

Aims:

The children will:

- name all the members of their families
- tell how big their families are
- know that families can have different number of members
- count to seven

- use words bigger – smaller in an appropriate way

Vocabulary / Key words:

Family, number, mum, dad, grandma, grandad, sister, brother, a family member, home, chart

Process skills: observe, analyze and describe, conduct an experiment, draw conclusions, communicate observations, information and conclusions.

Time / Duration:

45 min

Materials and resources:

Pictures of different family members (we used pictures being part of *The Key To Learn Programme* by Vygotsky), a chart, glue, scissors, crayons, a picture with a house and a paper roof for each child.

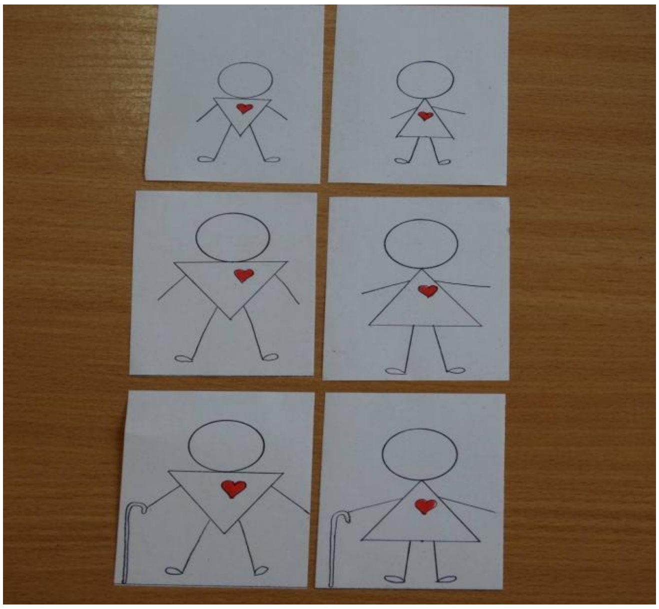
Question:

How big is my family?

Procedure:

A. Preparation:

Introduce children to the subject. Tell them about your family: how big it is, who lives in your house. Ask children to count all the members of your family. After that show them pictures of different family members and let them guess which one represents mum, dad etc.



Pictures of different family members

B. Exploration:

Put the chart on the board. A chart should contain a scale representing the number of family members and children's names. Ask each child to tell how many family members live in his/her house. After that, ask them to choose appropriate pictures and place them on the chart.

Nina chooses pictures representing members of her family

Klaudia is placing pictures on the chart

After placing all the pictures on the chart ask children to do one more thing. Tell them to colour pictures with a house and a roof. If they are ready ask them to stick it on the top of their 'family'.

C. Discussion questions

How big is my family?

Our chart.

D. Conclusions

Each preschooler knows how many people live in his or her house. Children compared family sizes, discussed who are the members in their families and how their homes look. We pointed out the family with the biggest /smallest number of members.

E. Assesment

The children really liked the classes. They enjoyed completing the chart and talking about their families. It was quite easy for the teacher to observe children working. They enjoyed communicating with each other and shared their observations spontaneously. The teacher appreciated the children's involvement, creativity and curiosity.

Further investigations:

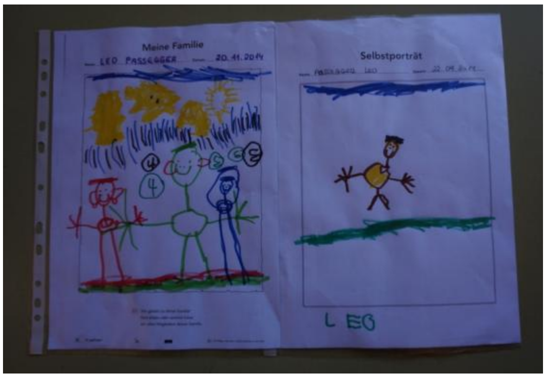
These classes may be a prelude to other topics concerning issues like: disability, racial and cultural differences. It will help children to be more tolerant and understanding.

Inquiry and creativity elements:

To sum up the classes children can draw a picture. It can be a picture of a family or a house.

School/Kindergarten: Kindergarten Rosental a. d. K., Austria
Subject: Integrated Science - Mathematics, Computer Sciences, Genetics, Fine Motor Skills
Age group: 3-6 years-old
Teacher: Sabine Hirschmugl-Gaisch

How old is my family?



Introduction:

This activity is part of the theme **Familiy Herald.**

Background:

In every family there are naturally great age ranges. We want to make these ranges visible, countable and comparable with the help of pearls.

Purpose:

By creating a portfolio-folder with the creative presentation of one's personality and of the family, questions concerning the age of the individual family members and the differences in their life years came up.

Aims:

1. Graphical representation of one's family
2. Visualising of the age structure of one's own family
3. Threading beads (Number of beads = specific age)
4. Training of fine motor skills and endurance

5. Numbers up to 5, to 10 and finally to 50 will be learned in a playful way
6. Comparison of the different age chains make the different age ranges visible
7. Development of knowledge in writing numbers

The children will:

Collection of experience in organizing, sorting, counting and comparing; Identify differences and describe, assess and learn to notice different sizes; Acquire language and math skills; Verbalize relationships exactly; Children learn to relate and compare numbers and sizes with each other; Get to know other family systems and learn to compare them with their own family structure (patchwork families)

Vocabulary/Key words:

Numbers up to 20 / father, mother, sister, brother, grandpa, grandma / the oldest, the youngest (clearly illustrated)

Process skills: observing, analyzing and describing, planning, gathering information, collecting data, interpreting data, drawing conclusions, communicating observations, information and conclusions

Time/Duration:

Approx. 1 hour (5-6 years old) – 45 minutes (younger children)

Materials and resources:

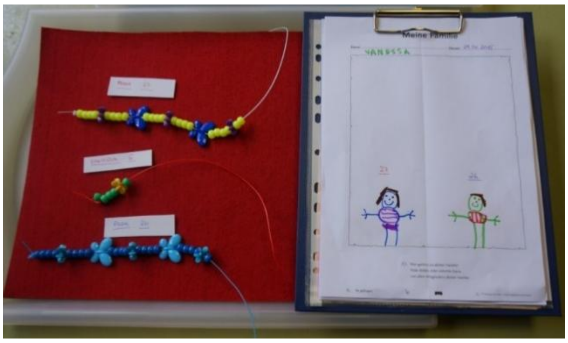
Differently coloured beads (one pearl colour for each family member) - every 5th part, a coloured flower button - every 10th part, one coloured butterfly button; cords for beading (cords are cut, when the counting/threading process is finished).

Question:

Which family member has the longest string? Who has the shortest and is the youngest?

Procedure:

A. Preparation:



Initially, the children ask for the ages of their parents (grandparents) and siblings on the basis of their drawings. Then the beads and corresponding materials are prepared.

B. Exploration:

The children decide for one colour per family member mentioned. Every 5th year is then marked with a flower button and every 10th year is highlighted with a butterfly button. That allows us to recognise the age of the family members at a single glance. The various beads are then counted and compared at the end. When all family members are represented, different families can also be compared and differences, similarities or differences can be discussed.

C. Discussion questions:

How many years am I younger than my father or my mother? Can I catch up these years? - Who is the oldest/youngest in my family? – Are there people of exactly the same age? Does the age structure of each family look the same? What differences could you observe?

D. Conclusions:

Visualization of different age groups really succeeded with prepared materials. Although some tasks were quite challenging, the children were able to complete them in total concentration.

E. Assessment:

Children showed greatest interest in comparing the individual strings of beads respectively the different age ranges. They wished, that they may "thread" and compare the age of pets, friends and other people (postman, baker, neighbour), too.

Further Investigation:

After the age of the parents and siblings, the age of grandparents and other friends were “thread” and again compared with the children`s own age. We also started to measure the weight and the size and documented these numbers with measuring tape on the floor respectively with weights like building blocks.

Inquiry and creativity elements:

Finger games; rhymes, songs and games in which numbers, counting and comparing occur (e.g. the songs "Hopsassa today we are counting", "My hat has three corners," "The Ghost-Song", "10 small fidgeting men")

Furthermore, the bead material and number-cards up to 10 were made available for the children for further use.

Teacher’s notes:

All families liked the idea of producing family pictures and they often were the reason for interesting exchanges, discussions and observation among the children, when they could watch their “masterpieces” in the foyer of our kindergarten. Children also liked working with the beads and finally enjoyed presenting and wearing their self-made necklaces and bracelets very much.


Meine Familie und ICH!


BASTI
Fam-KNOPPER
Jonas
Jan
Christian
Sina
Anastasia

Science in grandpa's backyard - Lesson Plan Synopsis

Lesson plans	Partner Country	Synopsis
Playing with nails and hammers	Romania	A hands-on activity focused on nails and hammers and the force needed to fix nails in a wooden plank.
Let's play with clay!	Poland	An introductory lesson on clay and how it can be used to create beautiful burnt figurines.
Our "traditional" science	Turkey	A series of complex activities on the science around the traditional use of cotton, wheat and pottery.
Seeds	Romania	Kids investigate the color, texture, size, shape, and ways of travelling of seeds.
Grandpa's tools: up and down with the pulley	Romania	A thorough investigation of a pulley and its uses.
Playing with a balance scale	Romania	A close look on how a balance scale works
What drives a car? – The PET Bottle Rocket	Austria	Children learn about other ways of powering up an engine than batteries.
Watermills	Romania	Children use different materials to build a watermill and test its resistance.

Kindergarten / School: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Math, Sensory, Practical Life and Art, Age group: 4-5 years old
Teachers: Cristina Preduca, Georgiana Boaza

Playing with nails and hammers

Introduction:

Playing with nails and hammers is part of the **Science in Grandpa's Backyard** project. Our grandparents' backyard can prove to be a magical realm for children as they discover different tools and materials. Here kids can experiment with hammers and nails, screwdrivers and screws, shovels and rakes.

Even nowadays, our grandparents and people that still live in the countryside, work using their hands and manufacture their own goods. For example, in our area there are a lot of people that still make their own cheese or yogurt from milk taken from cows, sheep or goats and do not go to the supermarket to buy them. Likewise, they make their own bread from wheat grown in their backyard, grinded in the mill and baked in handmade brick or clay stoves. At the same time, when something needs fixing our grandparents do their own repairs in the backyard or even build things by using old methods and traditional tools like hammers, screwdrivers, saws, axes, shovels, rakes, pickaxes, drills, chainsaws etc.

Background:

The task of joining materials is made easier with an object called the nail. The construction of buildings, inner walls, and furniture greatly depends on this hammer-driven object.

The first nails were made about 5,000 years ago by the Mesopotamians. Artists used them to fasten sheets of copper to wooden frames to make statues. In the 1700's American Colonists hammered nails by hand out of a bar of hot iron. About 1775, Jeremiah Wilkinson, an inventor in Cumberland, developed a process for cutting nails from a sheet of cold iron. About 1851, William Hassall, a machinist in New York City, invented the first machine for making nails from wire.

Today almost all nails that are made from wire are made by a machine that can make 500 per minute. These are called wire nails. Wire is fed to the machine by a large spool, then cutters cut the wire to the desired length, and they also form the point at one of the ends. At the same time a hammer like object shapes the head at the other end. The nails are then polished, plated, or coated. Manufacturers in the United States make nearly 300 different types of nails.

(Source: Which nails can resist the most force?
http://www.selah.k12.wa.us/soar/sciproj99/kylesciproj.html)

Purpose:

Playing around with nails gives children the opportunity to be both scientists and artists. They can experiment with different types of hammers and nails and create interesting geometrical or non-geometrical shapes using rubber bands.

Aims:

The goal of this project is to observe the effects of using different types of force when hammering nails into the same type of wooden plank.

The children will:

- Observe, touch, weight, compare different tools like hammers, nails, pliers etc.
- Observe the shape of the nails
- Study different types and sizes of nails
- Try hammering the nails using more or less force in the same type of wooden plank
- Analyze and describe the effects of using more force compared with less force when hammering the nails.
- Create awesome shapes using rubber bends strapped around the nails
- Create hedgehog-like creatures using nails, hammers and wooden blocks

Vocabulary/Key words:

Hammers, nails, screwdrivers, saws, axes, shovels, rakes, pickaxes, drills, chainsaws, wooden plank, force, hard, soft, small, big, sharp and blunt.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

30 minutes for activity

Materials and resources:

Long and short nails, small and big hammers, wooden and metal hammers, wooden planks, rubber bands, wiggly eyes, colored pompons, markers.

Question:

How hard do we have to hit the nail with the hammer to enter the wooden plank? Is one hit enough for a 4 year old child to put in a nail in a wooden plank?

Hypothesis:

We need to hit the nail with a lot of force to put in a wooden plank.

Procedure:

A. Preparation:

Demonstrate how to use the hammers. Give the children different types of hammers, nails and wooden planks.

B. Exploration:

Give children short, thin nails and wooden hammers and ask them to try hammer in the nails using their normal force in just one hit. Then ask the children to observe if the nails are strong in the wooden plank or they feel loose. If the nails are loose ask the children to count how many times they have to hit the nails to make sure they are stuck in the wooden plank.

Give children long, thick nails and ask them to put them in the wooden plank using wooden hammers. Repeat the operation as above and compare the number of hits.

Now repeat everything using metal hammers and compare the number of hits and how well the nails are stuck in the wooden plank. The children should change the hammers and nails and experiment with their force when hitting the nails with the hammers. They should use their normal force and try to put in the nail with just one hit.

C. Discussion questions:

How many times did you hit the nail with the wooden hammer using your normal force? How much of the nail is still out of the wooden plank? How many times did you hit the nail with the metal hammer using a stronger force? Which of the two types of hammers should we use in order to put in the nails faster? How strong do we need to hammer the nail in order to put in with just one hit? What kind of nails should we use when we hit with less force?

D. Conclusions:

When we use wooden hammers we need to hit the nails 5 or 6 times to put them in the wooden plank using a normal force. If we use a greater force the nails are in just after 3 or 4 hits. The metal hammers are more efficient. Long, thin nails enter easily the wooden plank, compared to the long, thick ones. Children need to hit the nails a couple more times than an adult to make sure the nail is fixed in the wooden plank.

E. Assessment:

First the children worked independently but they enjoyed communicating to each other and sharing with enthusiasm the new discoveries. It was quite easy for the teacher to observe children working. The teacher appreciated their involvement, curiosity and creativity. They tried patiently all types of nails and hammers.

Further investigations:

Nails are used in construction of buildings. Children can further experiment with nails made of different materials and how effective they are in building something.

Inquiry and creativity elements:

After the experimental part had finished and the kids decided that enough nails were hammered in, they began adding rubber bands to the wooden planks. At first there seemed to be an unspoken rule that each nail would be surrounded by one rubber band layer. And then the rubber bands kept on going around and around the nails.

Teacher's notes:

Children enjoyed playing with nails and hammers. They easily learnt how to handle the hammer and nails, even though in the beginning they need help to coordinate. They also enjoyed playing with colored rubber bands and place them around the nails.

School: Szkoła Podstawowa Nr 2 in Siewierz, Poland
Subject: Integrated Science, Age group: 5-6 years old
Teacher: Joanna Gornisievicz

Let's play with clay!

Introduction:

These activities are part of the theme **Science in grandpa's garden**. One beautiful summer day we went to 'Enchanted Farm' where we met Mr. Robert, a ceramic artist. Mr. Robert invited us to his workshop and told about his fascinating work. There were so many ceramic figures and sculptures around us! Inside the workshop we also noticed some strange looking tools and mysterious devices. Fortunately, Mr. Robert explained what he used them for.

Background:

Clay – a natural material made up of tiny particles of rock. When clay is mixed with enough water, it feels like soft, gluey mud. Unlike plain mud, however, clay holds its shape. Clay can be pinched, rolled, cut, or built up in layers to form shapes of all kinds. Wet clay makes a very useful building material because it hardens as it dries. Clay baked or fired, in an oven becomes especially hard and may last a very long time. Archaeologists have found pots and bowls made of clay that are thousands of years old. Like many other minerals, clay is mined, or dug up, from the ground. Before clay can be used, it must be cleaned. Cleaning removes small pieces of rock and other debris, or unneeded materials. Sometimes workers add sand to the clay to make it stronger. People use clay to make many things, including flowerpots, tiles, sewer pipes, sinks, toilets, and bricks. A very fine coating of clay gives certain papers a smooth surface. One type of clay, called kaolin, is used to make fine china and ceramics. Kaolin turns pure white when fired in an oven.

(http://kids.britannica.com/elementary/article-400095/clay)

Purpose:

Knowledge of the properties of clay and clay firing.

Aims:

The children will:

- explore the properties and applications of clay
- knead clay and form clay figurines
- observe the ceramic decorating techniques like ceramic glaze painting
- observe and analyze decorating techniques and the process of clay firing.

Vocabulary / Key words:

Clay, artist, sculptor, relief, ceramic kiln, ceramics, clay firing, ceramic glaze.

Process skills: observe, analyze and describe, conduct an experiment, gather information, draw conclusions, communicate observations, information and conclusions.

Time duration:

1 h 30 minutes

Materials and resources:

Clay, wooden tools.

Question:

What happens to the clay figures fired in the kiln? Why did they change colors? Why are they shiny?

Procedure:

A. Preparation

Mr. Robert, the sculptor, shows us a piece of clay. He explains what all his figures and sculptures are made of it. Later, he teaches us some modeling techniques, tells about the process of firing clay and presents ceramic decorating techniques. He also shows us a ceramic kiln.


B. Exploration:

Each one of us gets a piece of clay. It's time for modeling! We can form different clay figurines or reliefs. Some of us have noticed that when we knead clay, it becomes soft and very plastic.


Now, we can place our pieces of art into the kiln for firing. After firing, our ceramic figurines are hard. Now it's time for decorating. One of the ceramic decorating techniques is ceramic glaze painting. Ceramic glaze is a glassy substance that is applied to a ceramic object and then fired to meld it with the ceramic. After decorating, Mr. Roberts puts our figurines into the kiln again. We couldn't wait to see our works!

After a few days Mr. Robert brought all the figurines and reliefs to the kindergarten. We couldn't believe our eyes! They were shiny and colorful! How did they change colour? Isn't it magic?

C. Discussion questions:

What happens to the clay figures fired in the kiln? Why did they change colors? Why are they shiny?

D. Conclusions:

The children noticed that after the first firing, the ceramic figurines were hard. After decorating them with ceramic glaze and the second firing they changed colors. Why? It's simple: ceramic glaze is a glassy substance that is applied to a ceramic object and then fired to meld it with the ceramic. Like paint, ceramic glaze contains many different ingredients to achieve its vibrant colors. For example, manganese dioxide is used to darken many different colors, copper carbonate is used in reds, cobalt oxide is used for blue pigments and chrome oxide is used for pinks, reds and greens, of course it all happens at high temperature.

E. Assessment

The children really liked the stay in an artist's studio. They enjoyed carrying out an experiment with clay and ceramic glaze and couldn't believe their eyes! It was quite easy for the teacher to observe children working. They enjoyed communicating with each other and shared their observations spontaneously. The teacher appreciated the children's involvement, creativity and curiosity.

Further investigations:

You can carry out another experiment with children. For example, test the permeability of clay.

School: Ş. Jan. Uzm. Çvş. Ahmet Güngör Anaokulu, Tarsus-Mersin, Türkiye
Subject: Integrated science, Social sciences, History, 4-6 years old
Teacher: All teachers and parents

Our "traditional" science

Introduction:

The activities in this plan were held under the theme **"Scıence In Grandpa's Backyard".**

Background:

Science is everywhere, everytime. In spite of developing technology, it is very exciting to discover the ways that things were done in my granpa's time from agriculture to daily life.

Purpose:

- Getting children familiar with old techniques, science and know how their elders used to make their life easier, how the things have changed meanwhile.
- Comparing and contrasting old and new techniques

Aims:

Throughout the activities held during this lesson, students will:

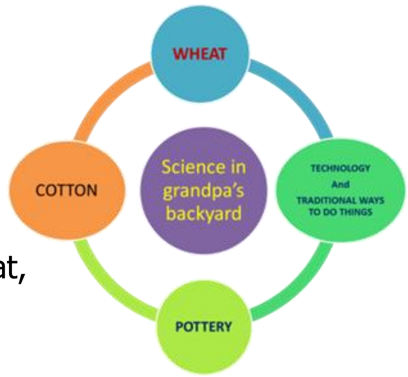
- Discover the process of making flour from wheat,
- Making rope from cotton,
- Making pottery from clay,
- Making carpets from rope,
- Discover the devices used for illumination,
- Know about old tools and devices, coal iron, old radio, etc.
- See the differences between the recent technological devices and old machines

Key words: scince, technology, old times, cotton, pottery, wheat, carpets, traditions.

Process Skills:

Observation, using creativity, learning by doing, excursion, parent-student collaboration, communication, questionning.

Time: 4 weeks



Materials:

All kinds of old materials used in old times for wheat, cotton, pottey, light and iron, etc. in my grandpa's time.

Questions:

- ***How did the things use to be done in my grandpa's time?***
- ***How did the technology develop?***
- ***How do we do them now?***

Procedures:

A. Preparation:

The teacher gave information about the technology and technological devices that we use in our daily life. She drew attention of the rapid changes within a short span of time in the ways we do the things. How much did the technology and science make our life easier? In what way the devices have changed? She asked children about the basic tools that they daily used at home or in their life (i.e. light, iron, radio). Then, she talked about wheat, cotton, pottery and other things.

B. Exploration:

Everything has a story. So we started with the story of wheat, than went on with the story of cotton. Children were shown the old techniques for the way wheat was crashed, what new things were made from flour and crashed weat, how the cotton was fluffed and turned into rope, old oil lambs, coal iron, weawing carpets, doing pottery, etc.

A lot of old tools were brought to school and the big hall was arranged for showing children how the things were done in ancient times. Some parents were invited to school to explain how those tools were used. The teachers and the director of the school made these demonstrations wearing old, traditional costumes. Classes were taken to the hall one by one. A fluffer was also invited to show children how cotton was fluffed. Children also tried it themselves.

Teachers organized several excursions to show children how things used to be done and how they changed now with the recent techonlogy.

C. Discussion questions:

- How was wheat crashed and turned into small pieces, then into flour in my grandpa's time?
- What kind of food were/are made with wheat in my traditional life?
- How did they use to make rope from cotton?
- What kind of materials are made with cotton?
- How was hand-made carpet produced?
- How is the pottery done?
- Do they still make pottery?
- How did my grandpa use to lighten his house when there was no electiricty?
- How did they use to iron their clothes?
- What did the radios look like?
- How did they use to listen to music?
- What kind of toys did they use to play with?


D. Conclusions:

Lots of materials were collected for this reason. While many of the activities were done at school, children were taken out to a pottery workshop, the baker's and to some parents' house for field visits. At the end, an exhibition was organized for everybody. A lot of parents, people living in the neighbourhood, teachers from other schools and people from local authority visited our exhibition.

Assessment:

It was very exciting and enjoyable for our children to discover the science of their grandpa's time. They compared and contrasted the similarities and differences between now and then. They drew conclusions and enlargened their views about our traditional lives in the past. They understood that people always found a way to make their life easier one way or another.

Inquiry and creativity elements:

Children tried most of the activities and learned by doing, observing and discovering.

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science and Language
Age group: 5-6 years old
Teacher: Mihaela Balint

Seeds

Introduction:

This activity is part of the theme **Science in grandpa's backyard.**

Background:

Agriculture is an occupation almost as long as the history of human civilization. Since immemorial times the plants give us food (fruit and vegetables), shelter (trees) and fibers for clothes (flax, hemp, cotton). Plants make seeds in order to reproduce and grow new plants. The part of the plant that holds the seeds is called the fruit. There are many kinds of seeds just as there are many kinds of fruits and plants. The seeds don't look alike. They come in many different sizes, colors, shapes, textures and quantities. This diversity among seeds is due to variations in climates and environments, as well as the way different seeds travel in order to find a place to grow into a new plant. Some seeds travel by floating on water, flying on the wind, catching on an animal or being eaten and passed by an animal.

Purpose:

Explore the differences between fruit and/or vegetables seeds.

Aims:

The children will:

- Observe different kind of seeds
- Describe, compare, identify and classify some seeds. Label the seeds (write the name of the plant with capital and/or small letters)
- Communicate data, observations and conclusions

- Predict
- Conduct and experiment (planting seeds, taking care and observing the seedlings)
- Keep a photo journal
- Draw conclusions

Vocabulary/Key words:

Plants, fruit, seeds, pollination, seedlings, flower pot, soil, watering can, big, bigger, small, smaller, some colors and shades (white, whitish, brown, yellow, yellowish, green)

Process skills: observe, collect data, analyze, compare, classify, communicate, predict, draw conclusions and take pictures with a camera.

Time/Duration:

- 50 minutes

Materials and resources:

- Variety of fruit with seeds of varying sizes, locations and quantities: apples, pears, plums, cucumbers, tomatoes, grapes, oranges, lemons, bananas, avocado, peppers, eggplants, pumpkins, chestnuts, nuts. It depends of the season. Bulbs (tulip, hyacinth, lily, narcissus).
- Plastic plates and knives
- Soil for gardens and small pots (plastic cups)
- Watering can, water

Question*:*

Do seeds look the same?

Procedure:

A. Preparation:

Remind children not to eat any of the fruit or seeds during this activity. They can taste some fruit at the end of the lesson but only after they wash their hands carefully.

Discuss with the children about seeds. What are the seeds? Why do they think the plants have seeds? Where are the seeds in a fruit? How big are the seeds? Big fruit means big seeds? What does a seed look like? What's inside a seed?

B. Exploration:

It all starts with a flower and an insect. After pollination, inside the flower, the fruit starts growing.

Display some fruit and seeds. The task is to observe these fruit and seeds. On the data sheets they'll write the name of the fruit (plant) and some observations like size, color, shape.

Give each team a plate and a plastic knife. The children can cut their fruit.

You may need to open some of the fruit for them.

Before children cut into or open any fruit, have them check their fruit to see if any seeds are already visible (strawberries, for example). Show them how to use the plastic knife to extract a seed from the fruit.

Have the teams share their observations.

Let the children choose some seeds and plant them in little flower pots. Label the pots with their names and the name of the plant. Pour some water in each pot. Use these pots to spark further investigations.

C. Discussion questions:

Which seed is bigger/smaller? What color is this seed? How do seeds differ? Do they notice any similarities and differences between seeds? (pear and apple seeds, for example).

Why do you think some fruit have smooth seeds while others have rough seeds? Why some fruit have seeds on the outside and some fruit on the inside?

What are the needs of a seed in order to grow into a new plant? What kind of plant will grow from this seed? Does the seed know that now it's November? It will sprout now or it will wait till spring? If we keep the pot in the classroom (enough light and heat) can we cheat the seed to sprout now?

D. Conclusions:

Seeds differ in many ways, including color, texture, size, shape, ways of travelling, quantity and location on / in the fruit. Some fruit have more seeds/larger seeds/smoother seeds than others. Seeds are shaped for their mode of dispersal and are insulated for the climate in which they will sprout. Fruit with small, smooth, rounded seeds may travel well through the digestive tracts of animals that eat that fruit. Some fruit have seeds on the outside to ensure that animals that eat the fruit will disperse them. Some seeds may travel by wind, by water or simply grow where they land when dropped from the plant.

E. Assessment:

The teacher observes the children during their work and analyze the datasheets. Team work, information exchange and presentation of the results and conclusions are also important.

Further investigations:

Ask children to keep a record of their flower pots observations to track which seed do or do not sprout. They can take pictures and record a kind of journal. Let them draw the seedlings/plants and share their thoughts about their little plants.

Inquiry and creativity elements:

Children explored the many differences between all kinds of seeds and the links between the seed's characteristics and the reproduction of the plant. The scientific language was enriched. Children were encouraged to share information, data, conclusions and thoughts (feelings). Recording data on a datasheet was also a good practice in organizing data, sharing and analyzing the information. The presentations improved the communication and team work skills.

Watching for seedlings is a good exercise for being patient. Sometimes it takes time to see the results of your experiment. Sometimes the result could be the one we don't expect (the seed didn't sprout). And that is a good opportunity for new questions. Why?

School/Kindergarten: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science and Physics, Age group: 5-6 years old
Teachers: Cristina Vacarau, Stefania Roman

Grandpa's tools: up and down with the pulley

Introduction:

This activity is part of the theme **Science in grandpa' s backyard*.*** After we studied different tools used in households like the balance scales or the inclined plane, we decided to find out more information about the pulley. The starting point of the project was a bucket full of water that the children tried to lift. They realized this was quite hard. We placed the bucket lower than their level and the children realized that it was even more difficult to lift. Now a question raised: how could our grandparents lift buckets of water from the fountain so easily?

Background:

A pulley is a wheel on an axle designed to direct a cable to move along its circumference without coming off. Pulleys may have been invented by Archimedes in ancient Sicily, about 250 BC but even the Egyptians may have used the pulleys to build the pyramids.

You can use a pulley to make it easier to pull a rope, to change the direction of a force or to get more mechanical advantage and lift something heavier than you can lift by yourself. The pulley is used in the construction of many objects that are around us like sail boats, cable cranes, fountains, elevators and even for the roller-coaster. It gives the mechanical advantage: you can pull with less force for a long distance to get the work done or lift different things that would be too heavy for you.

Purpose:

Introduce and explore the concept of force and show how pulleys are used to make work easier. Children experiment with different uses for pulleys, the impact of using single and multiple pulleys and identify pulley use in everyday life. Playing around with the pulley gives children the opportunity to discover another type of simple machine used in households.

Aims:

The children can experiment with different types of pulleys and, this way, practice real life skills.

The children will:

- Observe what the pulley is made of
- Analyze and describes the pulley material
- Learn how pulley systems are used in machines and impact everyday life
- Discover the fact that by using the pulley we reduce the required force to lift different weights

Vocabulary/Key words:

Ropes, axle, wheel, left, right, up, down, above, under, heavy, light, strong, short, thin, wood, iron.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

45 minutes

Materials and resources:

Wood pulley, rope, plastic pail, weights, water, plastic dolls, braids.

Question:

How is it possible that our grandparents were so strong that they could lift a heavy bucket out of the fountain?

Hypothesis:

The pulley makes it easier for one to lift heavy things.

Procedure:

A. Preparation:

Bring a bucket full of water in the class. Place it on a plastic sheet and ask the children to lift it up. Now, tie a rope around the handle and take the bucket to the stairs and lower it to the floor below. Have the cleaning mop ready, just in case! Ask the children to pull on the rope and try to lift the bucket from the lower floor up to their floor. (It is useful if you have an assistant who would make sure that the bucket is in balance and the water does not spill all over the place). What do you notice? Is easier or harder to lift the bucket now? A well can be several floors deep. How can our grandparents lift buckets of water out of the fountain seemingly without too much effort?

B. Exploration:

Just put a wooden toy pulley on the table and explore with children all the materials needed to make a pulley and to pull up and down different weights. After you form three groups of children, give them 3 pulleys and leave them choose the necessary materials and weights to make it work.

They will have to put the string on the pulley's wheel, to hang some weights to this string and pull.

Next, give them several smaller buckets and ask them to fill them with something heavy like metal balls. Ask them to lift the bucket without and with the pulley. They will soon realize that they need less force if they use the pulley.

If you can, arrange a multiple pulley system and let them lift the same weight without pulley or with 1, 2, 3 connected pulleys. The contrast is so obvious that all children can quickly sense and tell the difference.

C. Discussion questions:

What do you notice when you lift the same thing with and withought the pulley? Does the weight become heavier or lighter? What happens is you use multiple pulley systems?

D. Conclusions:

A pulley is a simpe machine that helps us lift different heavy things. To set the pulley in motion one uses his own strength or a counterweight. A multiple pulley system (2-3 pulleys connected with the same rope) makes the load even easier to lift.

E. Assessment:

The children were very excited to try out the pulley and change the weights to be lifted (small boxes, paper clips, balls, levers, rollers). They also tried a large variety of counterweights. By playful experimentation and combining different materials and objects they understood how the pulley functions and why is it so important. They also made a connection with a construction pulley system fixed on the neighbouring house and could identify the pulley in a series of everyday objects and machineries (bike, fitness equipment, cranes etc.).

Further investigations:

The children build a simple elevator using a counterweight. The children used a small plastic box, a fingerpuppet, a rope and a wooden cute for a counterweight.

We also talked about the fairytale *Rapunzel.* We realized that it really hurts if someone pulls on your hair, nethertheless if you have to lift a prince heavier than you are. The children suggested that if Rapunzel used a pulley system to lift the prince in the tower, she would lift him easier. A demonstration of this was made during the *Let's Play Science International Sympozium and Science Fair 2015.*

Inquiry and creativity elements:

The children really enjoyed playing with the pulley and discovering their own pulley systems: they used different ropes which they pulled over a bench, a hanger or just over an stick. They lifted like this different object ranging from toys to furniture.

Teacher's notes:

Simple machines like the pulley is not part of the preschool national curriculum yet the children loved exploring and playing with it.

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Math, Language and Art craft, Age group: 6-7 years old
Teacher: Mihaela Balint

Playing with a balance scale

Introduction:

These four activities are part of the theme **Science in grandpa's backyard** sub-theme **Instruments and tools.** In our days we usually use electronic balance scales (at the market, in shops or at the chemist's). Yet, classic balance scales are still in use in small farms and country households. In our grandparents' households we found balance scales and enjoyed playing with them. An *antic* balance scale from an old chemist's also rose our interest and became an interesting topic for our activities.

Background:

A balance scale is a tool that we use to compare weights of two objects. A balance scale looks like a seesaw. When the scale is balanced the objects on both sides weigh the same. When an object is heavier than the other, the scale is unbalanced. The heavier object drops below the level of the lighter object. If we add standard weights (such as grams and kilograms) to one side of the balance until the scale shows a balancing fit we can find the weight of the object on the other side.

Purpose:

- Use a balance scale to compare the weights of two objects-observe how the balance scale works
- Use a balance scale and nonstandard weights (such as paper clips, coins, small beads, beans) to find the weight of an object.
- Use a balance scale and standard weights (grams) to find the weight of an object.
- Build a balance scale using materials from the classroom.

Aims:

The children will:

- Observe different kinds of balance scales (including internet detailed pictures)
- Compare the weights of two objects
- Find the weight of an object using nonstandard units
- Find the weight of an object using standard units (grams)
- Record data, analyze data, draw and communicate conclusions
- Describe a balance scale and construct a balance scale from different materials (recycled or reusable materials)

Vocabulary/Key words:

Balance, balance scale parts (base, pointer, beam, pan, fulcrum), scale, gram, kilogram, standard unit, nonstandard unit, weigh, weight, measure, compare, predict, prediction, data, table, records, conclusion, more, less, lighter, heavier, same weight, equal.

Process skills: observe, plan, conduct an experiment, gather information, collect data, interpret data, compare the measurements / data, draw conclusions, communicate information, data and conclusions.

Time/Duration:

4 x 50 minutes

Materials and resources:

Balance scales, standard units (grams), nonstandard units (coins, paper clips, small beams, beans, nuts), data sheets, pencils, small objects (small toys, sharpeners, erasers, candies, pencils, crayons) recycled materials (cardboard, paper, all kind of boxes, glue, hot gun, strings).

Questions:

How does a balance scale work? Which object is heavier/lighter? How much does this object weigh? Will we find the same result for this object if we use another balance scale?

Procedure:

A. Preparation:

The scales must be zeroed before passing them to the children. Even when the scales are zeroed out, some adjustment may need to be made once students have moved the balance scales to their desks. Before students begin the exploration, the teacher should conduct her own measurements in order to be able be able to judge whether the results the students get are reasonable.

B. Exploration:

1. Allow the children to compare the weight of two objects (wood cylinders) and to find the cylinder with the same weight. They can check the result by looking at the color of the circle from the bottom of the cylinder. You can use this game as an introduction. Ask student what scales are used for. Encourage them to describe situations when they have used a scale and to explain how they did it (measure, calculate the value of the weights). Use a balance scale as a model. Identify with students the main parts of the scale: *base, fulcrum, beam, pans, pointer and adjustment dial.* Show students the pointer on the balance scale and explain how to tell if the scale is balanced. Let them play with the balance scales and some small objects that they find in the classroom.
2. Show students some small objects and the objects you chose as nonstandard units. Have students predict which object is heavier and which object is lighter. Place first object on one side of the scale and one nonstandard unit on the other side. Ask students which object is heavier and how they know that. Ask them to try to balance the scale adding more nonstandard units. Let them play. Help them record their results. Ask the children to compare their results for a similar object. For example, a pencil could weight 10 paper clips and another identical pencil

could weight 12 paper clips on another balance scale. Why? Children can also exchange the objects between teams to compare the measurements.

3. Explain that for the next part of this exploration, students will measure the weights of different objects in grams. Explain that people use grams to weigh small things like pencils, erasers, sharpeners, small toys, candies and sweets. Bigger things like people, children, desks, tables, chairs are measured using kilograms. You can use standard units or two small paper clips connected together as long as they weigh together approx. 1 gram. Model how to use a balance scale to find out how many grams an object weighs. Place a small object in one pan. In the other pan count out pairs of paper clips or standard units until the scale balances. Write the total number of paper clips or units used. Help children to record their measurements and to compare and communicate their results.
4. Ask the children to build a balance scale using materials from the classroom. The materials will vary but should indicate a basic knowledge of balance scale parts. Children might draw a sketch of their idea.

C. Discussion questions:

How could you tell if two objects weigh the same? Did any of the objects weigh an equal amount? If yes, which objects? If no, which objects were closest to equal? Which object weighed the most? How many grams did it weigh? Which object weighed the least?

D. Conclusions:

Why is it useful to know how to use a scale? Some answers: doctors keep track of children's weight to make sure that they are growing. People weigh food, airlines use scales to make sure that a plane doesn't carry too much baggage. A ship can sink if it becomes too heavy.

How does a balance scale work? The weights of objects can be compared using a balance scale. Assuming that the pans are at an equal distance from the fulcrum, an object that weighs more will be on the lower side of the scale. If an object weighs less, it will be on the higher side of the scale. If objects weigh the same amount, the scale will be parallel to the table and will show a balancing fit.

E. Assessment:

The teacher will observe children at work, analyze their records and evaluate their communication skills. A balance scale built by the children in pairs or small teams and a short presentation of their work is also valuable.

Further investigations:

- Using another set of small objects measure the weight of these objects using standard units and improving the ability of adding numbers (tens and units)
- Why different scales could give different values for the weight of the same object?
- How can we improve the precision of our balance scale (our handmade scale)?

Inquiry and creativity elements:

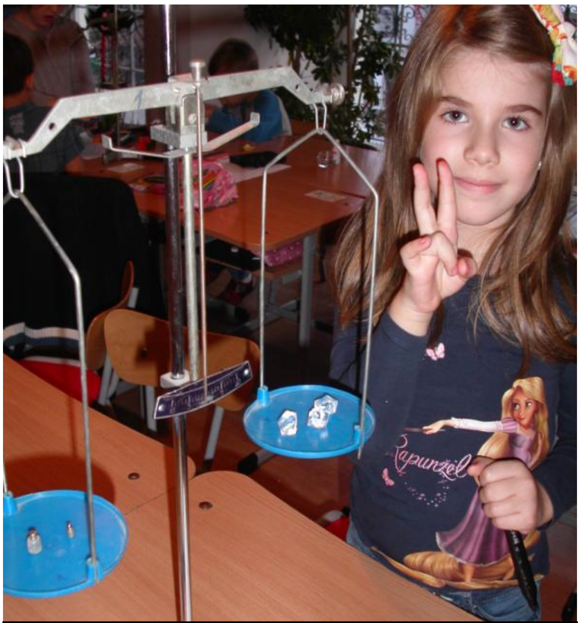
Children understand how a scale works and learn to compare weights using a balance scale. Also they learn to measure the weight of an object using a balance scale and standard units (grams). Based on these knowledge children draw a sketch of a balance scale and build their own balance scale using materials from their classrooms and homes.

The weight of an object could be a tricky matter. Sometimes a small object is heavier than a big object. The size isn't always a right clue. The teacher used these kind of questions and objects to animate the activity.

Teacher's notes:

The students may need help in adding the values of their measurements. Our students recorded the values of the weights and started soon to add numbers like: 10g+50g+5g= 65g. It seems that vertical additions are easier to understand.

Stefan finds the objects with the same weight. Then he compares the weight of two cubes with a nonstandard weight unit.

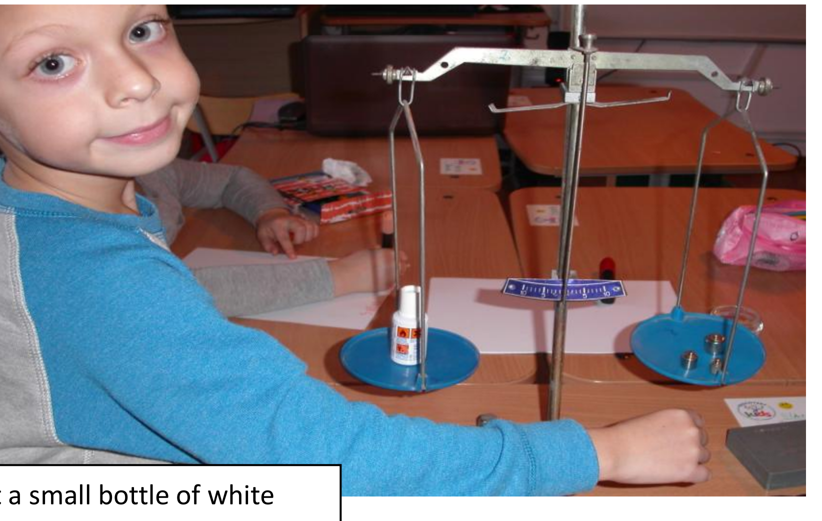


Maria finds the weight of 3 little “precious stones” using standard units (grams) - 12 grams. She is so happy because she has discovered herself that one stone wighs around 4 grams!

Mr. Albert, our teacher assistant, helped Eliana find the weight of a small toy using standard units (grams) and an old balance scale from her grandparents chemist’s shop.

Bianca proudly shows us her balance scale. Yes, she knows it is just a toy, but she loved to do it.

Ingrid finds the weight of a little toy using standard units (grams).



How about a small bottle of white corrector fluid? ***50+20+5= 75 grams***, Ianis proudly communicates the result.

Enclosure 1: Data sheets examples:

Name...Date..............................
Measuring the weight of the objects with the balance scale
Nonstandard measuring units- paper clips

No	Object	No. of paper clips	Grams (approx.)	Compare and classify data
1	pencil			
2	eraser			
3	sharper			
4	small bottle of ink			
5	pen			

Name...Date..............................
Measuring the weight of the objects with the balance scale
Standard measuring units - grams

No	Object	Grams	Compare and classify data
1	candy		
2	small chocolate		
3	lollipop		
4	cookie		
5	muffins		

School/Kindergarten: Kindergarten der Volkshilfe Rosental a. d. K., Austria
Subject: Integrated Science - Physics, Technology, Language Training
Age group: 3-6 years-old
Teacher: Sabine Hirschmugl-Gaisch

What drives a car? – The-PET-Bottle-Rocket

Introduction:

This activity is part of the theme: **Science in grandpa's backyard**.

In the backyard of Marina's grandfather's house there is a car repair workshop, which we had the opportunity to visit. Although we were able to observe various work steps, one big question remained: What actually drives such vehicle?

Background:

In this experimental unit we get to know the principle of the "slopping level" as well as the "recoil principle".

The recoil principle is always activated when something is bounced off from another body or surface, on which a force in the opposite direction acts (3rd Newtonian Axiom): In this experiment we make use of air and a "PET-Bottle-Rocket" to make this effect understandable. (In case the PET-bottle is inflated and the valve of the air pump is removed quickly that the air in the bottle can flow backwards powerfully, the rocket moves along a cord in the opposite direction through the room. In the animal kingdom, such a principle of movement is observable too: cuttlefish throw water backwards in order to move forwards.

Purpose:

For our self-produced vehicles, cars, trailers (for Santa Claus) and the "PET-Bottle-Rocket", we tried to find or invent suitable drives.

Aims:

1. Getting to know different drive options for vehicles (natural and technical)
2. Exploring the "slopping level"
3. Discovering and trying out the "recoil principle"
4. Assembling and running a battery-powered electric motor (closed electric circuit)
5. Manufacturing different vehicles (to earth, water and air)

The children will:

In this lesson, the children learn about different types of vehicles as well as to create own ones with waste materials (up-cycling) and by using different drives. Physical laws are thereby playfully experienced, verbalized and technically implemented.

Vocabulary/Key words:

Balloon car, balloon rocket, PET-Bottle-Rocket, electric motor, battery, electric circuit, alligator clips, "slopping level", "recoil - principle".

Process skills: observing, analyzing and describing, planning, conducting an experiment, gathering information, collecting data, interpreting data, drawing conclusions, communicating observations, information and conclusions.

Time/Duration:

1 hour / 3-6 children

Materials and resources:

1 empty PET-bottle (about 2 litres), tapes, closure, 1 bike flash valve, glue, bicycle pump, a long string across the room, a thin installation pipe in the length of the PET-bottle.

Question:

How does the "recoil principle" function? Can air produce so much power? Why does it not work always? Does it matter whether the rocket is fired vertically or horizontally?

Procedure:

A. Preparation:

After visiting the car repair shop, it was the children's wish to repair and run their toy vehicles themselves independently.

B. Exploration:

After creating their own car models from waste material and introducing the "slopping level", children wanted to have a vehicle that can move "itself". The attachment of a balloon on the cars only brought moderate success and a relatively short distance that could be driven by means of the "recoil principle".

Attaching a battery powered electric motor proved to be too complicated for the younger group, so we decided to build a "PET-Bottle-Rocket".

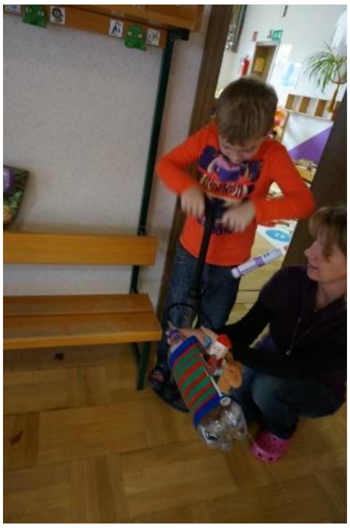
Using two balloon rockets, the "recoil principle" could be explained: After preparing the rocket, the installation of the pump, of the pipe and of the cord across the room, the first bottle rocket could be fired off. The rocket was inflated up to 16 bar (16 strokes) and then released very quickly. If the pressure is high enough, the rocket flies quickly across the room until it lands on the floor again.

C. Discussion questions:

Does an electric motor always work? What shall we do if the battery is empty? How much weight can such a motor pull? - Which factors do we have to think of? What else can drive a car even if there is no mountain nearby ("slopping level")? Can a balloon drive a car or a boat? What shall we do if the balloon is overinflated? Can I also inflate other items?

D. Conclusions:

The installation of the "PET-Bottle-Rocket" was a huge success - we had to keep it ready for using for one whole week, because the children wanted to present the rocket to their parents and friends enthusiastically. Even the adults were fascinated by our installation and the children were proud to explain the visitors the "recoil principle" accurately and correctly.




E. Assessment:

As this topic offers an extremely wide range of experiments and tasks, it should really be planned as a one-year-project. Even the children came up with many further ideas, which we will come back to at a later time in order to make use of their pre-knowledge.

Further investigations:

The children have to consider which vehicles can move only on the road or in the air respectively which drives could also be suitable for watercraft.

Inquiry and creativity elements:

The children designed different bottle rockets (large and small bottles - with and without pilots it etc.) and decorated them with different motives.

A rocket-song was then searched and sung during the flight of the rocket. Each starting process of the rocket we could use for a revision of the numbers 10-9-8-7-6-5-4-3-2-1-0 in the context of our experiment. Moreover, the 16 strokes with the air pump were counted together before the start of the rocket (Promotion of mathematical skills).

Teacher’s notes:

Vehicles are always fascinating for children – and producing them out of reused materials stimulates children's creativity, trains their fine motor skills and improves their ability to implement previously made plans. The different ways of setting a vehicle in motion gave rise to a lot of great ideas, even if some would be impossible to implement in reality.

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Math and Art, Age group: 6-7 years old
Teacher: Popescu Laura

Watermills

Introduction:

This activity is part of the theme **Science in Granpa's Backyard** and focuses on the water mills, one of the artifacts present all over Europe and one of the most useful tools on a farm.

Background:

The water mill is a mill that uses water as a driving force. Evidence of using water mills dates back to 3 a.d. in Greece. It is a mechanical process that was used in the production of many materials such as flour, lumber, paper, textiles and even metal producs. Generally, the water is diverted from a river along a channel or pipe. The force of the water moes the blades of a wheel or turbine, which in turn rotates an axle that drives the mill's machinery. The passage of the water is controlled by gates that allow maintainance and of course, flood control. The water can come from the lower part of the mill or fall from above on the mill's blades.

(Source: Wikipedia https://en.wikipedia.org)

Purpose:

Understand the way the water mills work and their function in the history of human being.

Aims:

The children will:

- Observe different types of water mills (both the mill and the production process)
- Observe that water can come from above and flow at the lower part of the wheel
- Think what the main parts of a mill are and build a functional the model
- Use recycled material to build a mill

- Use efficient team-working strategies so that the task get completed
- Describe the model made in front of an audience
- Analyze and describe the way our models work

Vocabulary/Key words:

Mill, water, water power, axel, blades, force.

Process skills: observe, analyze and describe, plan a design, turn the plan into reality, conduct an experiment, interpret data, draw conclusions, communicate processes and observations, information and conclusions.

Time/Duration:

50 minutes

Materials and resources:

Videoprojector, internet resources on mills with clear pictures, recycled materials: plastic bottles and cartons, string, tooth-picks, plastic sheet, scissors, sylicon gun, tape, pieces of wood, wooden sticks, source of water, plastic bottles or jars for pouring water, a plastic box.

Question: ***Can you build a functional water mill?***

Procedure:

A. Preparation:

Show the children several pictures of watermills. Ask them what they know about the object presented, how it is made and why do people use mills. Observe the materials in front of you. Take them, feel them, weigh them and discuss how can you use them to build a watermill. Now your task is to build watermills in groups. When you finish them we will try to see which one can work longer and is more efficient (rotates the axel faster). Each group will have a teacher assistant who will help with the sylicon gun or any other risky building process that could produce injures.

B. Exploration:

Each group has engaged in the process and has participated with enthusiasm. Sometimes there was need of adult intervention to help the pupils together as a group and accept each other's ideas. Finally, each group was very satisfied with the outcome and could hardly wait to try our their models. Here, we had a surprise, as not the most robust model proved to be the most efficient but the one built from the most waterproof materials.

C. Discussion questions:

What are the parts of a water-mill? How does it work? What materials can you reuse to make a water-mill? How does the water move the windmill? What made the winning watermill be more efficient than the other models? What do you imagine used the watermill for?

D. Conclusions:

The most efficient watermill used easy, waterproof materials. When it comes to machines that work in wet conditions, carboard has to be excluded.

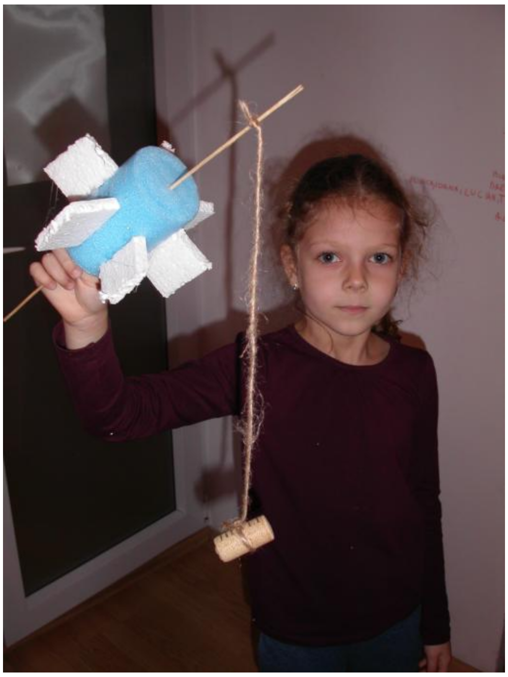
E. Assessment:

Assessing a creative act is difficult. However, the way the design and materials chosen fit with the aim can be easily assessed. The teacher followed the pupils' ability to work in teams and negociate best solutions.

Further investigations:

The watermill that stood the test had bended blades. The next question was if blended blades worked better than straight ones.

Inquiry and creativity elements:



The lesson was totally inquiry based as children had to find by themselves the best solutions for the given problem. It was also creative as pupils had a variety of recycled materials at hand to build their watermill model.

Teacher's notes:

This was a really enjoyable activity, quite messy, but really valuable. After a month's time I assessed whether the pupils know what a watermill is, how it functions and what were the best materials for building a watermill model. Their answers made me recommand this activity.

Santa is a Scientist - Lesson Plan Synopsis

Lesson plans	Partner Country	Synopsis
BeeBot visits Santa Claus in the Advent City	Austria	Kids discover first-hand the art of programming and robotics with the help of a funny looking bee robot.
Toilet paper tube snake	Poland	A fun experiment with toilet paper tubes in the shape of a smart snake that taught the kids about the force of gravity.
Winter wonderland in a jar	Romania	Kids learned how to make their own winter globe and found out what a solution is.
The inclined plane	Romania	A hands-on complex experiment on inclined planes and how children can discover angles and types of surfaces.
Kaleidoscope: the shape and color factory	Romania	A colorful activity about what is and how to build a kaleidoscope.
It's time for charity	Turkey	Fun, filled with love ideas on sharing and bringing joy to the ones in need during special moments along the year.
Christmas toys	Romania	Kids enriched the art of play by transforming, renewing and recycling everyday consumer products into toys.

School/Kindergarten: Kindergarten Rosental a. d. K., Austria
Subject: Integrated Science - Robotics, Information Sciences, Programming, Storytelling
Age group: 3-6 years-old
Teacher: Sabine Hirschmugl-Gaisch

BeeBot visits Santa Claus in the Advent City

Introduction:

This activity is part of the theme: **Santa is a scientist.**

Background:

With the help of the robot-bee „BeeBot", children can gather first experience and knowledge in the fields of informatics, programming and robotics.

Purpose:

Presentation and introduction to the bee-robot "BeeBot" as well as providing different exercises concerning first programming steps in order to enable children to work with the IT independently.

Aims:

1. Practice of structured thinking
2. Training of logical thinking
3. Arouse interest in technology and robotics
4. Learning first programming steps
5. Application of "BeeBot" for learning language in speech and writing
6. Promoting mathematical skills with the help of "BeeBot"
7. Development of social learning and cooperation.

The children will:

They have the chance to gather first experience in robotics and are able to take part creatively in the working process. "Research-based exploratory learning" thereby happens at all levels.

Vocabulary/Key words:

Computer science, robotics, programming, deleting, to create a program, to save, consolidation of orientation (front to back, right, left,...); Clap syllables by using names, words, letters, numbers - getting to know and work with them.

Process skills: observing, analyzing and describing, planning, conducting an experiment, gathering information, collecting data, interpreting data, drawing conclusions, communicating observations, information and conclusions.

Time/Duration:

45 minutes / 4 – 6 children

Materials and resources:

BeeBot - neutral floor tiles with divisions (squares of 15cm); Advent city - 24 houses with street numbers (1- 24) - for all other issues, material appropriate for the tasks can be manufactured in the kindergarten.

Questions:

Which commands do I have to program when I want "BeeBot" to visit house number 16? What do you think how many steps will it need? - What do I do if I have programmed an error? What should I consider if I want to program a new job? (deleting, logical thinking, calculating)

Procedure:

A. Preparation:

After a short introduction to "BeeBot", children are allowed to try out the robot and to set simple programming steps. Then they get wood sticks with a certain length in order to build roads, paths and mazes for "BeeBot" that it should follow.

B. Exploration:

24 colourful tiles with house numbers are randomly distributed on the neutral plates. Then "BeeBot" gets the task from Santa Clause to visit the houses (after stating a particular house number), to collect hidden letters addressed to the Christ Child and to bring them back to the start.

C. Discussion questions:

How many steps do you think that it will take you to get to house number 12? What do have to remember before you send "BeeBot" on a new trip? - What are you doing when you made a mistake? – Is "BeeBot" able to think on its own?

D. Conclusions:

The children quickly discovered that "Beebot" could be used for various tasks, but also that they have to program every single step beforehand. After a completed command, the previous program has to be deleted immediately; otherwise "BeeBot" would start with the previous program again.

E. Assessment:

The children learned the technique of programming quickly and could immediately work independently with "BeeBot". They also enjoyed to develop their own creative tasks for the robot. By using "neutral plates" completely new ideas and tasks as well as the learning environment could be re-created again and again.

Further investigations:

In addition to the prescribed experiments, we worked with "BeeBot" in the field of physical education - practiced programming on our own body and combined this with different tasks ("Find the gummy bears on your back on the basis of programmed information!" or "Go through the maze!"...)

Inquiry and creativity elements:

In addition to the programming tasks for finding the way, we used "BeeBot" to get to know letters, words and names (Clapping syllables). We let the children record their programs and ways (Finding the pirate treasure) and used the technique of Storytelling in order to develop further tasks for "BeeBot" ("*The three Little Pigs*" – "Which house cannot be blown down by the wolf? – Find the right way to get there!")

Teacher's notes:

It was important for us to tell the children that "BeeBot" is not a toy but a real robot that can be programmed independently at any time and that it precisely performs what we programme - including errors and incorrect program steps that can become noticeable if we act carelessly or forget to delete.

Working with "BeeBot" filled the children with unbelievable enthusiasm and let them create many ideas and programming proposals.

School: Szkoła Podstawowa Nr 2 in Siewierz, Poland
Subject: Integrated Science, Age group: 3-4 years old
Teachers: Joanna Gornisievicz

Toilet paper tube snake

Introduction:

These activities are part of the theme **Santa is a scientist**. Christmas time is coming. We spend this magical moments with our families and friends. One common Christmas tradition is giving presents. Let's make our own presents and discover the force of gravity.

Background:

All objects attract other objects because of a force called *gravity*. Gravity is a pulling force that works across space. That is, objects do not have to touch each other for the force of gravity to affect them. For example, the sun, which is millions of miles from Earth, pulls on Earth and the other planets and objects in the solar system. On Earth, gravity pulls objects toward the center of the Earth. This is what makes objects fall. It is also what gives an object weight. Weight is a measurement of the force of gravity between an object and the surface it stands on. If a person stands on a scale, gravity pulls the person against the scale. The scale shows the strength of this force, or the person's weight.

(source: http://kids.britannica.com/elementary/article-400109/gravity)

Purpose:

To demonstrate, that the force of gravity acts on paper tubes.

Aims:

The children will:

- Get to know the properties of paper tubes
- Paint the paper tubes
- Observe dropping tubes, describe their observations

Vocabulary / Key words:

Gravity, up and down

Process skills: observe, analyze and describe, conduct an experiment, gather information, draw conclusions, communicate observations, information and conclusions.

Time / Duration:

30 minutes

Materials and resources:

Paper tubes, paints, long ribbon

Question:

What happens with paper tubes if one end of the ribbon is lifted up?

Procedure:

A. Preparation

Give out the paper tubes to the children. Discuss their properties. Tell the children how to make a toilet paper tube snake.

B. Exploration:

The children paint the toilet paper tubes. Older kids can paint various snake patterns.

Put the colourful paper tubes on a ribbon.

If you are ready, lift up one end of the ribbon and look what happens: all the paper tubes go down. The higher you lift it up the faster they go down. Our ribbon is like a 'slippery slope'.

C. Discussion questions:

Let's discuss the question: What happens with paper tubes if one end of the ribbon is lifted up?

D. Conclusions

Paper tubes slide down the ribbon because of the force of gravity.

E. Assessment

The children were very fascinated with 'building' the toilet paper tube snake.They also really liked carrying out an experiment with a ribbon. The children enjoyed communicating with each other, they spontaneously shared their observations. The teacher appreciated children's involvement, creativity and curiosity.

Look at our snake, isn't it wonderful? It helped us understand the force of gravity. What a smart snake!

Inquiry and creativity elements:

It's time for making Christmas presents for family and friends. The children enjoyed playing with paper tubes. Have a look at their ideas for presents.


Blanka


SOCHA
Nina

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Language and Art Craft, Age group: 6-7 years old
Teacher: Mihaela Balint

Winter Wonderland in a Jar

Introduction:

This activity is part of the theme **Santa is a scientist.**

A beautiful toy, a shimmering decoration for Christmas, an easy to make craft for kids becomes a source of float or sink investigation. The question *What is a solution?* gets an answer, too.

Background:

A *solution* is basically two substances that are mixed together. One of them is called the *solute* and the other is the *solvent*. A *solute* is the substance to be dissolved (salt). The *solvent* is the one doing the dissolving (water). A solute can be a solid (salt, sugar), a liquid (glycerin, milk, ink) or a gas (carbon dioxide).

Purpose:

Crafting homemade snow globes from all kinds of materials easy to find in the classroom like small Christmas/winter themed ornaments.

Children made these snow globes as a surprise present to their family members and best friends. They presented their work in front of their colleagues and family members during a Christmas Fair, describing as simple as it's possible the science facts behind the craft.

Aims:

The children will:

- Observe the properties of water and glycerin
- Prepare a solution from distilled water and glycerin
- Observe the hot glue and how it works - attaching the ceramic or plastic ornaments to the lid of the jar using the hot gun (helped by the teacher!)
- Observe how small items like glitter, sequins, small plastic snowflakes, very small Styrofoam fragments float or sink in the solution.

Vocabulary/Key words:

Water, distilled water, glycerin, solution, dissolve, ceramic, glass, plastic, metal, Styrofoam, sequins, glitter, sink, float, glue, hot gun, up, down, upside down.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

50 minutes

Materials and resources:

Small jars with lid, glycerin, distilled water, small ceramic or plastic Christmas/winter ornaments/snowflakes, two identical transparent cups, sequins, glitter, wooden beads, Styrofoam beads, hot gun, hot glue, snow-globes.

Questions:

What is a solution? Which items sink or float in the solution?

Procedure:

A. Preparation

1. Make sure that the jars are clean and dry. Also, the lids.
2. Show to the children a Christmas globe or a winter globe. Turn the globe upside down, shake it and turn it again. Some items from inside are fixed, some are floating and some are sinking. Some small items look like snow. It's a winter wonderland. Allow the children to play with the snow globe and observe what's happening inside. Are they interested to make their own Christmas/winter globe?

B. Exploration:

1. Help children to glue on the lid of the jar some small Christmas decorations, a figurine (Santa, fir tree, angel, sled, snowman, penguins, polar bears) with the hot gun and let them dry. Give special attention to this part and supervise children's work.
2. Explain the children that inside the jar they will pour a solution- a mix between two liquids: water and glycerin. Pour some water and glycerin in two identical cups and ask them to analyze the liquids using the sense of sight, smell and touch.

Properties	Water	Glycerin	Solution
Sight (color/ transparency)			
Smell			
Touch			
Taste (optional)			

3. Pour ¾ distilled water in the jar. Add 2-4 teaspoons of glycerin. It depends of the jar (150,200,250 ml). See what's happening inside. Now, in the jar we have a solution - a mix of water and glycerin.
4. Add some glitter, sequins, snowflakes, wooden beads, plastic or ceramic beads, Styrofoam beads. Don't add too much glitter; it will stick to the bottom of the jar. Don't add too much small items or the central figurine will not be visible. Add more water if it is necessary to fill the jar till the opening.
5. Screw the lid tightly. Turn the jar over and back again and let it snow! Make sure the solution doesn't trickle! When you are satisfied by all the details you can permanently glue the lid with the hot-gun.
6. Decorate the lid.

C. Discussion questions:

What is inside the jar? What color is the water/glycerin? Is it a transparent or a translucent liquid? Can you see through the water/glycerin? Does it smell? How does it feel on your fingers? What items are sinking/floating?

D. Conclusions:

- Water, glycerin and the solution are transparent, colorless, inodorous liquids

- Glycerin feels a little greasy on fingers
- Glitter, sequins and the little snowflakes sink gently
- The small fragments of Styrofoam or the small beads of wood float in the upper part of the jar
- Some plastic and wooden items can float somewhere inside the jar, in the liquid.

E. Assessment:

The teacher observed the children's activity very attentively. She analyzed children's work individually and as part of the team, children's final products, the presentation of their work, the worksheets.

Further investigations:

What other solution can we prepare for the globe? Can we use just tap water?

Inquiry and creativity elements:

Small or big, Christmas or winter globes are nice gifts for the dearest ones during the winter holidays. They are quite easy to make even for the little children and a good opportunity to investigate liquids (and solutions), floating and sinking. A winter globe is a perfect story starter, also.

Teacher's notes:

Children can work in pairs or small teams and fill in data sheets. Glycerin can be tasted, too. Glycerin tastes sweet and is generally considered non-toxic. Yet, to prevent any negative reaction I don't recommend a taste test.

Enclosure 1

Name...Date...

Just circle:

Items	I predict It will	I observe It
1.	float/ sink	floats/ sinks
2.	float/ sink	floats/ sinks
3.	float/ sink	floats/ sinks

Example:

Items	I predict It will	I observe It
1. Wooden beads	float/ sink	floats/ sinks
2. Plastic beads	float/ sink	float/ sink
3. Plastic snowflakes	float/ sink	floats/ sinks
4. Styrofoam beads	float/ sink	floats/ sinks

Kindergarten/School: Happy Kids Kindergarten, Ramnicu Valcea, Romania,
Subject: Integrated Science and Mathematics, Age group: 5-6 years old
Teachers: Cristina Vacaru, Stefania Roman, Rotaru Elena, Prejbianu Irina, Balint Mihaela

The inclined plane

Introduction:

In the weeks dedicated to the theme **Santa is a scientist**, the children manufactured and experimented the science in lots of toys and simple mechanisms which were later showed and tested and in front of their parents in a fair. We called this event the Christmas Fair. The children sold toys made and presented by them to the parents, grandparents and members of the community and the funds were used by a foundation for the children hospitalized during Christmas. This way, by playing, experimenting and working for a noble cause, the children discovered optical illusions, how to mix colors, made catapults, discovered the power of with magnets and mirrors. In fact, many of the topics approached in earlier Comenius themes such as *Science in grandpa's garden* or *Science in a Fairy-tale* were approached again at the children's request.

One of the most beloved topics were the inclined plane which raised the interest and curiosity of all the children.

Background:

The inclined plane is a ramp and with its help we can push up or down weights and we can move easier from one place to the other. The inclined plane has been used since ancient times to build the pyramids or to move stone blocks. The stairs, the slide in the playground, sledging slope - all these are inclined planes.

Purpose:

Experiment with the inclined plane using variables in:

1. Inclination angle
2. The type of surface covering the plane

in order to notice the difference in the descending speed.

Aims:

The children will:

- Observe the inclined plane in the kindergarten and in real-life
- Discover through experimentation how descending speed differs according to the inclination angle
- Make and analyze and describe different types of surfaces, palpating and developing their sensory abilities
- Analyze, describe and draw conclusions of how the descending speed depends on the type of surface: flat, abrasive or bumpy

Vocabulary/Key words:

Inclined plane, simple mechanisms, angle, surface, flat, abrasive, bumpy, large, low, increase / decrease the speed, the same, different, rolling, obstacles.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, communicate observations, information and conclusions.

Time/Duration:

45-50 minutes

Materials and resources:

Inclined plane, toy cars, cardboard, tinfoil, sandpaper, wooden spatula, glue.

Question:

What is the purpose/usage of the inclined plane? How does the change of the angle affect the descending speed of the cars? How does the descending speed vary according to the type of surface used? (flat, abrasive, bumpy)

Procedure:

A. Preparation:

Start by asking the children how they would get from a lower surface to a higher one or the other way around. Give them examples: "How did you got up from the ground floor to the first floor in your kindergarten?" "The slide is straight or inclined?" "When you climb down a hill with a car or a bike do you speed? Why?" Tell / Remind the children that is an inclined plane and ask them to give you examples from the school / real life. Then, you can present to the children on the smartboard, different images with the usage of the inclined plane. You can also watch a short movie of an off road course.

B. Exploration:

Analyze with the children an inclined plane (we asked a carpenter to make some for us), point to the angle and ask them to increase / decrease the angle. Then form three groups of children and give them three inclined planes and small toys cars. Ask them to increase / decrease the angle and observe the difference when a car comes down on the plane. Ask them to describe with every-day words what they notice.

Together you can cut three bands/strips of cardboard which can fit to the inclined plane's mobile part. Present them three types of materials with different textures: tinfoil, sandpaper, wooden spatula. Ask the children to touch these materials and tell how they feel. Then ask each of the three groups to make a type of surface:

1. Group number one will cover the cardboard strip in tinfoil
2. Group number two will glue sandpaper to the cardboard
3. Group number three will glue the wooden spatulas at a distance of 5-7 centimeters.

Once they are ready they can predict which surface will be the fastest / slowest. You can write the predictions in a table. Now, it's testing time. Children should describe what they see. Were their predictions accurate?

C. Discussion questions:

What is the purpose/usage of the inclined plane? How can we change the angle of an inclined plane. In what situation is the car going faster? How does foil / sandpaper / cardboard covered with wooden spatulas feel? How do we call each type of surface? Which is the fastest / slowest surface? Do you think that the car tyre "feels" the different surfaces in the same way you do? Can you think of similarities with the simple cars that we studied during the "In grandpa's backyard" project theme?

D. Conclusions:

The descending speed of the car depends on the inclined plane's angle and surface.

E. Assessment:

The children were very curious and active during the whole activity. Later on they put different cars from different materials on the inclined plane and they raced or bumped. It was a time well spent!

Further investigations:

In the future we can study the frictional force on the inclined plane, the speed of heavier cars versus easier cars. How about ascending? When do you push harder, when the angle is bigger or smaller. Can we take an object to a place by rolling it or we can bring it down changing our position towards the object?

Three other teachers in our school were inspired by the described activity:

The babies (two years old). The children could compare two ways to slide on an inclide plane:

1. On a matress with a textile surface
2. On a matress covered with a plastic bag resulting a slippery surface.

The 3 year old group with their teacher tested how easily or not a toy car goes on the three types of surfaces:

A student of Discovery Kids Primary School demonstrated how you can cheat gravity with a few magnets, even if your car is sliding on an inclined plane:

Inquiry and creativity elements:

It is important for the children to understand to change only one variable at a time. Of course, during the play-time that followed their imagination had no limit. For instance they wanted to see how other objects, with or without wheels slip on the inclined plane.

Teacher's notes:

The above mentioned demonstration was also made during *Let's Play Science International Symposion and Science Fair 2015,* part of Comenius dissemination, and was very appreciated by the jury.

See also: the lesson plan for **Inclined planes in sports and life**, theme **Get sporty.**

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Language, Art and Craft, Age group: 6-7 years old
Teacher: Mihaela Balint

Kaleidoscope: the shape and colour factory

Introduction:

This activity is part of the theme **Santa is a scientist.** Usually simple toys are the most entertaining. If the toys are made by the children they become even more interesting and challenging for them.

Background:

Light travels in a straight line through empty space, but when it bumps into an object, it changes direction. Shiny surfaces like mirrors, send or reflect light back to us (think of a ball bouncing off a wall.) The mirrors inside the kaleidoscope reflect the beads, sequins, and confetti. The reflections bounce back and forth from side to side creating multiple images. When we turn the kaleidoscope, the pieces move, and we can see different designs each time.

Purpose:

Enjoy the beautiful colors and symmetrical patterns formed by a kaleidoscope crafted by the children themselves. Children understand how light bounces between the mirrors of the kaleidoscope and have fun decorating it when finished and playing with it.

Children present their work in front of the colleagues and family members during a Science Fair, describing as simply as it's possible the science facts behind the craft.

Aims:

The children will:

- Play with a kaleidoscope
- Observe the reflection of light on the mirrors and the different designs formed by this phenomenon (the colors and the patterns)
- Work in pairs
- Select suitable materials for this craft: cardboards, small mirrors, colored papers, sticky tape, colored transparent beads, small sequins, shiny confetti, stickers and wrapping paper, clear plastic sheet
- Craft a kaleidoscope
- Describe their work using the new vocabulary and trying to explain the science facts behind the craft

Vocabulary/Key words:

Light, reflection of the light, mirror, reflected light, design, pattern, the colors of the rainbow, transparent, transparency, translucent, opaque, opacity, color, colored, symmetric, symmetry, kaleidoscope, tube.

Process skills: observe, analyze and describe, design and make a craft, gather information, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

60 minutes

Materials and resources:

Kaleidoscopes, 3-4 mirrors for each team, duct tape or masking tape, clear thin plastic sheet, stickers, colored paper, wrapping paper or scrapbook paper, paper towel tubes, transparency paper, markers, scissors, hot glue gun, glue, multicolored translucent beads, shiny sequins, colored confetti.

Questions:

Why do we see such colorful and shiny images inside this toy? What is a kaleidoscope?

Procedure:

A. Preparation:

Let the children play with some kaleidoscopes. Encourage them to explore different situations: more or less light, different sources of light (sun, lamp, flash-light), different type of kaleidoscopes (round, triangle or square shaped) and so on. Show them the mirrors and the way the mirrors are put together. Children already observed and investigated the reflection of the light on mirrors or shiny surfaces during previous activities. It is a good opportunity to reinforce this knowledge now. **Do they want to make their own kaleidoscope?**

B. Exploration:

Model 1.

- Take three mirrors and tape them together to form a triangle shape tube. Make sure they are well fixed and the tape is outside the mirrors.
- **Safety notes:** make sure there are no sharp edges exposed. Do not use cracked mirrors.
- Look at the window and while you look through one end slowly turn the tube. Light enters through the other end and reflects off the mirrors on the inside creating a succession of moving images. You can use the toy like this or you can continue working. You can also make another triangle shaped tube for a second toy.
- Cut a triangle from the thin clear plastic a little larger than the tube. Glue it with a small amount of hot glue.
- **Safety Note:** Use the hot gun carefully!
- Inside the tube drop some colored beads or/and shiny sequins.
- Cut a slightly smaller triangle from the plastic sheet and push it inside the tube over the beads. Make sure that the beads and the sequins can move between the plastic triangles!
- Cut a third plastic triangle bigger than the triangle tube. Glue it at the other end of the tube.
    - When the kaleidoscope is ready let the children design and decorate it with colored paper, wrapping paper, stickers or anything else they want to use.
    - The end of the kaleidoscope with the beads and sequins can also be covered with translucent paper.

C. Discussion questions:

Why do we see such colorful and shiny images inside this toy? What is the reflection of the light? What kind of materials you will use for your craft? Show me a transparent/opaque material. What is a transparent/opaque material? What is a translucent material? Show me a translucent material. What colors are the beads? What colors can you see in the designs? Which design you like it most? What changes did you notice when you looked through the kaleidoscope in the light (at the window)/ in a darker corner? Do the designs shine in the same way? Why not? Can you see the colors in the dark, well? Why not?

D. Conclusions:

- Playing around with mirrors gives us the opportunity to be both artists and scientists. We can arrange mirrors in special ways to create marvelous effects for our eyes and also use them to carry out scientific investigations.
- And first of all, the toys made by ourselves are far more interesting than other toys.

E. Assessment:

The teacher's evaluation includes:

- children's activity in individual and group work
- children's final products - the kaleidoscopes
- the presentation of their kaleidoscope and of the scientific facts behind the craft.

Further investigations:

- Craft different types of kaleidoscopes: square shaped (with four mirrors), round, with or without translucent paper at one end, with different kinds of beads and sequins and play with them.
- What other kinds of shiny surfaces can we use instead of mirrors? How about the aluminum foil?

Inquiry and creativity elements:

There are not two identical kaleidoscopes. Each team built his own craft choosing their own favorite materials. Also, some of the children crafted 3-mirrors kaleidoscopes and others 4-mirrors kaleidoscopes. Also, one team decided not to craft a closed tube kaleidoscope. They noticed that by watching their colleagues through the open tube they see awesome, multiple images of their faces and that it is more fun!

Teacher's notes:

Children enjoyed making their own kaleidoscopes and playing with them very much.

School: Ş. Jan. Uzm. Çvş. Ahmet Güngör Anaokulu, Tarsus-Mersin, Türkiye
Subject: Social life, Charity, Age group: 4-6 years old
Teachers: All teachers

It's time for charity

Introduction:

This activities were parts of the theme **Santa is a scientist**.

Background:

Giving presents to people we love or sharing our belongings with those who are in need are very important in our culture and social life. Our children must get used to the importance of charity and the idea of sharing.

Purpose:

- Imposing the idea of sharing, giving presents, helping each other and being part of social life.

Aims:

At the end of these activities, students will:

- Know the sense and meaning of charity
- Increase the awareness towards social relations
- Be aware of the importance of the idea of "sharing"
- Be familiar with the idea of giving presents.

Process Skills:

Using creativity, student collaboration, communication, using waste materials

Key words:

Charity, presents, new year's cards, sharing, helping

Time:

2 weeks

Materials:

All kind of toys and materials for Christmas Cards.

Questions:

- ***What is charity?***
- ***What kind of Christmas cards can we prepare?***
- ***What can we share with other children?***
- ***How can we make other people around us happy?***

Procedures:

A. Preparation:

The teacher asked the children what people do to make each other happy. The students replied "giving presents, sharing our toys, helping people in need", etc. A new year was approaching. So they decided to prepare Christmas cards for their families, relatives and friends. They needed colourful cardboard, crayons, glue, scissors and other stationary materials for decoration.

B. Exploration:

Preparing New Years' cards for their families was a very great idea but what else they could do?

first of all all the students prepared nice cards to celebrate their families' New Year and gave them to their parents, relatives and friends.

The other issue that we wanted to impose was the importance of sharing our belongings with those who are in need of them. They had a lot of toys that they didn't play with anymore at home. We started a charity campaign among children who wanted to share their toys with those who live in villages. Children brought their toys from their home. We collected them in a box. There were hundreds of toys collected and waiting to be sent to other children as a gift.

Our teachers classified all the toys according to their use: cars, baby dolls, teddies, etc.

C. Discussion questions:

- What can we do to make other people around us happy?
- How can we prepare Christmas cards?
- What does charity mean?

D. Conclusions:

Christmas cards were ready and sent to families. Toys were collected and classified and then sent to the preschools in other villages. But there must have been more to do. Our teachers made some investigation and we organized another activity for the children in the Hospital of Mersin University, Medicine Faculty- Oncology Service. We visited the children who were staying in the hospital because of cancer. We bought presents for them, and decorated their rooms.

BEFORE **AFTER**

E. Assessment:

The ideas of charity, sharing, helping and giving presents were appreciated by all the children at school. Not only did they feel happy but also they made others feel happy, too.

Inquiry and creativity elements:

We can prepare our own celebration cards using waste materials and decorate them as we wish. It is more valuable when we add our feelings and creative thoughts on them. Furthermore, life gets better when we share our belongings, such as toys in children's case.

We prepared project magnets for our partners.

We sent Christmas cards to our partners.

The school staff gave presents to each other.

We sent the toys to other schools.

Kindergarten/School: Happy Kids Kindergarten, Ramnicu Valcea, Romania,
Subject: Integrated Science, Science and Art, Age group: 4-5 years old
Teachers: Cristina Preduca, Georgiana Boaza

Christmas toys

Introduction:

These activities are part of **Santa is a Scientist** project. For young children, Christmas is a magical time of the year. We decided to work together to create gifts the children can offer their family and friends during the Christmas Fair for a small donation that will be used to help other children hospitalized during the Christmas holiday. We also wanted to create Christmas decorations for home and school. It's a good idea to teach children that it's just as much fun -- if not more -- to give as to receive. It also helps them develop a sense of responsibility within their classroom or household when they see that their decorations are being used. This is the starting point of our adventure in making toys from reused / recycled materials.

Background:

This theme (of having fun making beautiful toys and decorations out of recycled material) may seem different for young children but it is a very current and entertaining one. The activities in this theme require little or no investment and they will provide hours of fun, while respecting the environment. Creating toys out of recycled materials is not specific to developing nations. Craft fairs display objects made out of tin cans, rubber from tires, bottle caps, and other discarded material. Young children make toys out of Popsicle sticks and bottle caps for school projects. So,

we thought of making some toys from recycled materials and after the toys are finished, the children will be proud to show their parents, at the Christmas Fair, what they made out of the material they found in the preschool.

Purpose:

Playing around with recycled materials gives children the opportunity to be inventive, creative, express their uniqueness and originality. This is a new opportunity for the teachers to talk with the children about what it means to help the environment and *think green*. Together teachers and children can enrich the art of play, through transforming, renewing, and recycling everyday consumer products into toys.

Aims:

The children will:

- Observe the recycled materials.
- Identify materials that can be reused rather than simply depose of them for recycling or waste.
- Combine different recycled materials.
- Make toys that float, spin and climb.
- Build musical instruments using the materials they have found.
- Describe the characteristics of the toys.

Vocabulary/Key words:

Recycle, float, spin, climb, floating bugs, green car, plane, doll, doll house, horse, teddy bear, drum, guitar, small, big, tall etc.

Process skills:

Observe, analyze and describe, plan, conduct an experiment, gather information, communicate observations, information and conclusions.

Time/Duration:

30 minutes for each toy

Materials and resources:

Cereal boxes, cake mix, pasta, cookies & crackers, cakes, powder laundry detergent box, soap pads, water bottles, cleaning products and liquid detergent, toilet paper, paper towels, tissues, soap pads, stationery, napkins, soup cans, vegetables and fruit cans, pet food cans, coffee cans, cards with different shapes and figures, a black marker for whiteboard, stickers, shoe boxes, pencils, paper, crayons, elastic bands, plastic bottle caps, wooden broom stick.

Questions:

What recyclable materials can there be used to make a toy? What science facts are there behind the functioning of the toy?

Procedure:

A. Preparation:

Just put the **Magic box** on the table**.** You will open the box and share with the children all the materials as they need them.

B. Exploration:

Give children a pet food can and ask what they can make out of it. They will immediately know that they can make a drum with this box.

Give children a shoe box and brainstorm what toy they can make with that box. Show them images of different toys, made in factories and some made of recycled materials. Compare some of the modern toys. Help the children avoid the common misunderstanding that all broken toys are old and all shiny toys are new. Tell them that now our toys are made in factories, thousands at a time but that was not always so. Tell the children a little about the history of the toys and the materials from which they were made.

While they play, ask questions that would make them realize the science facts that lay behind the functioning of that toys: *What makes a shaker sound? What is the difference if you put more/less cereals in the cups that make the shaker? What happens if you replace cereals with pasta or paper clips?*

What is Santa doing when you spin the spinner fast?

What is Santa doing when you pull the strings aside? Pull them fast/slow what do

What makes the guitar sound?

What would happen to the ping-pong ball if it weren't attached with a string?

C. Discussion questions:

What materials can we use to make a doll or a doll house? What can we use to make a floating bug or a gliding toy? What materials can we use to make a tractor or a plane? Can you make musical instruments from recycled materials? What kind of materials?

D. Conclusions:

When we use recycled materials we help children enrich the art of play, through transforming, renewing and recycling everyday consumer products into toys. If we combine recycled toys with regular toys, children will learn to be inventive, creative and think *green*.

E. Assessment:

The teacher appreciated if:

Science: in order to make an interesting toy, you need to know some science facts

Art: the children had initiative in sorting and working with the materials to manufacture the toys

Language: the kids could describe the toy, tell the materials used to make it and talk about the way it functions

Music: they made different kind of "music" and rhythms with the toys they made.

Further investigations:

The children combined all kinds of reused materials to make a toy. In the first part of the activity one of the children noticed how different recycled toys look. In the future most of the toys could be made using recycled materials. How about searching information about these kids on toys?

Inquiry and creativity elements:

Children came with their own ideas of variables to be changed while playing with the toys they made.

Get sporty - Lesson Plan Synopsis

Lesson plans	Partner Country	Synopsis
Inclined plane in sports and life	Romania	An easy to do experiment to teach kids that inclined planes make it easier to lift things or to practice sports.
Cardiologist	Poland	Kids read a chart to see how their body reacts when doing some physical exercises.
Balance – Figures – Everything's balanced!	Austria	A fun, interesting collection of activities to study balance.
How far can you get in the long jump?	Romania	Standing long jumps can help kids learn about the metric units of length.
Sport activities at school	France	Here you can find many ideas of how to difersify the sports activities at school
Let's move!	Turkey	A complex series of indoor and outdoor activities on sports to make kids learn about and love them.
Perfect footwear	Romania	Children demonstrate that using proper footwear in icy conditions is really important

Kindergarten/School: Happy Kids Kindergarten, Ramnicu Valcea, Romania,
Subject: Integrated Science and Mathematics, Age group: 4-5 years old
Teachers: Cristina Preduca, Georgiana Boaza

Inclined plane in sports and life

Introduction:

These activities are part of the theme **Get sporty!** We will explore a simple tool that we haven't explored before. It's called an inclined plane. Inclined is when something is tilted, so that part of it is touching a lower point in space than the other. A plane is anything that is large and flat, like a piece of paper or wooden board or a football field. Let's say you are a professional skier and you want to try out a cool trick, but what do you need? You need some snow. What does a skier use to jump? A ramp. That is an inclined plane! Who else might use an inclined plane besides a skier? Let's say you are an engineer building a road but the mountains are blocking the road! How do engineers build roads over mountains? They use winding roads that go slowly up. Whenever you drive on such a road, you are driving up or down on a "twisted" inclined plane.

Now that we know an inclined plane can be used to move something (car, skier etc.) from a low point to a high point, let's find out why inclined planes make our work easier.

Background:

Inclined planes serve as tools that reduce the work necessary to transfer objects to different vertical heights. As children discover in the lesson, the actual weight lifted up an inclined plane turns out to be significantly less than the weight that would be lifted if the object were lifted straight up into the air. Inclined planes find their way into roadway construction, bike and skateboard ramps, wheelchair access, skier trampoline etc.

The function of the inclined plane is to reduce the effective weight of the object. An object being pulled up an inclined plane requires less force than an object hoisted vertically. When an object is pulled up an inclined plane a significant portion of the total weight of the object is supported by the ramp and the rest supported by the person pulling. How much of this weight is supported by the ramp and how much must be pulled by the person depends on the angle of inclination of the ramp.

Purpose:

Students will identify the uses of inclined planes in their environment. Students will recognize that inclined planes make it easier to lift things or to practice some sports.

Aims:

The children will:

- Observe the inclined plane.
- Observe the difference between an inclined plane and a normal one.
- Observe the importance of the inclined plan.
- Analyze and describe the things that occur when the plan is not so inclined.
- Identify an inclined plane.
- Describe how an inclined plane is used in the world.

Vocabulary/Key words:

Inclined plane, weight, skier, car, sky jumping, ramp, road slopes, train, train tracks etc.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, communicate observations, information and conclusions.

Time/Duration:

40 minutes for the activity

Materials and resources:

Inclined plane, cars, train, train tracks, ramp, a wooden object.

Question:

What is an inclined plane?

Hypothesis:

It is a flat surface that is higher on one end.

Procedure:

A. Preparation:

Just put the box on the table**.** You will open the box and share with the children all the materials as they need them.

B. Exploration:

Students conduct a hands-on experiment to investigate exactly how inclined planes make work easier. First, we weigh the item we are using as a load. Then, we create an inclined plane by pitching two pieces of wood. So we will create an inclined ramp and one not so inclined. Slowly slide the object up the inclined plane. Children will compare the movement of the objects on both ramps. Students will see the angle produced by the inclined plane and we will notice as the angle increases, the force of the ramp increases.

The object on the inclined ramp.

The object on the ramp no so inclined.

Give the children train tracks, a train, some cars and a skiing ramp. They will observe once again that the angle increases the force of the ramp.


A train or a car go faster on a skiing ramp


A train or a car go normally on train tracks.

C. Discussion questions:

What does inclined mean? So now that you know what inclined and plane mean, what is an inclined plane? On what kind of plane objects go faster?

D. Conclusions:

Children will conclude that the higher the inclination of the plane, the greater the force produced by the marble car/train and the greater the distance the object will be moved from its starting point.

E. Assessment:

.First the children worked independently but they enjoyed to communicate to one another and share with enthusiasm the new discoveries. It was quite easy for the teacher to observe children working. The teacher appreciated their involvement, curiosity and creativity.

Further investigations:

The kids can be asked to observe their home environment to find out if there are any inclined planes or think of other sports where slopes are used.

Inquiry and creativity elements:

Children enjoyed to play with inclined planes. They easily discovered how to use the ramp when they played with different toys and how this inclined plane helps them in real life.

School: Szkoła Podstawowa Nr 2 in Siewierz, Poland
Subject: Integrated Science and Mathematics, Age group: 4-5 years old
Teacher: Dagmara Malota-Machura

Cardiologist

Introduction:

These activities are part of the theme **Get sporty!** Every time we do any physical effort it causes changes in our body. We get short of breath, sweat and our heart rate increases. During these classes children will check the heart's reaction to physical effort.

Background:

A heart is a muscular, pear-shaped organ slightly larger than a clenched fist, the human heart is the center of the circulatory system. The human heart pumps blood through the body at a rate of more than about 4 quarts (3.8 liters) per minute. The heart of an adult weighs between about 8 and 12 ounces (230 and 340 grams) and beats an average of 72 times per minute.

(Source: article-927480kids.britannica.com/comptons/8/heart)

Purpose:

To observe the heart's reaction to physical effort and measure the difference in heart rate at rest and during exercises.

Aims:

The children will:

- cooperate in groups
- understand fair play rules in sports
- locate the heart
- conduct an experiment and observe that our pulse is lower when we are at rest and increases when we exercise

- mark their observations on graph

Vocabulary / Key words:

Gymnastics, sport, health, a heart, heart rate, a heart rate monitor, a stethoscope, olympic games, a graph.

Process skills: observe, analyze and describe, gather information, draw conclusions, communicate observations, information and conclusions.

Time / Duration:

60 minutes

Materials and resources:

A heart rate monitor, a stethoscope, gym clothes**,** a stopwatch, a whistle, Klanza animation canvas (parachute), balls, sports cones, sports bean bags, a tunnel, a skipping rope, a chart.

Question:

Does the rate of our heart change when we exercise?

Procedure:

A. Preparation:

The children use a stethoscope to locate the heart and listen to the heartbeat. They notice that the heartbeat is regular and calm. After that, use a heart rate monitor to check one's pulse and put the results on a chart. Now it's time to organize Olympic Games! After each competition children can earn points.

Examples of sports competitions:

- Moles. Put ten sports bean bags on Klanza animation canvas. Divide children into two groups. Choose one child from each group and cover his/her eyes with blindfolds. Their task is to collect as many sports bean bags as possible in one minute. After that, put another ten bean bags on Klanza animation canvas and repeat the competition for each child. The team that collects more bags wins the competition.

- Throwing the ball into the basket. Divide children into two groups. Each child from each group throws the ball into the basket twice. The team that collects more points wins the competition (one point for every successful shot).
- An obstacle race. Prepare an obstacle race (use skipping ropes, sports cones, balls, tunnels etc.) Divide children into two groups. The group that is faster wins the competition.
- Jumping into the distance. Divide children into two teams. Each child jumps into the distance. The team with 'the longest jump' wins.

An obstacle race.

Jumping into the distance.

B. Exploration:

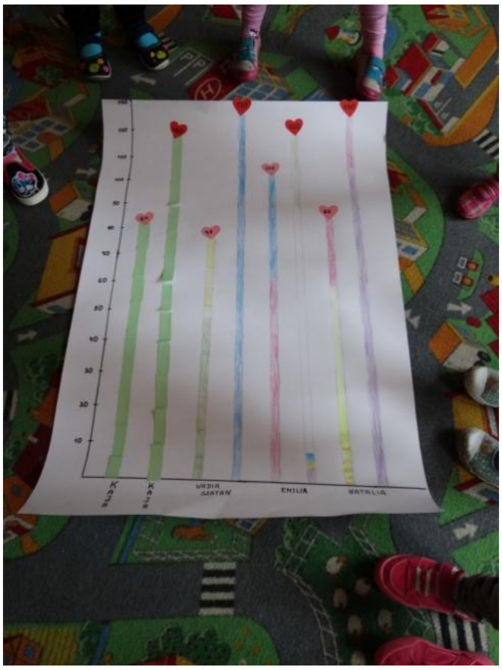
After many olympic competitions children instanly notice that their heartbeat isn't as calmv as it was before. They check their pulse with a heart rate monitor and put more fascinating results on a chart.

They put the results on a chart.

Children check their pulse with a heart rate monitor.

C. Discussion questions

Does the rate of our heart change when we exercise?



Our chart.

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D. Conclusions:

After analysing the chart children noticed that our pulse is lower when we are at rest and increases when we exercise.

E. Assessment:

The children were very fascinated with taking part in Olympic Games. They also really liked carrying out a medical experiment with a heart rate monitor and were surprised with the results after analyzing the chart. The children enjoyed communicating with each other, they spontaneously shared their observations. The teacher appreciated children's involvement, creativity and curiosity.

Inquiry and creativity elements:

The children enjoyed all the competitions and activities prepared by the teacher. They easily noticed that their pulse was lower when they were at rest and increased when they did some exercise. They promised to force their parents to do some exercise and check their pulse with a heart rate monitor.

School/Kindergarten: Kindergarten Rosental a. d. K., Austria
Subject: Integrated Science and Physics, Fine and Gross Motor Skills, Sports
Age group: 3-6 years olds
Teacher: Sabine Hirschmugl-Gaisch

Balance-Figures – Everything's balanced!

Introduction:

This activity is part of the theme **Get Sporty!**

Background:

In nearly every sport the ability of keeping the balance is extremely important.

Purpose:

At the beginning, we introduce the topic about balance within the sports lessons. By performing certain movements very slow, starting to balance on only one leg and on special exercise equipment, children get to know their own body better and can develop their individual sense of balance. Afterwards we try out some balance table games in order to improve the fine motor skills and create balance figures out of paper.

Aims:

Training of fine and gross motor skills

Discovering the balance point of an object or of your own body

Discovering and exploring balance

Getting to know the difference between a stable, an instable and an indifferent balance.

The children will:

The children will learn about the physical forces that are responsible for the balance as well as about important organs that are necessary to keep the balance.

Vocabulary/Key words:

Balance, balance point, gravity, perpendicular, level, stability, balance-shift.

Process skills: observing, analyzing and describing, planning, conducting an experiment, gathering information, collecting data, interpreting data, drawing conclusions, communicating observations, information and conclusions.

Time/Duration:

45 minutes – 6 children per unit

Materials and Resources:

Paper, templates of clowns, butterfly and bird, scissors, glue, coins, a taut clothesline in the gym (or between two chairs).

Questions:

What brings and keeps us in a good balance? Is it easier to keep the balance in a resting or a moving condition? Can the balance figures on the rope keep the balance or will they fall to the ground? Are there any other places where the figures can balance? What is the reason that our figures are able to balance? What do we need? (Coins for a balance point).

Procedure:

A. Preparation:

Each child receives scissors, paper with cut-out patterns, coins and glue in order to create and test their own balance figure.


B. Exploration:

After cutting out the figures, the children try to balance them without a balance point (coin). This is only possible with the little bird; all the other characters have to be weighed down with coins. After some trial and error, the children find the right places on the figures to stick the coins, so that the figures can balance on the clothesline in the gym.

C. Discussion questions:

Do we have to consider shifting our weight if we want to keep balance?

D. Conclusion:

All objects have a balancing point, also called the center of gravity. The lower you make the center of gravity the more stable the object is. This is why a double decker bus should fill up the bottom deck first with passengers – i. e. make the bottom heavier; the bus is less likely to topple over. – *Skills:* Investigating and experimenting.

E. Assessment:

This experimental series presents a major challenge for the children in the following areas: fine motor skills, dexterity and concentration.

Despite the high demands, the children worked with enthusiasm and perseverance and it could be observed, that they acted with greater mindfulness and body awareness in following gymnastics lessons.

Further investigations:

Designing and producing our own balancing figures. (A balance-clown-model can be found on the website of "Discover Primary Science")

Inquiry and creativity elements:

Using the template in order to make a cardboard clown and try to balance it on its nose first. – Then lower the center of gravity by attaching coins or plasticine and it will balance.

Teacher's notes:

This experimental series represents an excellent workout in basal progenitor skills and competences in the most diverse areas for preschool children before entering primary school.

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Sports and Mathematics, Age group: 6-7 years old
Teacher: Mihaela Balint

How far can you get in the long jump?

Standing Long Jump- measuring length

Introduction:

This activity is part of the theme **Get Sporty!** The *long jump* was one of the events of the original *Olympic Games* in Ancient Greece. The athletes carried a weight in each hand, called *haltere*. These weights would be swung forward as the athlete jumped to increase momentum, and then thrown backwards whilst in mid-air so as to propel himself further forward.

Background:

This lesson provides students with the opportunity to apply their understanding of centimeters and meters in a hands-on learning activity. Additionally, it introduces students to estimating, comparing and ordering as important skills of measurement.

During our activity students didn't use weights.

Purpose:

Measure, compare and order the standing long jump lengths using metric units of length. Graph representation of the data.

Aims:

The children will:

- Execute three standing long jumps after some previous warming exercises
- Measure and record the distance between the starting point (take off line) and the landing point using a meter ruler
- Compare and order the lengths recorded for all the children
- Realize a graph with these data
- Think/discover new ways to improve their performances

Vocabulary/Key words: standing long jump, distance, length, metric units, effort, measure, measurements, record, compare, order, graph representation, starting point (take-off line), landing point/line.

Process skills:

Observe, analyze and describe, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

50 minutes

Materials and resources: tape measure (meter ruler), nonslip floor for take-off / landing, sport equipment, sheets of paper, pencils, colored pencils, trainers.

Question:

How far can you get in the long jump?

Procedure:

A. Preparation:

- Explain children, show them some pictures or video files on the IWB about what *Standing Long Jump* means.
- Let them do some warming exercises and practice standing long jumps. Encourage them the try some small changes like bending the knees lower, swung their arms forward and backward many times. You can even change the floor (carpet or not), with or without strainers and so on.
- The child stands behind the marked line on the floor with feet slightly apart. A two foot take-off and landing is used, with swinging of the arms and bending of the knees to provide forward drive. The child attempts to jump as far as possible, landing on both feet without falling backwards. Three attempts are allowed.
- Attention, the take-off line should be clearly marked!
- Show them how to line the ruler up correctly: we begin measuring at 0 not 1.

B. Exploration:

- The measurements are taken from take-off line to the nearest point of contact on the landing (back of the heels).
- Each child will jump three times.
- Record all the distance jumped and circle the longest value - the best of the three attempts.
- Ask children to compare and to order all the records.
- Help them fill the graph sheet.

C. Discussion questions:

What did you use for measuring the length of your jump? How long was your best jump? Where did you fix the beginning of the ruler? Which jump is the longest/shortest? Who is the champion? Who won the second/the third place/medal?

D. Conclusions:

For length measurements we used a meter ruler. 1 meter has 100 centimeters. For a good and correct measurement we have to fix the beginning of the ruler "0" at the take-off line. We use the same take-off line for all measurements.

E. Assessment:

The teacher appreciated

- Children's involvement in the activity
- The position of their body at the take-off line; the movements of their body
- The length of their jumps
- The records of the data and the graphing representation of the data

Further investigations:

What can we do to improve our performances?

Inquiry and creativity elements:

The merge between math and sport is always attractive to children. The children were encouraged to do some exercises and prepare for the jumps session. Also, they were eager to record, compare and order the lengths of their jumps just to see who the champion is.

The graph representation at this age seems to be hazardous, but coloring the number of spaces corresponding to the number of centimeters of the length of their jump helps them record and analyze data. Make sure you use different colored pencils to keep graphical representation more readable.

Teacher's notes:

This activity is a great mixture of math and sport. Even the children who are not mad about sports enjoyed this activity and did practice some exercises trying to improve their own results.

Enclosure 1:

Class:……………………………………………………Date………………………

No.	**Name of the child**	**Jump's Length (cm)** **Circle the best jump!**		
		1	**2**	**3**
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Enclosure 2

Class:......................... Date...........

Compare and classify data. Classification in decreasing order

Number	Name of the child	The best jump
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		

School/Kindergarten: Ecole Maternelle J.Jaures Brignoles, France
Subject: Integrated Science, Physical education and Art, Age group: 3-6 years old
Teacher: Marie-Agnès Lahougue

Sport activities at school

Introduction:

This activity is part of the theme **Get sporty.**

Background:

Physical activity provides various sensations. By expressing verbally, children put feelings into words, exchange impressions, understand what has been lived and experienced...

Various sport activities are available for children throughout the year in order to get them to discover their body (the body parts), features (5 senses) and understand how it can be in motion (joints).

Purpose: Participate throughout the year in various sport activities

Aims:

The children will:

Practice different physical activities that will enable them to:

- Adapt the movements to various environments or constraints
- Cooperate or oppose individually or collectively; accept collective rules
  Perform artistic, esthetic or expressive actions
- Describe what they are doing, feeling

- Identify their own actions.

Vocabulary/Key words:

- The different body parts: head, body, legs, arms, forearms, thighs, calves, hands, feet, fingers, hips
- Joints: neck, shoulders, elbows, wrists, hips, knees, ankles
- The five senses and the organs attached to them: seeing/ eyes, earing / ears, smelling/ nose- touch/ hands, taste/ tongue
- Actions: running, rolling, crawling, jumping, walking, climbing.

Process skills: observe, analyze and describe, communicate observations, information and conclusions.

Time/Duration:

30 minutes a day throughout the school year + 5 one-day sporting events for all the classes of the school.

Materials and resources:

Sport gyms at school, sport field , playground, hiking trails, gymnasium.

Sport equipment: ball, hoops, studs, motor equipment, bicycles, scooters, swing roller, skates, skateboards, ribbons, hoops, ladder, ropes.

Procedure:

1 - Gymnastic activities

Move in unusual action forms challenging balance: crawling, sliding, rolling, swinging, moving on all fours, squatting, upset, jump on the trampoline, moving with stilts...

2 - Activities of climbing

Climb a bench, a chair, a table, a rope ladder, a climbing wall.

3 - Rolling Activities

Move with or on different machines which have an instability character: tricycles, scooters, bicycles, swing-roller, skateboards.

4 - Athletic activities: running, jumping, throwing

4.1. Run, jump in different ways: run fast in a straight line, relay race, run in slalom, jump away with or without momentum, jumping over hedges.

4.2. Move (walking, running) in related environments and gradually in foreign and uncertain environments (playground, public park, small wooden plank...) Traveling in or on unstable environments (water, snow, ice, sand ...)

4.3. Throw in various spaces with various materials (bags, balls, bag of seeds, rings...)

4.4. Throw in various ways (up, away, into) to launch to a target.

5 - Collective games

Opposing individually to an opponent in a fight game: pulling, pushing, grabbing, with fall, stop...

Cooperate with partners and oppose collectively with one or more opponents in a collective game: carry, run (objects, bullets), run to catch, to save himself.

6 – Dancing

Express themselves freely or by following a simple rhythm, musical or not, with or without hardware.

7- Five senses walk

From things collected throughout the walk, perform various activities to introduce children to the 5 senses.

5 senses walk in the country

Assessment:

- *Science:* the children have to identify the 5 senses and the corresponding body parts. They have to identify the different parts of the body and joints.
- *Plastic ARTS:* To work on visual art and make artistic productions on the theme *Move your body, do sports*.
- *Language:* Use everyday language to describe

activities, actions, the sequence of actions, the rules of the game.

Further investigations:

During all these activities bring the children to observe and describe the manifestations of life on themselves (breathing, sweating, heart beat...)

Teacher's notes:

Performing physical and sporting activities provide the children with the opportunity to play with their body and so know it better by focusing on perceptions and describing how they feel. The teacher helps the chidren improve and enrich their vocabulary (words and sense of words), and to gradually structure knowledge throughout their construction.

Athletism

School: Ş. Jan. Uzm. Çvş. Ahmet Güngör Anaokulu, Tarsus-Mersin, Türkiye
Subject: Integrated science, Physical education, Health, 4-6 years old
Teachers: All teachers and parents

Let's move!

Introduction:

The activities in this plan were organized for the theme **Get Sporty!**

Background:

Practicing sports is very important in our daily life. We must do sports for our health, too. Our children should know how and why to practice sports daily.

Purpose:

Being familiar with different kinds of sports and materials that are used for exercising.

Process Skills: Observation, using creativity, parent-student collaboration, learning by doing, communication.

Aims:

At the end of this lesson, children will:

- Be aware of the importance of practicing sports regularly for our health
- Know about different kinds of sports such as table tennis, basketball, weigh- lifting, rope skipping, etc
- Be familiar with the equipment used for different sports
- Try several types of sports
- Make sports equipment with waste materials

Key words:

Doing sport, sport activities for children, healthy life, special equipments for practicing sport

Time:

3 weeks

Materials:

All kinds of materials for making your own sports equipment tools

Questions:

- ***Why is doing sport important?***
- ***What kind of sports can we do in our daily life?***
- ***How do we practice them?***
- ***What kinds of equipment are used for doing sport?***
- ***How can we make sport tools using waste materials?***

Procedures:

A. Preparation:

The school spent 3 weeks for these activities. The activities were aplied to all age groups in the morning and afternoon classes. Everybody was involved actively in the sport activities.

B. Exploration:

During «get sporty» unit, we did several spots activities at school. We prepared different kinds of equipment that are used in sports. Children did paintings for getting to know different sports. We invited professionals to make a demonstration of their abilities at school. We wanted to raise children's awareness towards sports and its importance in our life.

In the class

In the garden

C. Discussion questions:

- Why should we practice sports regularly? Why is it so important?
- What kind of sports are there?

- What kind of equipment do we use for practicing sports?

D. Conclusions:

We can do sports everywhere, at any time. Practicing sports regularly is very important for our health. We use different tools/equipments for different sports. We can also use waste materials to make our own equipment.

E. Assessment:

All the children were involved in the activities. They liked them very much. They got the idea to do sports in their daily life. They now know that while some of the sports fields need special training such as diving, swimming, basketball, they can do basic simple sports activities at home with their families and with their own equipment such as morning sport, walking, table tennis, weight lifting, etc.

Inquiry and Creativity:

Students explored many kinds of sports that they can do in their daily lives. They made sport equipment that they can use easily. The children were very enthusiastic about working with their own equipment.

School/Kindergarten: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Language and Music, Age group: 5-6 years old
Teacher: Cristina Vacaru, Roman Stefania

Perfect Footwear

Introduction:

This activity is part of the theme **Get Sporty.** We studied different types of winter sports like skiing, snowboarding, ski jumping, figure skating, speed skating, luge, skeleton, bobsleigh. We studied gravity with snowballs, and we measured the distance steamed by the snowballs. We also explored sports equipment and footwear. This activity is about the perfect footwear during the icy, snowy season.

Background:

Kids already knew that we use different types of footwear depending on the season (sandals in the summer or boots in the winter), but they didn't realize that the sole can be so different. There are ribbed, ridge less, thick, spikes soles for footwear depending on the model chosen.

Purpose:

By investigating and experimenting, the children learn which type of footwear sole is the safest in icy conditions.

Aims:

Experience and explore the characteristics of footwear on ice.

The children will:

- Observe different types of footwear
- Observe and analyze the soles like the ridgeless or ribbed footwear
- Experiment how their footwear slip on ice
- Notice, compare and describe which is the fastest kind of footwear

Vocabulary/Key words:

Ice, inclined plane, ridge less, ribbed, fastest, leather boots, gum shoes.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

30 minutes.

Materials and resources:

Footwear with different kinds of sole, ice, inclined plane, plastic tray, ice.

Question:

Which type of sole is safer in icy conditions?

Procedure:

A. Preparation:

Start by gathering all the materials (plastic tray covered with ice, footwear with different types of sole). Analyze the different kind of soles (make sure size and the material they are made of is the same – plastic and the difference is given by the pattern and the depth of the shapes in the sole). Let the children feel the difference with their fingers. Ask them which of them could be the safest in slippery, icy conditions and why.

B. Exploration:

Encourage the children to sustain with arguments their point of view. You can even make a chart to mark the children's suppositions. Then bring in the ice and try how the different soles slide first on flat position then in inclined position. Ask the children to observe, describe and draw conclusions after experimenting.

C. Discussion questions:

Which type of sole is the most slippery? What does mean? Which type of sole is the safest for you and why? Why do we use different types of footwear in the four seasons? Why does the sole have different features? Why is the footwear is important, after all?

D. Conclusions:

Ribbed footwear is safer in icy, slippery conditions. All types of sole become slippery on ice but flat soles slide much faster, which means that you are less safe. Nevertheless, ice is dangerous and you must be really careful how you walk in such conditions.

E. Assessment:

The children were very curious and they showed a great deal of interest in this activity. They were happy and enthusiastic about the experiment! They shared their ideas and drew their own conclusions. The teacher appreciated their involvement and curiosity. They also concluded that the lesson had a lot of relevance in every day life.

Further investigations:

Why do we have to change car tyres twice a year? What type of footwear is more proper for winter: gum shoes or leather boots? What kind of footwear do we use for winter sports? Why bending slightly is safer than leaning backwards on slippery surfaces? Why extending your arms can sometimes save you from slipping or why should we avoid keeping our hands in our pockets?

Inquiry and creativity elements:

It has been a great pleasure for the kids to observe and experiment with different types of footwear. Sometimes, they wanted to change more than one variable (both the angle of the inclined plane and the type of footwear) which is not scientifically correct. They also tried the same experiment with other pairs of footwear.

History in a nutshell - Lesson Plan Synopsis

Lesson plans	Partner Country	Synopsis
Build knowledge by building houses!	Romania	Ideas for activities during a field trip to teach kids about the development of housing throughout years.
Transportation then and now	Romania	This lesson plan presents good ideas to use for the theme history of transportation.
Paper airplane	Romania	Another thorough experiment on paper planes built from different types of paper and construction methods.
Fly away, my paper airplane!	Romania	A real science investigation to study the flight of a paper airplane in different conditions.
A string phone	Poland	Does a string phone really work? Find out in this lesson plan.
Life cycles	Turkey	A series of indoor activities to fully discover the lifecycles of chicks, butterflies and frogs.
How was my chocolate produced? The bursting chocolate marshmallows	Austria	A practical lesson on the physical and chemical processes which are necessary to make chocolate out of cocoa beans.

Happy Kids Kindergarten, Ramnicu Valcea, Romania, Age group: 4-6 years old
Discovery Kids Primary School, Ramnicu Valcea, Romania, Age group: 6-7 years old
Subject: Integrated Science and Art
Teachers: Laura Popescu, Balint Mihaela, Vacaru Cristina, Roman Stefania

Build knowledge by building houses!

Introduction:

Through the project theme **History in a Nutshell** we wanted to give the children an image of the human civilization along the years by dealing with the:

- History of housing and buildings
- History of clothes
- History of means of transportation.

Put together, like puzzle pieces they are meant to form the image of a society in development and make children understand that the way we live now was the result of many years of technological development.

Background:

The first “houses” dating back to the ice-age were the caves and tents made of mammoth skins and bones. By 8,000 BC, people Began to farm and they made their houses with sun dried bricks. About 7,000 BC people already used mortar to plaster walls and floors. To ensure support, houses made of mud bricks were built touching against each other. They used their houses also like a defense wall since these houses had no doors and the entrances were some hatches in the roof. By 4,000 BC, people began to live in huts made of stones or wattle and daub. They used to cover these houses with thatched roofs. The round wooden huts with the same thatched roofs were fashionable in the Bronze Age. In the middle ages rich people began building castles: first of wood and then stone. By the 15th century some people could afford glass windows which became more common in the following century. However, if you moved house, you took your glass windows with you because they were very expensive! It was by the 1880 that working class could afford a decent house. Today, we use modern materials, we insulate our houses and till the crisis hit us, building was one of the most profitable economic areas.

(Source http://www.localhistories.org/houses.html)

Purpose:

- understand that what we are and how we live today is due to a process of technological development throughout the ages.

Aims:

The children will:

- Understand that, along the history, houses changed in building material, size, shape, facilities
- Identify building materials
- Understand that for different purposes we build different buildings
- Develop their communicational skills and group-working skills
- Develop their public-presentation skills

Vocabulary/Key words:

Prehistory, cave, tent, hut, bone, mammoth skin, mud, brick, mortar, thatched roof, stone, rock, church, house, hotel.

Process skills: observe, analyze and describe, identify, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

20 minutes presentation + 45 minutes workshop

Materials and resources:

Ppt presentation on the history of housing.

Question:

Does the function of the building determine the size, looks and materials used in a building?

Hypothesis:

The plan of a building is made according to the scope is going to fulfil. It also determines the size and the materials used.

Procedure:

A. Preparation:

The children visited the "Nicolae Balcescu Memorial Museum", not far from Ramnicu Valcea. Here, after visiting this wonderful mansion of a man who is really important in the Romanian history, we met a historian, who made a presentation about the history of housing since the early years of human history to the present days.

B. Exploration:

The presentation was followed by a workshop. The children formed three groups. Each group was presented the task: to make a collage for the front part of a medieval castle / church / modern hotel. The children designed the shape, colours, details for every building according to its purpose. Within the group, they also discussed about the building materials to be used and the best location for their building.

C. Discussion questions:

Where did the first humans live? What do you think they made the first tents with? What materials do we use today to make houses? How would you build a castle? What special detailes does a castle have? (towers, mobile bridge, small openings for the archery) Where would you build a hotel? What special details tell us that this is a hotel? (sign, big windows and front door, ramp, playground, parking lot) What does a church look like? What do you usually see on top of the church? What do the windows of the church look like? What is stained glass?

D. Conclusions:

- Children saw in pictures the development of housing throughout the ages.
- The purpose of a building determines its size, shape, type of building materials, special details.

E. Assessment:

The teacher appreciated the children's attention and involvement in the presentation of the history of housing, the dedicated participation in the art workshop and the presentations of the outcomes.

Further investigations:

Next, with the help of the historian, the children reproduced the hierarchy in a Romanian medieval court. Each child played a role and they enjoyed doing their specific duty for their king and queen.

Inquiry and creativity elements:

The children liked working with the collage technique. They also had to think about the building place it in time, space, add specific details, which helps developing and inquiring mind.

Kindergarten/School: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Math and Art, Age group: 4-5 years old
Teachers: Georgiana Boaza, Cristina Preduca

Transportation: then and now

Introduction:

These activities are part of the theme **History in a nutshell**. A transportation theme is a traditional topic in most preschools but why? Preschoolers love activities that include playing with all types of transportation including vehicles such as cars, trucks, airplanes, trams, utilitarian vehicles and more. This topic is part of their everyday lives. They drive or walk to school, have seen or ridden on a bus or taken an airplane to go on holidays. This natural interest in transportation as something they experience in their lives brings life to the theme in the preschool classroom. Children learn in a playful way. Providing theme-based, hands on activities in all of the Interest Learning Centers of our classroom will draw them into playing and learning!

Background:

Transportation is a very important part in our society's everyday life. The first way of travelling was walking, then horse riding, which changed into driving a wagon pulled by an animal, then the automobile was invented followed by the airplane, ship, steam engine, and so on. Technology has played a growing importance in how people travel across land, air, water and space. This evolution and advancement makes traveling to far-off places efficient, effective and accessible.

The kids need to be aware that with technological advances, people are able to go places that they never would have dreamt of. In the beginning, people migrated from one town to the next, then with the development of the animal-driven wagons, people were able to travel farther. The more advanced technology became, people were able to discover new territories and spread their ways of life. By researching the types of vehicles or transportation, students will be able to create a mural that depicts the evolution and advancement of technology, as well as its contributions to people.

Purpose:

Playing around with the history of transportation gives children the opportunity to be both detectives and artists. They can discover the evolution of transportation, determine if that vehicle belongs in the past, present or future and they can make a book that shows the evolution of means of transportation.

Aims:

The goal of this project is to observe the evolution of the transportation passing through time.

The children will:

- Discover the evolution of the transportation.
- Compare and contrast different forms of transportation.
- Draw different means of transportation.
- Create a book that includes the evolution of the wagon, car, train, bus, airplane and any other forms of transportation.

Vocabulary/Key words:

Water, air, land, boats, cars, automobiles, ships, sailing, walking, movement, bicycle, sled, canoe, airplane, truck, school bus, skateboard, skates, airport, vehicles, driver, pilot, captain, traffic light, horn, windshield wipers, safety belts, steering wheel, trains, fuel, gas, tires, dump truck, pick-up truck, station-wagon, sports car, garage, tractors.

Process skills: observe, analyze and describe, plan, gather information, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

30 minutes for each type of transportation

Materials and resources:

Encyclopedia, historic photographs from internet sites, time line, paper and crayons, different kinds of materials and any resource that would give information about the introduction of transportation.

Question:

How have means of transportation changed over time?

Hypothesis:

We see changes in the way transportation looks like because technology has evolved a lot along the years.

Procedure:

A. Preparation:

Demonstrate the evolution of the transportation by showing them a power point presentation and discuss what they noticed. Explain the children that they will create a book that marks the evolution of transportation.

B. Exploration:

After the presentation, the kids will talk about how people get to places (school bus, ferry boat, car etc.). They will look at travel magazines and they will say if anyone has been on a plane, a train, a horse etc. After that they will say how they get to kindergarten every day. We will clasify the means of transportation into land, sea and air and we will elicit other examples for each group.

The children will also be divided into three groups: Land, Air, and Water. The Land group will work on vehicles that travel on land. The Air group works on vehicles that travel on air and the Water group focuses on vehicles that travel on water. The children will receive a number of pictures reflecting the history of the means of transportaion in each cathegory (land, water, air). The task will be to sort the images acording to the different means of transportation they belong to (for instance train or bycicle etc. for the Land group) and then try to arrange them according to the time line. Next, they will create drawings and paintings of their favourtie means of transportation. The pictures can be painted or decorated with markers or crayons. Once complete, the pictures can be cut out and put together on A3 paper.

C. Discussion questions:

What kind of vehicle is this? How did transportation change over time? What forms of transportation did children use to go to school in the past? What are the three basic modes of transportation? What is the fastest way of transportation? Are some trains faster than others? What are the differences between cars and trucks?

D. Conclusions:

The children learnt about transportation and based on just the way means of transportation looked along the years they could arrange the pictures in a time line. The children understood that science and technology have developed, changed and affected the history of transportation along the years.

Assessment:

First the children worked independently but they enjoyed to communicate to one another and share with enthusiasm the new discoveries. It was quite easy for the teacher to observe children working. The teacher appreciated their involvement, curiosity and creativity. They drew special drawings for this activity and combined all the materials to create a beautiful book.

Further investigations:

The kids can make a creative story about a trip they would like to take. In the story, the children should be the main character and they must use the form of transportation their group drew. They should tell where they are going and what it is like to travel with their specific transportation.

Inquiry and creativity elements:

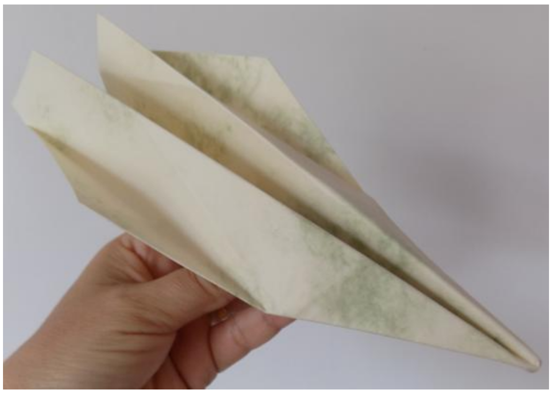
Children enjoyed to play with different means of transportation. They easily learnt how transportation evolved along the years and they discovered different ways to get from here to there. They also enjoyed to draw or paint different types of vehicles.

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science and Paper art craft, Age group: 6-7 years old
Teacher: Mihaela Balint

Fly away, my paper airplane!

Introduction:

This activity is part of the theme **History in a nutshell- Means of Transportation.**



A simple handmade craft, like a paper airplane or a glider, can be a good start for a science investigation. *Can it fly? How can I make my paper airplane fly further?*

Background:

When we throw forward a paper plane, the air flows around the wings pushing up on them. Investigating details like:

- using different types of paper
- aiming the plane slightly up or down as we throw it (changing the angle we throw the plane)
- adding an extra weight to the top of the plane
- folding the tips of the plane's wings up or down as we throw it

we can find answers to the following questions: *how does the paper airplane fly and how can I make it to fly further.*

Don't forget, in a real science investigation we change the variables one at a time!

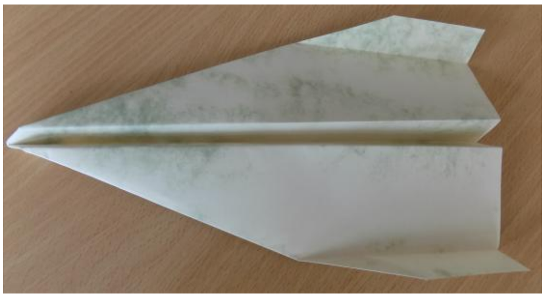
Purpose:

Investigate the flight of a paper airplane in different conditions.

Aims:

The children will:

- Build paper airplanes using different types of paper and different construction methods
- Observe and describe the flight of the paper airplane in different conditions



- Discover new ways to make a paper airplane fly further
- Make use of the new vocabulary in a proper context

Vocabulary:

Plane/airplane, glider, wings, tail, top, tips/ flaps, wind, air, further, faster, lighter, heavier, forward, backward, up, down, left, right, angle, loop, change, flow, lift, push, throw, fly, glide.

Process skills: observe, analyze and describe, craft paper airplanes, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations and conclusions.

Time/Duration:

50 de minute

Materials and resources:

Different types of paper (A4), stickers, colored pencils, pencils, crayons.

Question:

How can I make my paper airplane fly further?

Procedure:

A. Preparation:

Following the models from this site http://www.paperaeroplanes.com/ (or any other instructions) build paper airplanes or gliders from different types of paper. Personally, I recommend the *Dart* model; even young children can be taught to make this plane.

A glider is a plane with broad wings. The bigger the surface of the wings, the more air pushes up on them. So, the gliders flies further then "classic" airplanes.

B. Exploration:

Just play with these airplanes and observe the flight of each type of airplane. Test planes with different sizes of the wings, of the tail, positions of the wings, type of construction paper. Don't forget to change only one variable at a time. For instance:

- Build two planes from different types of paper but using the same construction model. *Which one flies further, the lighter one or the heavier one?*
- Build one plane using your favorite model. Try aiming the plane slightly up or down as you throw it. *How does it fly? In which case does it fly further?*
- Build two identical planes. Throw the planes forward in the same time but with different forces
- Build two identical planes using the same type of paper. Fold the tips of the first plane's wings up and throw the plane. Fold the tips of the second plane's wings down and throw the plane. *Which one flies further? Does it fly differently?*

Children can work in pairs, each team making his own investigation.

C. Discussion questions:

Which plane flies further? How can you "help" your paper plane fly further? If you push it harder will it fly further? If you fold the tips of the wings down/up and throw the plane does it fly differently? How about changing the angle you throw the plane?

D. Conclusions:

The flight of the paper airplane depends:

- on the type of paper (lighter or heavier)
- on the construction model
- on the force used to push the plane forward
- on the angle we throw the airplane

E. Assessment:

Paper airplane are quite easy to make even for the young children. Also, it is a good way to plan and run new investigations and have fun in the same time. The teacher can evaluate:

- the activity of the children in individual and group tasks
- their description of the plane and of the flight
- the use of the new vocabulary

Further investigations:

Can we make the paper airplane fly further using a rubber band?

See ***Paper airplane*** activity**.**

Inquiry and creativity elements:

The children have the opportunity to test all kinds of construction materials (paper or light cardboard), different construction details. At the same time, they work in pairs, describe their work and airplane model, communicate with peers, plan their own investigation, come to a conclusion and design new models. Children can use white paper and decorate their airplanes using stickers or/and colored pencils. Also, they can choose a name for their plane and imagine a story based on an adventurous flight with their plane.

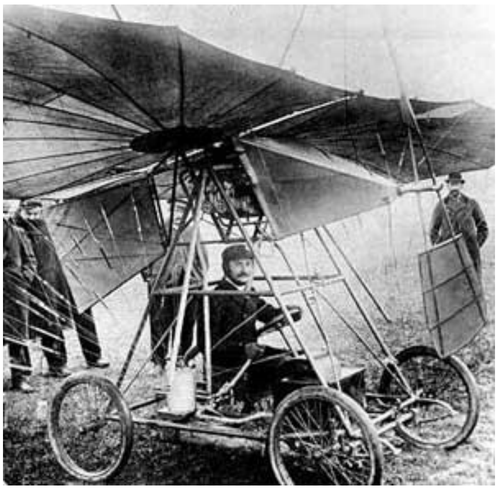
School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science and Paper art craft, Age group: 6-7 years old
Teacher: Mihaela Balint

Paper Airplane

Introduction:

This activity is part of the theme **History in a nutshell - Means of Transportation.** It is an extension of another activity **Fly away my paper airplane.**

Background:



One of the first flights of an airplane was one with the airplane built by the Romanian Traian Vuia in 1906. This was a high-wing monoplane constructed entirely of steel tubing. (*The picture on the left*). The wings looked like those of Otto Lilienthal's gliders, and were covered in varnished linen.

Hard to believe but many of the first airplanes were made of linen, cardboard and light wood. (the picture on the right)

A simple handmade craft, like a paper airplane, can be a good start for an engineering investigation. *Can it fly? How can I make it fly straighter, faster, further?*

Purpose:

Investigate the flight of a paper airplane (a paper glider) in different conditions.

Aims:

The children will:

- Build paper airplanes using different kinds of paper and different construction methods
- Observe and describe the flight of the paper airplane in different conditions
- Discover new ways to make a paper airplane fly straighter or/and further

Vocabulary/Key words:

Plane, airplane, wings, tail, flaps, wind, force, air, far, farther, faster, straight, straighter, rectangle, forward, backward, up, down, left, right, loop, rubber band, force, energy

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

50 de minute

Materials and resources:

Different kinds of paper, light cardboard, scissors, stickers, colored pencils, pencils, rubber band, hole punch, sticky tape.

Question:

Which paper airplane flies better?

Procedure:

A. Preparation:

Following the models from this site http://www.paperaeroplanes.com/ (or any other instructions) build different paper airplanes from different types of paper.

B. Exploration:

Just play with these airplanes and observe the flight of each type of airplane. Test different sizes of the planes, of the wings, of the tail, positions of the wings, type of paper. Don't forget to change only one variable at a time. For instance build two planes from different types of paper but using the same construction model. *Which one flies better?*

Can I make the airplane fly further using a rubber band?

Use a hole punch to make a hole way along the plane. Thread one end of the rubber band through the hole in the plane. Bend the other end around and push it through the loop. Pull it tight. Loop the rubber band over the top of a pencil. Pull the plane back as far as you can, then let it go. Be careful, it could be dangerous. Two of our planes smashed against a cork panel board and got stuck there!

C. Discussion questions: Which plane flies straighter/ faster/ a longer period of time/ further? How can I make the paper plane fly further? If I push it harder will it fly further? How can I make the airplane fly further using a rubber band? How about pulling the plane back as far as I can and let it go? How about using a longer rubber band/ a thicker rubber band?

D. Conclusions:

The flight of the paper airplane depends:

- on the type of paper (paper, light cardboard)
- on the construction model
- on the force used to push the plane forward

E. Assessment:

Paper airplane are quite easy to make even for the young children. Also it is a good way to plan and run new investigations and have fun at the same time. The teacher observed the activity of the children as individuals as well as part of a team.

Further investigations:

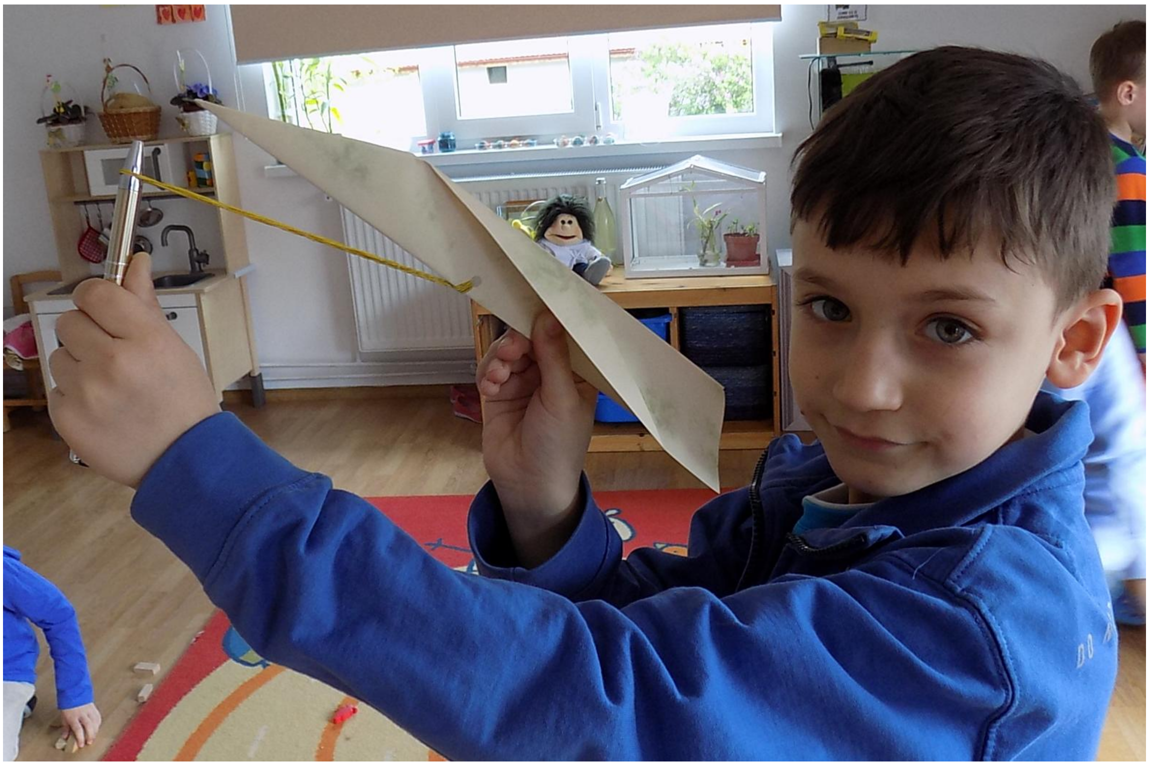
Children can build new models of airplanes based on pictures of old real airplanes from new papers or cardboards (recycled or reusable materials). Even if they don't fly, these airplanes are a great way to develop some handy abilities and design skills.

Inquiry and creativity elements:

The children have the opportunity to test all kinds of construction materials (paper or cardboard) and different construction details. At the same time, they work in pairs, describe their work and airplane model, communicate with peers, plan their own investigation, come to a conclusion and design new models. Children can use white paper and light cardboard and decorate their airplanes using stickers or/and colored pencils. Also, they can choose a name for their planes and imagine a story based on an adventurous flight with their plane.

Teacher's notes:

All the materials necessary for these activities are available in every classroom, at any time.



School: Szkoła Podstawowa Nr 2 in Siewierz, Poland
Subject: Integrated Science and Mathematics, Age group: 3-4 years old
Teacher: Dagmara Malota-Machura

A string phone

Introduction:

These activities are part of the theme **History in a nut shell**. Telephones play an important role in our lives. We can't imagine the world without them. But how old is a telephone? What did it look like many years ago? We start a journey through time.

Background:

Every kind of *sound* is produced by vibration. The sound source may be a violin, an automobile horn, or a barking dog. Whatever it is, some part of it is vibrating while it is producing sound. The vibrations from the source disturb the air in such a way that sound waves are produced. These waves travel out in all directions. If the waves happen to reach someone's ear, they set up vibrations that are perceived as sound. Sound, then, depends on three things. There must be a vibrating source to set up sound waves, a medium (such as air) to carry the waves, and a receiver to detect them. Sound waves cannot travel through a vacuum.

(Source: http://kids.britannica.com/comptons/article-9277144/sound)

The telephone is a very common device for communicating over a distance. With a telephone, a person can talk almost instantly with someone on the other side of the world. Most telephones are linked to each other by wires. Others, such as cell phones, are connected by invisible radio waves that travel through the air.

(Source: http://kids.britannica.com/elementary/article-353842/telephone)

Purpose:

- To make a string telephone
- To explain why is it possible to talk on the string telephone

Aims:

The children will:

- Talk on the string telephone
- Feel vibrations at the bottom of the cup and along the string
- Describe their observations, draw conclusions

Vocabulary / Key words:

Sound, sound waves, sender, receiver, telephone

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, draw conclusions, communicate observations, information and conclusions.

Time / Duration:

30 minutes

Materials and resources:

Two plastic cups, a long string, scissors

Questions:

Does the string telephone really work?

Can it really be used to communicate?

Procedure:

A. Preparation:

Tell the children about the telephones. Ask them some questions: What did the first telephone look like? Who invented it? When was it invented? What do we use them for? What types of telephones are there?

B. Exploration:

Take a plastic cup. Poke a small hole through the center of the bottom of the cup. Remember not to make the hole too big, just big enough to fit the string. Poke the end of the string through the cup.

Tie a knot on the part that is inside the plastic cup. Repeat these steps with the second cup.

The string telephone is ready. It's time to try it out.

Choose two volunteers: a sender and a receiver. A sender holds one plastic cup up to his/her mouth and talks loudly into it. A receiver holds the second cup up to his/her ear. It is important to keep the string tight between the cups.

If the string is tight the receiver should be able to hear the sender's message through the cup (while talking on the phone children can touch the bottoms of the cups and the string to feel the vibrations).

C. Discussion questions:

Can you feel the vibrations at the bottom of the cup and along the string when you are speaking into the cup? Can you feel the vibrations at the bottom of the cup and along the string when your friend is speaking into the other cup? Does the string telephone really work? Can it really be used to communicate?

D. Conclusions:

A string telephone works because when we talk into the cup our voice vibrates the string. These vibrations travel through the string like waves. When they reach the other end they vibrate the bottom of the plastic cup and turn back into sound waves which we are able to hear.

E. Assessment:

The children really liked the classes. They enjoyed carrying out an experiment with a string telephone. It was quite easy for the teacher to observe children working. They enjoyed communicating ☺ with each other and shared their observations spontaneously. The teacher appreciated children's involvement, creativity and curiosity.

Further investigations

You can show the children that it is impossible to talk on a string phone if the string between the cups isn't tight enough.

Inquiry and creativity elements:

A book about telephones.

School: Ş. Jan. Uzm. Çvş. Ahmet Güngör Anaokulu, Tarsus-Mersin, Türkiye
Subject: Integrated Science and Art, 4-6 years old
Teachers: All teachers

Life cycles

Introduction:

The activities of this plan are a part of the theme **History in a nutshell.**

Everything in nature follows a process in its own world. Chick, butterfly, frog, tulip, etc. They all have a start as something small like a dot, and they miraculously turn into another living being, another beauty.

Purpose:

- The children will recognize the stages in the life cycle (growing-up and development) of some animals such as a chick, butterfly and frog.

Key words:

Grow up, process, life circle, egg, butterfly, frog, chick

Process Skills: observation, peer-learning, learning by doing, questioning, using creativity, communicating.

Time:

3 hours

Materials:

Yellow rope, plastic gloves, plastic plates, bottles, colorful papers, glue, scissors, some waste materials

Questions:

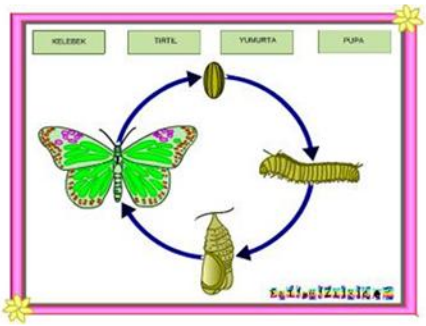
- How does a chicken hatch?
- How does it get out of its eggshell and grow up?
- How does a caterpillar become a butterfly?

- What is the life circle of a butterfly?

Procedures:

A. Preparation:

Children watch videos about life circle of a butterfly. Teacher discuss with the children about how a caterpillar turns into a butterfly with drawings and posters.



B. Exploration:

Children watch videos about the life circle of different plants and animals.

Then, they will give a feed-back on their understanding of changes in a life-cycle. Next, they will order properly the stages of development on a worksheet. The teacher will introduce the materials necessary to represent the booklet/model on the life cycle of a chicken, a butterfly and a frog. The children will use different techniques such as drawing, sticking, cutting etc. to visually represent life cycles. The craft will give them the opportunity to think and order the life-stages, the role of the teacher being that of a facilitator and she will interfere as little as possible. Their work is exhibited in the class and showed to other classes.

C. Discussion questions:

- What kind of in-class activities can we make to teach the life cycle of some animals and plants?
- Can we use waste materials? If yes, what?
- What are the phases of a butterfly, frog and chicken life-cycle?
- Are there similarities or differences among them?

D. Conclusions:

Each class worked on a different creature: one investigated the phases of development of a butterflies, some worked on frogs, and some worked on chicks. They used waste materials, drawings and other materials for making sample work. Each class composed a file/ booklet on the theme. They showed their own files to other classes and learned from each other.

E. Assessment:

It was very interesting and enjoyable for children to learn about the life cycles of different animals and plants. They asked a lot of questions about the topic. They watched all the videos with a great curiosity. They took pride in their craft and during the next days they kept watching and talking about the displays. The children kept their albums in the class and showed them to their friends and parents.

Further investigations:

Every living creature in the nature has a life cycle. This topic can be enriched by investigating other living beings. Students can grow up plants or animals in the class and make observations. They can keep a diary or checklist about their growing process.

Inquiry and creativity elements:

We can make many lesson models using waste materials and using our creativity.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School/Kindergarten: Kindergarten der Volkshilfe Rosental a. d. K., Austria
Subject: Integrated Science - Physics, Chemistry, Protection of the Environment, Sustainability, Ecology, Health, Molecular cooking
Age group: 3-6 years old
Teacher: Sabine Hirschmugl-Gaisch

How was my chocolate produced? – The bursting chocolate marshmallow

Introduction:

This activity is part of the theme **History in a nutshell**. What is cocoa and chocolate made of? What does the process of making chocolate out of cocoa beans look like?

Background:

The production of chocolate out of cocoa beans includes fat, sugar and many other substances (alkaloids, cholesterols, proteins, polyphenols, carbohydrates, lipids, anadamids) as well as several physical and chemical processes of molecular biology. We investigate the characteristics of the individual ingredients and the final product chocolate.

In order to promote sustainability and ecology, we also examine the conditions under which the ingredients of chocolate are produced and which products are available "fair trade".

Aims:

We explore the physical and chemical processes which are necessary to make chocolate out of cocoa beans.

The children will:

In this experimental unit, children learn about the whole production process of chocolate and other products made from cocoa.

Vocabulary/Key words: names of different chocolate products like chocolate ice cream, varieties of white and very dark chocolate, the different names of the ingredients (alkaloids, cholesterols, proteins, polyphenols, carbohydrates, lipids, phenylamins, anadamids); explanation of words like "carbohydrates", which often occur in advertisements.

Process skills:

Observing, analyzing and describing, planning, conducting an experiment, gathering information, collecting data, interpreting data, drawing conclusions, communicating observations, information and conclusions.

Time/Duration:

Approx. 45 minutes / 6 – 8 children.

Materials and resources:

Different types of chocolate to taste, candles for heating up chocolate, an oven-proof glass bowl, solar cookers with glass bowl, pieces of chocolate, melted chocolate in the fridge, chocolate marshmallows, vacuum pump.

Questions:

How stable is a chocolate-skin? - When does chocolate melt? - Why does soft chocolate change its color when it is placed in the refrigerator? - What happens to a piece of chocolate when I hold it in my hands or mouth too long? - Can I form chocolate? – Why can chocolate be so colorful?

Procedure:

A. Preparation:

Chocolate marshmallows and a vacuum pump are prepared for each child. As an introduction different types of chocolate are first tasted blindfold and then classified. After that some chocolate is melted with the solar cookers and some is put into the refrigerator so that we are able to observe how the chocolate changes in different environments.

B. Exploration:

First, the chocolate marshmallows are tasted and their consistency is closely examined. Next, we examine the vacuum pump and work out their differences to an air pump. After the chocolate marshmallow is placed upright in a vacuum box, the box is well-sealed and the air is then extracted from it with the pump. The children get to see how the chocolate glaze starts to spring and the protein mass starts to swell.

C. Discussion questions:

How does a vacuum pump function? When and why do I need such a device? What would happen if the filling of the chocolate marshmallow consisted of jam, marzipan or chocolate cream?

D. Conclusions:

By extracting the air, the chocolate marshmallow inflates and its chocolate shell cracks. The extraction of the air causes a vacuum and the relatively higher pressure inside the marshmallow brings about the expansion or even the burst of it.

E. Assessment:

The difference concerning the function and application between an air pump and a vacuum pump was physically perceptible for the children and sparked off great astonishment. Furthermore, he swelling of the egg-white mass and the springing glaze filled the children with greatest enthusiasm.

Further investigations:

The next topic which came into the children`s minds was the exploration of gummy bears and their ingredients and characteristics.

Teacher's notes:

It was great to see that children worked on the topic with interest and enthusiasm. We could also raise awareness of the children as well as of their parents and grandparents concerning the need for a fair and sustainable handling of products in cultivation, transportation and manufacture. Through conscious buying and consumption of fair trade products we can help to prevent exploitation, destruction and abuse!

Spring detectives - Lesson Plan Synopsis

Lesson plans	Partner Country	Synopsis
Where is spring?	Poland	Kids work with observation sheets to discover the signs of spring and learn how to collect data.
Bees and flowers	Turkey	A full range of activities to make the connection between changes in nature and living beings.
Bug detectives	Romania	A detective like activity to discover the main characteristics of insects.
Plant detectives	Romania	Young children aged 2-4 observe plants grow
Spring flower investigation	Romania	A long term activity to learn about and observe a new born plant evolving from a bulb.
The journal of spring signs	Romania	Kids play around with cameras to be both science detectives and artists and to capture the signs of spring.
Our weather is crazy, isn't it?	Austria	A 2-week activity to observe and document the local weather and learn how professional weather instruments work.
Trees and flowers are living beings	France	A year-long project to learn about and discover the changes in nature with the coming of every season.

School: Szkoła Podstawowa Nr 2 in Siewierz, Poland
Subject: Integrated Science and Mathematics, Age group: 5-6 years old
Teacher: Dagmara Malota-Machura

Where is spring?

Introduction:

These activities are part of the theme **Spring detectives**. Winter was very long this year and we really miss the spring. But wait a minute, isn't it spring time? Where is spring?! Let's go for a walk and look for its harbingers.

Background:

Spring, which comes between the cold weather of winter and the warm weather of summer, is the season during which temperatures gradually rise. Spring begins with the vernal equinox, when the length of the day and that of the night are equal in length.

(Source: http://kids.britannica.com/comptons/article-9604859/spring)

Purpose:

To look for and observe spring harbingers.

Aims:

The children will:

- know spring harbingers
- know how to use and complete the table / observation sheet
- observe
- analyze the data from the table / observation sheets

Vocabulary / Key words:

Spring, seasons, observe, snow, sun, grass, hat, stork, melting snow, wellingtons, flower buds

Process skills: observe, analyse and describe, gather information, draw conclusions, communicate observations, information and conclusions.

Time / Duration:

45 min. – twice a week

Materials and resources:

Tables / observation sheets, pictures with spring harbingers, glue, crayons.

Question:

Is spring coming soon?

Procedure:

A. Preparation:

Talk with the children about different seasons and their harbingers. Ask them if they know what season is coming.

Prepare tables / observation sheets and choose pictures presenting spring harbingers. Stick them into the table and write in the dates of observations (twice a week)

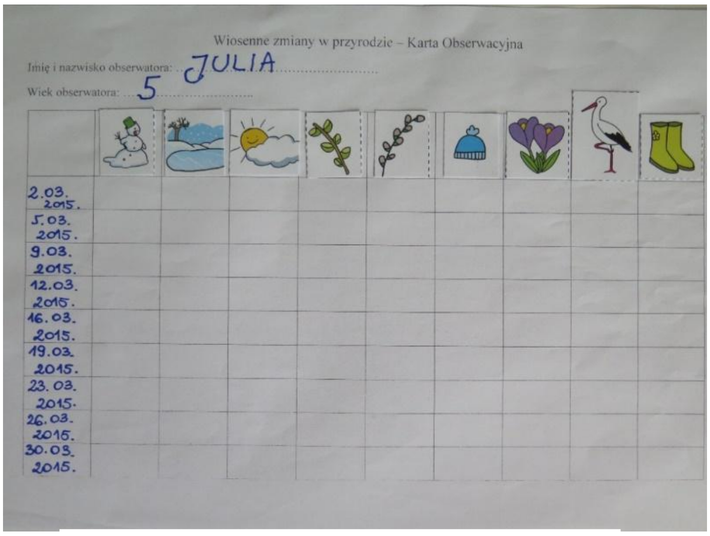


Table / observation sheet

Give each child an observation sheet. Explain how to complete the table (they can colour chosen box in the table). Take the children for a walk (twice a week), observe the surrounding nature, look for spring harbingers and complete the table.

Spring detectives at work!

Kacper found leaf buds

Ania found crocus

Kaja found flower buds

B. Exploration:

After a month of observations and collecting data we can analyse our observation sheets. At the beginning of the month the snow was falling and we had to wear warm jackets and winter hats. In the middle of the month we could observe more sun, the snow was melting and we saw some flowers. At the end of the month we saw storks.

Lena's observation sheet.

C. Discussion questions:

Which of the harbingers can you see in the grass/sky? Did you spot any other signs of spring which are not in the chart?

D. Conclusions:

After analysing all the observation sheets all the children unanimously stated that spring is coming!

E. Assessment:

Being a spring detective was a good fun for each child. They enjoyed searching for spring harbingers and completing the observation sheets. It was quite easy for the teacher to observe children working. They enjoyed communicating with each other and shared their observations spontaneously. The teacher appreciated children's involvement, creativity and curiosity.

Further investigations:

You can repeat these classes at the beginning of each season. It will help children to observe and understand changes in the nature.

School: Ş. Jan. Uzm. Çvş. Ahmet Güngör Anaokulu, Tarsus-Mersin, Türkiye
Subject: Integrated science, Art and Nutrition, 5-6 years old
Teacher: All teachers

Bees and flowers

Introduction:

The activities within this plan were organized as a part of the theme **Spring Detectives.**

Spring is the best season to make observations and see what is going on in nature. There are so many things waiting to be discovered by children. It is the best time to enlarge children's view of nature and other living beings.

Purpose:

- Observing the changes in nature in spring
- Making connections between changes in nature and living beings
- Understanding the relationship between flowers and bees
- Getting to know the process of making honey.

Process skills: observation, using creativity, parent-student collaboration, communication.

Time:

5 hours

Materials:

Outside environment (school garden or another area with flowers and plants), drawings related to bees and flowers, macaroni pieces, waste paper and materials, honey.

Questions:

- ***How do the bees work?***
- ***How do they make honey?***
- ***What is the process of making honey?***
- ***Is the taste of honey all the same?***

Procedures:

A. Preparation:

Teachers and children exchanged information about the changes in nature in spring time using inquiry-based learning technique. They asked some questions to raise the students's awareness towards nature and environment, the insects and flowers, and their functions in nature.

B. Exploration:

The children were taken out-doors to make observations on the bees visiting the flowers. They could observe the parts of the bee (the head, thorax, abdomen, wings and the 6 legs), they saw interesting features like the anthenna, the compond eyes, the jaws and the stinger, they watched the pollen baskets on the bee's legs. They discussed about drones, workers and bee queens and the function of each of them. We talked about how can we keep safe from bees and what do we do when a bee lands on our body. Next we talked about the connection between spring, bees and flowers like the role of bees in pollination and sustaining the planet's the eco-system. Most plants need the bees and other insects to spread and, in exchange, ofer nectar and pollen to bees.


C. Discussion questions:

- What changes are there in nature in spring?
- Why do bees like flowers?
- How do they make honey?
- What does honey taste like?
- What is beekeeping?

D. Conclusions:

They were shown some videos about bees, flowers and honey. Then, they made some drawings about bees.

They built a beehive with their drawings and handcraft materials like macaroni pieces, calourful paper and fabrics.

Then, they tasted different kinds of honey. They learned that the colour and the taste of honey depends on the types of flower that the bees took poleen from.

Further investigation:

The children can be taken out for an trip to a bee keeper's workshop to see the process of getting honey from beehives.

In other classes, some of the teachers worked on the relationship between insects and small animals and plants i.e. catterpillars and mulberry trees, butterfies and flowers.

Inquiry and creativity elements:

The children tasted different kinds of honey and discovered that the colour and the taste change according to the flower or tree that the honeybees visited.

The children also made a very nice model representing four stages: the coming of the spring, the bees collecting honey from flowers and trees, the bee-keeper taking to honey combs and the jars of honey in our homes.

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Language, Art and Personal development
Age group: 6-7 years old
Teacher: Mihaela Balint

Bug Detectives

Introduction:

This activity is part of the theme **Spring Detectives.**

Background:

Bugs are small creatures with legs. That may include insects as well as many other animals that are not insects, such as spiders and centipedes.

Some bugs are a type of insects that have a mouth shaped like a straw. Butterflies for example, use this tongue mouthpart to pierce plants and drink their sap or other juices. Some bugs, such as water striders and some shield bugs, use their piercing mouthparts to eat a variety of insects, spiders, and other small animals.

Purpose:

To identify the main characteristics of the insects/bugs. To classify an insect/bug starting from these characteristics. To recognize and name some insects/bugs.

Aims:

The children will:

- Recognize and name an insect/bug identifying the main features of the family they belong to
- Classify insects/bugs in families identifying some mutual characteristics/similarities
- Recognize and name some insects/bugs and list some of their features: bee, bumble bee, ladybug, wasp, beetle, butterfly, moth, dragonfly, fly, mosquito, snail, spider and centipede.

Vocabulary/Key words:

Insects/bugs, thorax, head, antennas, abdomen, wings, eyes, compound eyes, proboscis, legs, bee, bumble bee, ladybug, wasp, beetle, butterfly, moth, dragonfly, firefly, mosquito, fly, snail, spider, scorpion, centipede.

Process skills: observe, analyze and describe, gather information, collect data, organize and interpret data, communicate observations, information and conclusions, representation by drawings.

Time/Duration:

50 min

Materials and resources:

Writing papers, pencils, colored pencils, crayons, magnifying glasses, rulers, microscope, insects/bugs, books and encyclopedias for children, insect/bug pictures.

Question:

What is a bug? What is an insect?

Procedure:

A. Preparation:

Make available to the children a collection of insects and magnifying glasses. Allow them to observe all the insects and communicate their observations with peers. *What do they have in common*?

B. Exploration:

Organize their observations and, using a big picture of an insect (or the IWB), label the main characteristics of the insects - the parts of the body. Now introduce a picture with a spider. *Is the spider an insect, too?*

Split the class into pairs and give each team one bug. Working together, each team must reproduce by drawing the bug, label the main parts of their bug, write the name of the bug and search for information in a book, in an encyclopedia or on the internet. Children can also work independently.

Encourage your students to present their drawings, observations and information to their colleagues.

C. Discussion questions:

What kind of bug is it? What's its name? What can you tell us about your bug? (Size, colors, food, enemies, way of life, life cycle, other science facts, curiosities, etc.). Do you like this bug? Do you have special feelings related to this bug?

D. Conclusions:

There are many kinds of bugs/insects. All shapes, sizes, colors, with or without wings, with or without legs and so on. Many insects and bugs like butterflies, ants, bees and flies are part of our life. It is useful to know as much as we can about all of these bugs in order to have a better life together, on this planet.

E. Assessment:

The teacher appreciated: the children's involvement in the activity, their observation skills, attention to details, use of vocabulary, drawings, labels, notes, presentation of the bug, collaboration and communication with peers.

Further investigations:

More detailed observations upon two insects belonging to the same group: bees and wasps or butterflies and moths are quite challenging. Venn diagram is very useful in this type of activity. It helps children organize their observations and use the scientific vocabulary correctly.

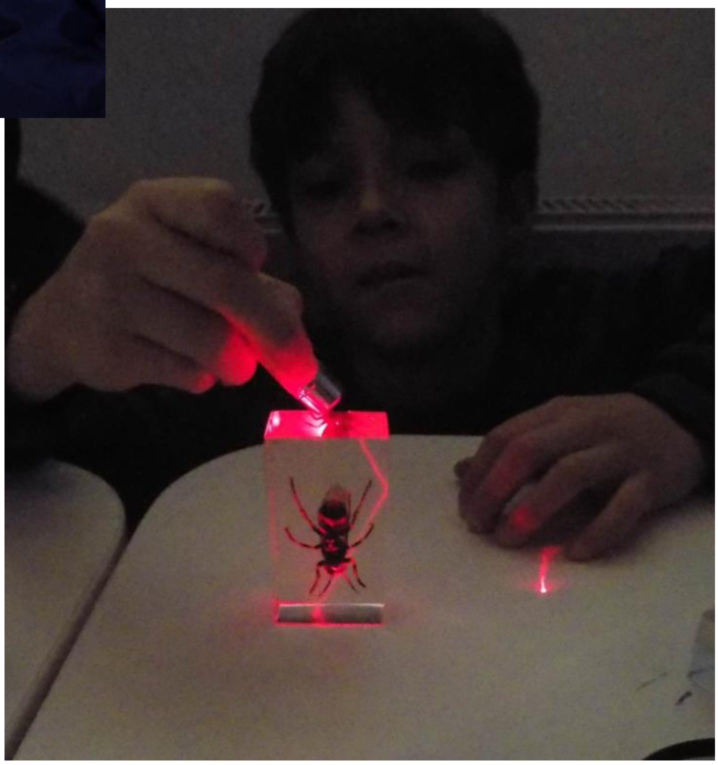
Inquiry and creativity elements:

Children improved their observation skills, their attention to details.

Reproducing by drawings the main characteristics of the insect/bug they became more aware of those features and of their importance in the bugs' life. Children can better understand how bugs adapt to the environment and their way of life. Since the number of insects on our planet is much bigger than that of the humans, it is very important to enrich our knowledge about bugs/insects and to keep the situation under control.

Teacher's notes:

Observing bugs / insects children discovered completely new directions for further investigations. Some of our bugs were *trapped* in clear plastic forms. Flashlights and point lasers revealed the light travel through the plastic forms and opened the appetite for some light experiments.



School/Kindergarten: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Mathematics, Language Development, Art
Age group: 2-5 years old
Teacher: Rotaru Elena, Prejbianu Irina, Preduca Cristina, Boaza Georgiana, Popescu Laura

Plant detectives

Introduction:

These activities are part of the theme **Spring detectives**. After the cold winter, the ground is thawing slowly touched by the spring sun. Tipical spring work starts in gardens and orchards. In the market places the farmers bring the first picked vegetables for selling.

Background:

Most of our children live in flats in our town. Their contact with country life and typical spring gardening is quite poor. We wanted them to feel the joy of planting and observing how, from the tiny seed, sprouts and grows a plant. Each of these preschool groups with ages ranging between 2-4 planted different species of plants and watched them grow.

Furthermore, preschoolers have difficulties in understanding time measurements. The following exploration activities provided a very good opportunity to understand time (we talked about today, yesterday, tomorrow, last week, two weeks ago, last month).

Purpose:

Plant seed and observe how plants grow in spring.

Aims:

The children will:

- observe and explore with their senses different kind of seeds and bulbs
- plant seeds and bulbs
- look after the plants
- observe regularly how the plants grow
- describe plants and focus on differences and similarities
- connect observations to knowledge about the life-cycle of plants.

Vocabulary/Key words:

Vegetable, farmer, seed, to plant, to water, to grow, roots, stem, leaf, flower, petals, pollinate, fruit, vegetable

Process skills:

Observe, analize, ask questions, gather information and draw conclusions.

Time/Duration:

5-30 minutes per day for 2-3 months

Materials and resources:

Bulbs and seeds, potting soil, pot, cups and other small containers to plant the seeds, tyres, water.

Question:

How does a plant grow?

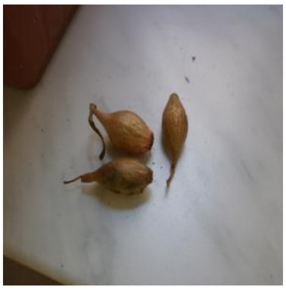
Procedure:

A. Preparation:

Discussions on signs of spring, weather changes, spring plants, parts of plants and life-cycles, what a plant needs to grow preceded the close look of the seeds and bulbs.

B. Exploration:

The children observed, smelled, touched and even tasted some of the seeds. They realized that seeds come in different shapes, sizes and colours but the seeds / bulbs of a type of a plant look alike. The children learned about the best potting soil and planted the seeds themselves.



Each class provided the best conditions for the seeds to grow (water, warm place) and observed how the seedling appeared. As soon as the seedling was out, the children moved the pots next to the window to make sure the light was strong enough for the plant to grow.

When the seedlings were big enough they were planted in the garden or in special places in the playground. They made the cleaning in the planting area, brought extra soil and water and used gardening tools such as: showel, rake, can.

The 2 years old planted wheat into painted egg-shells for Easter:

The *Happy Bubbles* and *Superheroes* (4 years old) observed the parts of a plant and planted spring flowers:

C. Discussion questions:

What will the bulbs that we plant become? What do these bulbs / seeds need to grow? How is the bulb similar/different to a seed? How long will it take for the seeds to become full grown plants? What do seedlings need to grow? How does the plant look different as compared to last week? How many leaves can you see? Which is the biggest and the smallest leaf? What colour is the flower of the plant? How many petals does the flower have? What does a flower need in order to develop into a fruit? What can we find in the fruit of a plant?

D. Conclusions:

From each type of seeds a different plant develops. Seeds, seedlings, plants and flowers need specific conditions to grow. Not all seeds produce new plants. It takes a long time for a seed to develop into a full-grown plant. In order to grow plants, the farmers have to take care of them and love them. Planting seeds and gardening is fun and educational.

E. Assessment:

The children were eager to know what will happen to their seeds / bulbs / seedling. We noticed that they frequently checked on their plants in the morning as they arrived to the preschool. They were extremely proud of their "achievements" and share with parents and visitors their planting experience.

Further investigations:

You might want to measure the plant. For this you can use two similar rulers or even two similar sticks. Push one of the rulers/sticks in the earth next to the plant and keep the other one in a plant-diary. Regularly mark how tall the plant is, then with the aid of the second ruler / stick draw in your diary how tall the plant is and what it looks to help you draw your recordings. Talk with the children about how the plant has changed and also how long it took. Besides observing the stages of plant development, children can practice important scientific skills like making predictions and regular measurements. In addition they learn how be responsible and care about the nature (when they see how long it takes for a plant to grow, children develop protective attitudes towards nature).

Inquiry and creativity elements:

Having patience and running regular observations is not something that young children naturally do. By running such activities, they learn that it takes lots of time and effort to produce meaningful results. This is a lesson for life!

The children became so fond of their plants and seedlings that they started naming them and creating stories and legends about their plants.

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Language and Art, Age group: 6-7 years old
Teacher: Mihaela Balint

Spring Flowers Investigation

Introduction:

This activity is part of the theme **Spring Detectives-Spring Flowers - The Tulip.**

Background:

The children know that plants grow from seeds. In the seeds there are baby plants which grow little by little changing into new plants similar to the parent plants. Usually seeds are something tiny and dark in color. In fact, a seed is a promise of a miracle. Some plants grow from bulbs. The bulbs like seeds, have a baby plant inside - an embryo. The rest of the bulb is food storage for the new plant.

Purpose: to observe a new born plant evolution starting from a bulb.

Aims:

The children will:

- observe the bulbs
- plant bulbs in small plastic cups
- observe the new plant evolve for a longer period of time
- record data through pictures, drawings and short notes
- take care of the new plant

Vocabulary/Key words:

Plant, the parts of the plant (root, stem, leaves, sprout, shoots, bulbs, flower, petals, pollen), the life cycle of the plant, seed, embryo - baby plant, the plant's needs: air, water, soil, the life process in a plant (photosynthesis, respiration).

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

8 weeks

Materials and resources:

Small plastic cups, gardening soil, water, watering can, a camera, a garden, small shovels, tulip bulbs, flower pots, paper sheets, coloring pencils, pencils, crayons.

Question: ***What plant will grow from this bulb*?**

Procedure:

A. Preparation:

Put on the table a plastic table cloth to protect the furniture. Prepare small plastic cups for each child, gardening soil and a watering can. With a push pin make some small holes in the bottom of the cup.

B. Exploration:

Ask children to put some soil in the cups. Show them some bulbs and let the children explore them. Some plants grows from bulbs not from seeds. A bulb has a baby plant inside like the seed. The rest of the bulb is just food storage for the future plant.

Gently put the bulb in the middle of the cup and cover it with some soil. Add some water and wait. I'm kidding! It takes around ten weeks to watch the plant grow. As we know, patience is not a child's attribute. So, well fit with magnifying glasses, paper sheets, coloring pencils / pencils and a camera they kept a journal with their observations (drawings and photographs).

When the plant is big enough it can be moved in the garden.

C. Discussion questions:

How big is the plant after the first week/second week and so on? What does it look like? Can you tell me what plant is it? Can you tell me what color will the flower be? How many flowers has the plant got? The stem is long or short, thin or thick? How many petals has the flower got? How many leaves has the plant got? What do the leaves look like? Are they long/short, thick, thin…? If we keep the plant in the garden shall we see it in the next year, again?

D. Conclusions:

Some plants grow from bulbs not from seeds. The tulip is a beautiful and elegant spring flower with a thick stem, 2-4 large and long leaves and a single, big flower. Many tulips have 5 petals but there are some varieties with more small petals. Our tulips were yellow but we saw tulips of all colors on the flower market and in the gardens.

E. Assessment:

The evaluation of the activity included the observation of the children's work, their involvement, their records (pictures, drawings, notes), the appreciation of the questions raised, of the observations/answers/ conclusions.

Further investigations:

Tulip is a spring flower. If we put a bulb in the summer shall we watch another plant grow? Does the plant know what season it is? How about planting in late autumn?

Plant new bulbs and watch them grow (lilies, narcissus, hyacinth).

Inquiry and creativity elements:

The teacher didn't tell children what plant they will watch grow in the next few weeks. She pretended she didn't know*. "It will be a surprise for everybody"* she said. When they saw the bud some of the children recognized the plant. *It is a tulip, miss!* And they were eager to see the color of the flower.

Guided by the teacher the children imagined a legend of the tulip. In Romanian language the word for the tulip is *Lulea*. Starting form this word they imagined a story about an old lady, called *Laleli* entirely dedicated to her garden and its beautiful flowers and trees. The garden's fairy rewarded *Laleli* for her hard work and good heart with some new bulbs - tulip bulbs. After *Laleli's* death people called the flower *Lalea* in the loving memory of this wonderful woman. Of course the beautiful story created by the children was completed with nice illustrations.

Enclosure 1 **Name……………………The name of the flower………………………**

Draw what you see	
Date	**Date**
Date	**Date**
Date	**Date**

Kindergarten/School: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Math, Sensory, Practical Life and Art, Age group: 4-5 years old
Teachers: Cristina Preduca, Georgiana Boaza

The journal of spring signs

Introduction:

The journal of spring signs is part of the **Spring Detectives** project. Winter has passed, the snow has melted, and the sun's warmth is beginning to awaken creatures big and small. Spring has sprung!

Seasons, change. Building on the concept that things change naturally, kids will investigate in a variety of ways how the changing of seasons affects people, plants and animals. By repeating similar observation throughout the year and revisiting the topic as seasons actually change, a journal of children with illustrations and photos will show evidence of the changes that occurred in the seasons.

The kids know that spring is a time of flowers and changing weather. Spring is that lovely time when the snow stops falling and the weather starts warming up. The days get longer, too. The season actually got its name because the longer days and warmer weather cause flowers and plant life to "spring" up.

Background:

A **season** is a division of the year, marked by changes in weather, ecology, and hours of daylight. Seasons result from the yearly revolution of the Earth around the Sun and the tilt of the Earth's axis relative to the plane of revolution. In temperate and Polar Regions, the seasons are marked by changes in the intensity of sunlight that reaches the Earth's surface, variations of which may cause animals to go into hibernation or to migrate, and plants to be dormant… In temperate and sub polar regions generally four calendar based seasons are recognized: **spring**, **summer**, **autumn**, and **winter**… In some tropical and subtropical regions it is more common to speak of the rainy (wet/monsoon) season versus the dry season… In some parts of the world, special "seasons" are loosely defined based upon important events such as a **hurricane season**, **tornado season** or a **wildfire season**.

Spring is one of the four temperate seasons, the transition period between winter and summer. Spring and "springtime" refer to the season, and broadly to ideas of rebirth, renewal and regrowth. The specific definition of "spring" as a season differs, however, among scientific disciplines such as astronomy and meteorology, and in cultural and human terms…. As it refers to climate and the earth's tilt relative to the sun, spring days are close to 12 hours long with day length increasing as the season progresses.

(Source: Wikipedia, https://en.wikipedia.org/wiki/Season*)*

Purpose:

Playing around with digital camera gives children the opportunity to be both detectives and artists. They can experiment with digital camera how the photographers capture some incredible aspects of nature. The purpose of this project is to discover and capture in photographs the signs of spring.

Aims:

The children will:

- Identify the spring changes in plants – growth, budding;
- Identify the spring changes in animals – behavior, body covering, habitat;
- Identify the spring changes in people – dress, recreation, work;
- Explain how temperature, light, and moisture influence the signs of spring.

Vocabulary/Key words:

Digital camera, habitat, temperature, light, dress, recreation, part of a plant: root, stem, leaves, flower, fruit, rain, fog.

Process skills:

Observe, analyze and describe, plan, gather information, take photos, communicate observations, information and conclusions.

Time/Duration:

30 minutes for activity

Materials and resources:

Story book, digital camera, teddy bear, computer, photos.

Question:

What are the signs of spring that we see outside? How can we immortalize them?

Hypothesis:

We need to take photos when we see these signs spring outside.

Procedure:

A. Preparation:

Demonstrate the signs of spring using a story with spring signs. The kids will learn about the changes that occur in nature and how those changes affect people and animals. As a culminating activity, kids will use a digital camera to take photographs of signs of spring.

B. Exploration:

Generate the interest and curiosity of kids, by reading a story of your choice, focused on the first signs of spring. After reading the story, brainstorm with children what some of the first signs of spring are and ask if they have noticed any of these signs outside. Ask the class if anyone has ever used a digital camera before and if not show them how to use the camera. Tell the children that they will be investigators and walk around the kindergarten to locate any of these signs. Next to these signs place a teddy bear, which will help create that journal.

After the children have photographed their first signs of spring, the photos are downloaded by the teacher and the children will see a digital the succesion of photos. Finally, can create a story called *Teddy discovers Spring* illustrated with the childdren's photographs.

C. Discussion questions:

What are some outdoor activities that people like to do in the spring? What do farmers do in spring? What are the outside activities that the children do when spring comes? What do they wear? What's happening with animals during spring? What are birds doing when spring comes?

D. Conclusions:

Outside there are a lot of signs that show us that spring is here, like: budding trees and flowers, spring birds singing, crocuses, daffodils, newly arriving bird species, nest building, caterpillars, ducks flying overhead, rainy days, worms and snails, people cleaning their yards, windy days, songbirds singing, blooming fruit trees, butterflies, people not wearing jackets. We capture a part or these signs by using a digital camera and we learn that, when we take photos we must capture the essential signs by avoiding disturbing elements which might partly or completely cover the view and by holding the camera straight.

E. Assessment:

First the children worked independently but they enjoyed communicating to one another and sharing with enthusiasm the new discoveries. It was quite easy for the teacher to observe children working. The teacher appreciated their involvement, curiosity and creativity. They tried patiently to put the teddy bear next to the signs spring and tried to take photos.

After the photos were downloaded into a computer, we deleted the blurry photos, we created the digital journal and we enjoyed watching it.

Further investigations:

Children can further experiment to create a beautiful encyclopedia, with the photos that they have captured on the kindergarten ground.

Inquiry and creativity elements:

Children enjoyed playing with digital camera. They easily learnt how to use digital camera, even though in the beginning they needed help to use it. They also enjoyed playing with the teddy.

School/Kindergarten: Kindergarten der Volkshilfe Rosental a. d. K., Austria
Subject: Integrated Science – Physics, Research on Climate and Weather, Recycling, Environment, Climate Protection, Meteorology
Age group: 3-6 years-old
Teacher: Sabine Hirschmugl-Gaisch

Our Weather is crazy, isn`t it? – So let`s measure and observe!

Introduction:

This activity is part of the theme: **Spring-Detectives – We create a barometer!**

Background:

By means of observations, documentation and mainly physical experiments, we try to describe, explain and explore weather phenomena.

Purpose:

After a 2-week period of weather observation and documentation with a special weather clock and a weather calendar, we set up a weather observation station with professional as well as with self-built models (from recycled materials) in our garden.

Aims:

Rain, sun, wind or storms - the weather is constantly changing. In order to predict different weather phenomena better, meteorologists all over the world observe, measure, collect and analyze data. We would also not only like to watch the phenomena, but also explore and explain them by means of professional measuring instruments as well as self-made models.

Vocabulary/Key words: weather, sun, wind, hurricane, storm, thunder, lightning, heat, cold, sudden fall in temperature, measuring instruments, air-conditioning, environmental protection, CO_2, thermometer, hygrometer, rain gauge, barometer, anemometer, solar energy, recycling.

Process skills:

Creation and exploration of a barometer and its functions.

Time/Duration:

Approx. 45 minutes – 6 children

Materials and Resources:

For all instruments: recycled materials such as PET bottles, glass, plastic cups, straws, pine cones, wooden sticks, etc.

For the barometer: clean honey jar without a lid; a balloon, scissors, a household rubber, a drinking straw, tape, paper sheet A4, thumbtacks, a waterproof pen; for checking purposes: a large PET-bottle.

Questions:

How do barometers, anemometers, rain gauges, thermometers and hygrometers work? How can I read the data obtained correctly? What do the records tell me? How can I contribute to environmental and climate protection with my behaviour?

Procedure:

A. Preparation:

The materials are prepared and named and a professional barometer is presented and tested. After that, the term "air pressure" is explained and it is also tried to make this effect even physically palpable. Furthermore, a measuring table for the documentation of the measurement results is prepared.

B. Exploration:

The neck of a balloon is cut off. The rest is pulled over the opening of the honey glass and fixed with a rubber ring. Then the straw is glued in the middle of the balloon skin, so that it forms kind of a pointer. After that, the Din-A4 sheet with the measuring table is placed in front of the barometer and the respective position of the straw-pointer is marked on the sheet. Thus, we get an overview of the constantly changing air pressure.

C. Discussion questions:

The pressure of the ambient air differs every day. Can these changes be felt? Are they visible? - How can I measure the difference and what is happening in the atmosphere?

D. Conclusions:

How does the barometer work? - Warm air expands, moves to the top and the pressure on the ground below decreases. This creates a so called low pressure area (cold air is heavier). If the air sinks down and the pressure on the ground increases - the result is a high pressure area.

If the air pressure is high, the air pushes the balloon skin into the glass and the straw is pointing upwards - the weather is nice. The higher the air pressure, the stronger the air pushes the balloon skin of the barometer into the glass and raises the straw-pointer. If the air pressure decreases again, the balloon rises again and the straw descends - the weather is bad. With the help of the markings on the A4-sheet, the changes in the air pressure can be observed and documented. The air pressure also causes the wind, as it always blows from a high pressure area to a low pressure area. The greater the difference in pressure, the stronger the wind blows.

E. Assessment:

Due to the different measuring instruments, new observation variants and explanatory models were constantly developed and made the various phenomena more comprehensible for the children.

Further investigations:

To illustrate how hot air expands respectively to show how cooled air contracts (PET bottle in the fridge), a large PET bottle is filled with hot water and heated for some time. After the hot water is emptied, the bottle is tightly closed and placed in the refrigerator. After a very short time a crackling sound can be heard.

After about 10 minutes the bottle lies flat and pressed in itself in the refrigerator. The hot air needs plenty of space – if this air contracts, it creates a vacuum, which then shrinks the PET bottle and leaves it flatly formed.

Inquiry and creativity elements:

We also manufactured a thermometer, an anemometer, a hygrometer and a rain gauge out of waste and recycling materials and installed a weather observation station in the garden. In addition, the weather patterns were documented in a weather calendar and with the help of a weather clock, daily weather phenomena could be presented to the parents.

Teacher’s notes:

Last but not least, we focused on the observation of the sun and the formation of shadows. We also used solar energy to cook with our solar cooker and to move our solar vehicles. Weather observation came out as a topic, which provides us with an unbelievable variety of tasks and ideas and should therefore play an important role in our pre-school curriculum.

School/Kindergarden: Ecole Maternelle J. Jaures Brignoles, France
Subject: Integrated Science, Language development and Literature, Art
Age group: 3-4 years old
Teacher: Christiane Coumoul

Trees and flowers are living beings

Introduction:

This activity is part of the theme **Spring Detectives.**

Background:

Living beings furnish the everyday world of children. Even in cities, plants and animals are part of their usual environment, but children have a recognition problem with living beings.

The notion of being alive is crucial to understanding the world, but it is not obvious; young children do not consider plants as living beings; gradually, scientific activities in preschool will help them to discover the manifestations of plant life: a tree grows and gets bigger (nutrition, growth) blossoms, produces fruit; fruit germinate and give saplings so they reproduce (reproduction).

Observing trees and flowers in spring season when plant transformation is significant, will enable children by their questioning and reactions to understand that plants are living beings.

Purpose:

The Educational activities offered at school are designed to change the initial representations of children and to gradually identify some characteristics of living creatures, accessible to young children. The obstacles to overcome are many: move, eat, have babies, grow are characteristics that children soon attribute to animals but with more difficulty to plants. Educational activities must be able to build the following concepts:

- A living being is born, grows, reproduces and dies.
- A living being feeds to grow and stay alive.
- Living beings find in their environment the food they need.
- A living being reproduces.

There are two major groups of living beings:

- Animals and plants

Men, women, children, we are living beings.

The activities allow the establishment of important basic concepts with very young children: the concept of life (one plant lives) and development in time (we highlight the life cycle of a plant).

Direct contact with living beings is fundamental: going out in nature or only in the playground, the realization of plantations at school involves direct contact with the plant. Children see plants growing; some plants may die. The activities promote the development of scientific methods to be constantly used in education. Continuous observations, comparisons, rankings... are often needed in the approach to the world of the living. The utilisation of documents (photos, DVD, drawings, albums, documentaries) is also essential; it enriches the comparisons and gives access to generalizations.

Aims:

The children will:

- observe the trees in the playground and close to school
- understand that a tree is characterized by its silhouette and is composed of 3 parts: roots, stem, leaves
- acquire scientific vocabulary
- describe a tree (size, shape, color) and its transformation in spring: the appearance of leaves, flowers;
- compare trees: some lose their leaves in autumn and in spring new leaves appear, some trees keep their leaves all year along (olive tree, fir tree)
- represent a tree: plasticine, construction game, collage and drawings
- communicate their observations and interact with their peers

Vocabulary/Key words:

- living beings, plants, grow, nourish themselves, reproduce, die
- trees, trunk, root, bark, branches, leaves, foliage, fruit, flower

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

Daily observation and several sessions of 30 minutes.

Materials and resources:

Notebook to write the evolution of trees in the yard for a period of three weeks in March, camera, drawing paper and pencils, albums, documentaries, movie

Question:

Is the tree a living being?

Procedure:

A. Preparation

All the year long we look at the trees in the school yard and see their transformation with the seasons in autumn and winter. We are at the end of winter and Spring will soon arrive. The trees have no leaves (except the olive tree).

Each morning for the next 3 weeks starting March 15th when children arrive in class, we discuss about what we can see outside (at home and in the area of school) concerning trees and plants. We take photos of trees we can see in the school yard and through the classroom window. The teacher writes down all that children say in a science book.

B. Exploration:

Children have noticed different signs:

- the leaves that are growing on trees
- the flowers growing on trees, in the fields and gardens
- the birds that are singing and making a nest in the tree of the schoolyard
- the days are longer, the sun shines brighter and the weather is warmer

C. Discussion questions:

What can you see growing in the trees now? What differences can you notice as compared to the last week? Why do trees lose their leaves in the fall? What do you think happens to the tree during winter? Do plants feel, too? What are the needs of a plant? Which are the parts of a tree/plant? How can we represent them?

D. Conclusions:

From the notes in the class science book, photos and documents on trees presented by the teacher, children realize that the tree is alive: that it has lost its leaves in winter but it was not dead, but only sleeping. They describe the tree and begin to make a mental representation. In order to strengthen this mental picture they will make trees in different ways respecting the silhouette and different parts of the tree: with modeling clay, with play structures, by making drawings and paintings.

Painting spring trees (collective and individual)

E. Assessment:

The children were very observant and curious; they enthusiastically involved in these activities. They have demonstrated that trees were living beings and that they were enrolled in *the cycle of life* through their transformation through the seasons.

The kids enjoyed communicating everything they saw and they continued observing the trees and plants after these sessions.

Further investigations:

- plant trees and flowers at school
- study flowers
- outdoor school activities
- study of a living environment (a river: animals and plants)
- study the tree and its changes every season: fall, winter, spring, summer

Inquiry and creativity elements:

- the tree, source of physical activity
- the tree, imaginary games complice
- the tree and the artistic awakening


Writing and drawing flowers

Writing and drawing flowers:

Earth Day is every day - Lesson Plan Synopsis

Lesson plans	**Partner Country**	**Synopsis**
How do mountains form? Why does the earth sometimes quake?	Austria	Two explanatory models that illustrate the process of mountain formation and earthquakes.
Craters on the Moon	Romania	The children create craters and learn about the landscape on the Moon.
Little ants on Earth Day	Romania	A series of indoor activities to teach kids about recycling through scientific investigation.
Terraformation	Romania	Children become little scientists and play with different types of habitats.
Treasures of the Earth	Romania	Earth is a treasure in itself both on the outside and in the inside – a study of precious stones.
I'm an alien	Romania	Children land on planet X and have to create the inhabitant who could perfectly adapt to the planet's environmental conditions.
Our life sources: water and soil	Turkey	A series of outdoor and indoor activities that emphasize the importance and correlation of soil and water in nature.
Save the trees – make recycled handmade paper!	Poland	Kids learn in a scientific way about how to make recycled handmade paper.
Selective sorting and recycling	France	A detailed lesson on how to identify various waste materials in a school and increase awareness of how to reuse, recycle and reduce.

School/Kindergarten: Kindergarten der Volkshilfe Rosental a. d. K., Austria
Subject: Integrated Science - Physics, Geography, Geology
Age group: 3-6 years olds
Teacher: Sabine Hirschmugl-Gaisch

How do mountains form? &
Why does the earth sometimes quake?

Introduction:

This activity is part of the theme **Earth day is every day.**

Background:

Questions like "Why do we have mountains?", "How have they been shaped?" and "Why does the earth sometimes quake?" spur on the fantasy of children and leave them with many questions. This is a good opportunity to combine geography, geology and physics in order to provide them with explanatory models.

Purpose:

In this unit we would like to explain how orogeny and earthquakes happen and to show that these processes are still in continuation.

Aims:

The aim of this unit is to illustrate the creation of mountains, the different layers as well as the connection between earthquakes and the earth's crust with the help of self-made models.

The children will:

The children have the opportunity to produce explanatory models in order to illustrate the process of mountain formation and to feel the fragility of the earth's crust "by hand".

Vocabulary/Key words:

Mountains, folded mountains, hills, desert, sand, rocks, gems, crystals, tectonic plates, magma, liquid, solid, pressure, force, growth, swim, earthquake zones, earthquake, shake, sway, natural phenomena, earth, earth's core, crust, rock layers, magma movements, volcano, outer core, mantle, temperature, rock strata.

Process skills: observing, analyzing and describing, planning, conducting an experiment, gathering information, collecting data, interpreting data, drawing conclusions, communicating observations, information and conclusions.

Time/Duration:

Approx. 45 minutes per group of 4 children

Materials and resources:

Globe, rock samples and hand-sized rock crashes, books about mountains, plasticine in different colors, rolling pin, glass marbles, 10 hard-boiled eggs, plastic knives, boards, paper, pens, camera for documentation.

Questions:

How have the mountains on our earth been formed?

Why does the earth sometimes quake?

Procedure:

A. Preparation:

As a first step pictures of mountains, mountain ranges and earthquakes are examined. After that the modeling clay is distributed to the children.

B. Exploration:

I) Fold mountain - Each child will receive 4-5 differently colored balls of modeling clay, which is formed out to plates of a size of about 20x10 cm. The various plates are placed one above the other. These thick plates are moved (short sides ahead) with the help of 2 boards and our hands to the center of the table. This folding creates a mountain like formation or even several small mountains. Then cut into it with plastic knives at various points. The children can then examine and document the different folds by drawing or taking photographs and they can also compare them with the rock samples and other photos.

II) Earthquake - Each child receives a board, a glass marble and three different colored plasticine balls, with diameters of 6 cm (orange), 5 cm (red) and 1-2 cm (blue-green). The marble is the inner core of the earth. The red plasticine ball (5 cm) one is rolled out until it becomes a plate of approximately 2 cm thickness – this is the outer earth`s core. The orange clay-ball is rolled out to a plate of about 3 cm thickness - this is the earth's mantle and complements our model of the earth. Thin parts are formed out of the small blue-green clay-balls, which symbolizes our earth's surface with the sea and the lands. Now the resulting "Earth Ball" is cut into two halves with a plastic knife, so that the individual layers become visible in a cross section. In order to show how thin the crust is in relation to the whole planet earth, hard-boiled eggs are used. The yolk symbolizes the Earth's core, the egg white the mantle. The relation becomes particularly evident when the hard-boiled eggs are cut crosswise and placed next to the model of our clay-earth. By means of the cracked egg shell can be demonstrated, how the tectonic plates of the Earth's crust move and cause destruction.

C. Discussion questions:

I) What does the globe consist of? Are mountains still growing? Are there different layers? Is the earth`s inside solid or liquid? Has the earth's crust the same thickness everywhere? How have fossilized sea creatures come in the Alps?

II) Can earthquakes happen everywhere or only at specific locations? What does exactly happen during an earthquake?

D. Conclusion:

I) Fold mountain - The tectonic plates of the Earth are several kilometers thick and composed of different layers of rocks that float on liquid magma. If these plates, driven by the movement of the ascending magma from the Earth's interior, are moved against each other with high pressure, these powerful forces form giant fold mountains such as the Alps or the Himalayas. Where we can find the Alps today, there was a sea several million years ago. The former sea ground has unfolded to mountains and valleys, because the land masses in the North and South have pushed against each other till this date. So some mountains are still growing - even if that is a very, very slow process.

III) Earthquake: Our planet consists of several different layers, which is illustrated by our clay-earth model. The very hot core in the center is made of solid, iron-containing material. Around the center there is the outer core of hot, liquefied rock. The area between the outer core and the very thin crust is called the mantle. The rock of the mantle is very hot and partly molten. The temperature rises towards the Earth's interior.

The extremely solid layer of the mantle and the thin crust are also called stratum. It consists of more or less thick layers of rock. The heat from inside the earth causes streams of magma in the mantle. The rock plates and the continents that are located thereon can be moved against, towards or apart each other by the respective magma movements under the Earth's crust. Sometimes they also slide one above the other. Due to the mobility of these plates, earthquakes can occur. The instability of the Earth's crust can set unbelievably strong forces free and causes the strongest earthquakes especially in areas where the Earth's crust has gaps and where the rock layers are rubbed against each other. In these areas we can also find most active volcanoes. In Japan, for example, the boarders of several plates meet – this circumstance regularly causes many strong earthquakes.

E. Assessment:

The issue was met by the children with great interest, because images of landslides, volcanic eruptions, earthquakes and other natural disasters are already part of children`s everyday life. - The production of models from plasticine and the ability to use the models to explain the phenomena to adults (parents, grandparents, postman and cleaning lady) was great fun for the children.

Further investigations:

The next step for us was to deal with the topic "Volcanoes" and to offer models and experiments again. Experiments performed outdoors as well as in the premises (different volcanic eruptions) were welcomed by the children enthusiastically.

Inquiry and creativity elements:

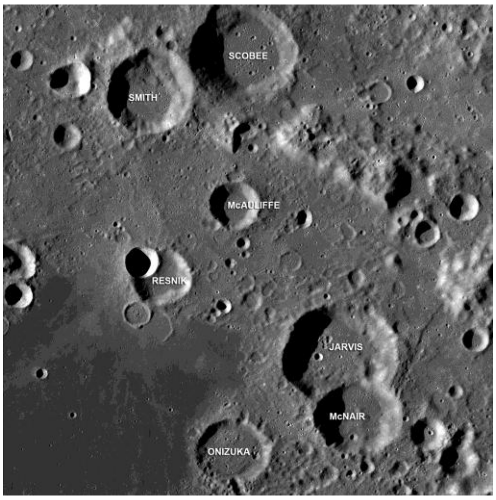
We have created many different earth colors and painted creative pictures using different soil types - such as red earth from tennis court, sand from the sandbox, potting soil, black earth graves, Meadow soil, clay etc., water and paste.

Teacher's notes:

This topic also gives us the opportunity to deal with issues like environmental protection, disaster prevention, proper behavior in emergency situations and preventive behavior with regard to the destruction of the environment, which makes the background and the explanations more comprehensible for the children.

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Language and Art, Age group: 6-7 years old
Teacher: Mihaela Balint

Craters on the Moon



Introduction:

This activity is part of the theme **Earth Day is every day.**

Children create craters and explore the lunar landscape during this hands-on activity.

Background:

The many craters on the Moon were created a long time ago by meteorite impacts. They all have different sizes and some of them have bright rays around them, an indication of their relatively young age (the dark zones are older). The crater's size and features depend on the size, mass, velocity, and incoming angle of the object.

On Earth, the impacts of meteorites disappear over time because of erosion: rain, wind and water smooth the surface by wearing away irregularities until only the most recent ones are still visible. On top of that, the Earth's atmosphere burns most meteorites before they crash onto the surface. How fortunate we are! The Moon, however, has no atmosphere, which means that all craters stay intact. This is why the Moon is scatered with so many craters—and they keep increasing in number as time goes by!

Models - such as those the children are using here - can be tools for understanding the natural world.

Purpose:

The children *create* craters and learn about the landscape of the moon. They make observations on how the size and mass, direction, and velocity of the projectile impacts the size and shape of the crater.

Aims:

The children will:

- Describe how the Moon gets its features
- Consider some of the parameters affecting the shape and size of the crater
- Conduct an experiment
- Draw conclusions
- Improve creative thinking
- Practice effective teamwork.

Vocabulary/Key words:

Planet, satellite, crater, meteorite, projectile, speed, velocity, size, mass, direction, moon, shape, lunar, landscape, features, surface, Solar System, impact, collision, rocks, dust.

Process skills: describe, compare, analyze, plan and conduct an experiment, communicate, think creatively.

Time/Duration:

45-50 minutes

Materials and resources:

- Baking tin or similarly shaped large and deep container
- Flour (enough to make a 3-4 cm deep layer)
- Cocoa or another colored powder (faina de roscove)
- Sieve

- Stones, large and small marbles, balls of different sizes
- Images of lunar craters
- Camera

Question:

What does the moon surface look like? What is a crater? What does a crater look like?

Procedure:

A. Preparation:

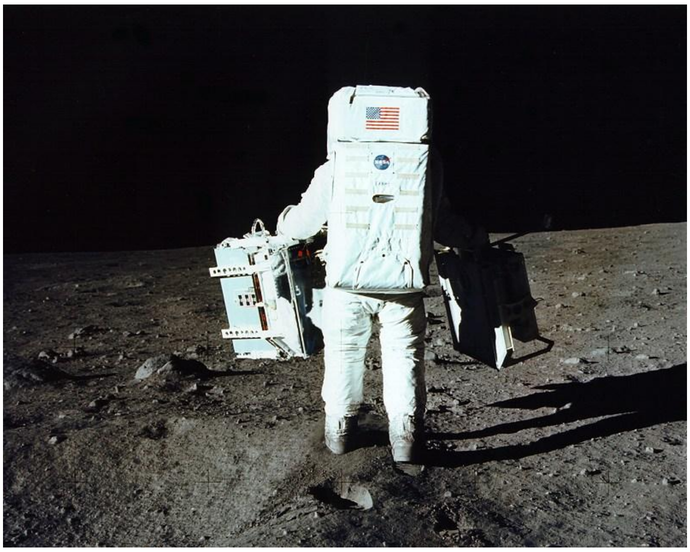
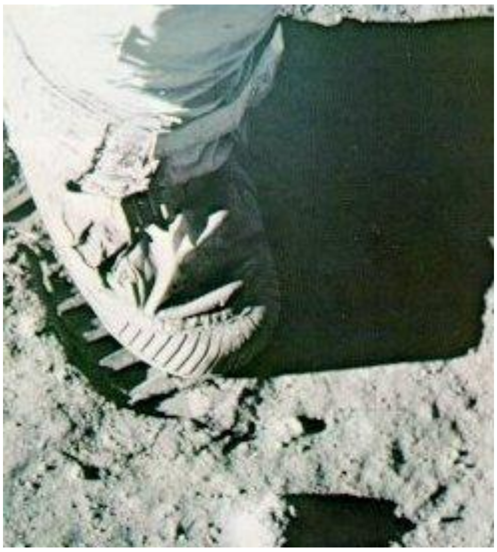
http://www.lpi.usra.edu/education/explore/LRO/activities/craterCreations/Lunar_Crater_Images.pdf

Show the students images of lunar landscape with different craters. Ask them to describe and analyze the craters. Encourage them to find explanations for the features of a crater and for the differences between craters.

B. Discussion questions: *What does the lunar landscape look like? How did the moon get its features? What is a crater? What does it look like? What is a meteorite? What does it look like? Why are some craters bigger/larger than others?*

C. Exploration:

- Split the group into two teams and give each team a tray and some materials to make a replica of the lunar landscape. Remind them that the lunar surface is a thick layer of dust and lots of rocks spread on the entire surface. Because the Moon has no atmosphere a footprint can be seen intact on the Moon's surface centuries later.

- Let them make the *lunar landscape* using the materials. Be sure they let enough space for collisions investigations. Too many rocks don't let enough room for *meteorite impacts.*

- Provide each team with *meteorites* (3 stones of different sizes)
- Ask children to drop the lighter stone vertically on the surface of the moon and to observe the crater. What shape is the impact crater? How big is it? (ask them to think of an object with the same size and shape).
- What do you think, a bigger stone produces a bigger crater?
- Repeat the steps using the other two stones.
- So, what do the new craters look like? Are they bigger or smaller?
- Now let's repeat the steps changing the direction of the impact.
- Does the shape of the crater change? How?

- Encourage the children to take pictures during the investigation. They can compare their recordings later on the Interactive White Board.

D. Conclusions:

In this activity, the children learnt about how the moon got its features and which factors influenced the size and shape of the crater. Through this activity, children also learnt about the variety of asteroids and comets, the lack of atmosphere on the moon's surface in comparison to that of the Earth, and gained an insight into scientific modelling.

The craters are round and sometimes star-shaped. The size and shape of the crater depends on the size and mass of the meteorite, on its speed and direction of the impact.

E. Assessment:

The evaluation of the activity included the observation of the children's work, their involvement, teamwork, lunar landscape model, the appreciation of the questions raised, of the observations/answers/ conclusions:

- Ask students what would happen to humans, to planet Earth if the meteorites hit our planet as they hit the Moon.
- Ask students what they think about the presence of gigantic planets like Jupiter or Saturn in our Solar System. Why are they called *meteorite catcher*?

Further investigations:

- The size, shape and depth of the crater depend of the shape, size, speed, mass of the meteorite and by the direction of the impact. Which meteorite could produce more damages: a meteorite falling with high speed or a low speed? Repeat the previous investigations using the same stones but with different impact speeds. Remember always to change just one variable at a time!

- See **I am an alien** activity.
- A different kind of investigation could be the design of a lunar rover, a sophisticated on wheels machine which explores the moon surface, takes samples and analyzes them, takes pictures, mapping the land and so on.

Inquiry and creativity elements:

Students review the environmental factors on the Moon's surface and compare them to environmental factors on the Earth. Creative thinking is used to design a scale model of the moon surface - a lunar landscape. Children talk about their investigation, describing the impacts of the meteorites on the lunar surface, the size and shape of the craters in relation with variables like size or impact speed of the meteorite.

Happy Kids Kindergarten, Ramnicu Valcea, Romania, Age group: 4-5 years old
Subject: Integrated Science, Math, Sensory, Practical Life and Art
Teachers: Cristina Preduca, Georgiana Boază, Popescu Laura

Little ants on Earth Day

Introduction:

Earth day is part of the **Earth day is every day** project. When you go outside at night you can see millions of stars, so many you cannot count them. There are also planets in the sky and one of them is the Earth. Our planet, the Earth, is a living planet. Earth is like a big spinning ball, and because of the earth's rotation on its axis we have day and night. The side that faces the sun is in day time while on the opposite side it is night time. The earth is shaped like a ball, but is a little flat at the top and bottom. These flat parts are called the North Pole and the South Pole.

Earth is the only known planet that supports life that comes in the form of plants, animals or humans. The Earth consists of land and water. About one fourth of the Earth is land and about three fourths of the Earth is made up of the water in the oceans, seas and rivers. This is the time when a new generation, more conscious about how fragile the earth is, has risen. It is out duty as teachers to shape and teach this new generation to be more careful about our resources and take better care of our planet.

Background:

April 22nd is the International Earth Day. It is a special day and a new reason to learn about our planet and environmental care. In 1969 a Senator named Gaylord Nelson expressed his worries about our planet. He had noticed how dirty the planet was getting and how many animals were dying. He knew that he couldn't solve these problems by himself, so he decided to teach other people about what was happening so that they too could help solve these problems of our planet.

He wrote many letters to his colleagues in Washington and published articles to convince people around the country to have a special day on which everyone would learn to care about the planet. On April 22nd, 1970, the first Earth Day was held and people across the country learned about our planet and the environment. It was so popular that very soon the idea of Earth Day spread around the world and now every April 22nd, people around the world make a special effort to learn about the planet and do things to help improve the environment.

Purpose:

Children will discover the need to protect the environment and their responsibility to do that for the common good through action and advocacy. They will learn about recycling through scientific investigation and how to demonstrate environmental commitment by protecting the environment through reusing, reducing and recycling.

Aims:

The children will:

- Identify things they can do to save our earth.
- Categorize litter into trash and recyclable materials such as paper, plastic, aluminum, glass.
- Recognize the interconnectedness of Earth and life.
- Recognize facts about air, water and land pollution.
- Give examples and explain the benefits of reusing, reducing and recycling.
- Develop an awareness of the need to conserve and recycle air and water.
- Participate in a neighborhood cleanup activity.

Vocabulary/Key words:

Air, water, land, animals, protection, pollution, paper, plastic, aluminum, glass, recycling, reusing, Earth, reducing, cleanup activity, ecology, ecologist.

Process skills:

Observe, analyze and describe, plan, gather information, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

2 x 45 minutes (45 minutes for the recycling lesson and 45 minutes for the environmental activity)

Materials and resources:

Unsorted trash, plastic bags, plastic gloves.

Question:

What we can do to have a cleaner and safer planet?

Hypothesis:

Recycling and environmental actions like trash gathering can make our planet a cleaner place.

Procedure:

A. Preparation:

Show the kids a power point presentation to better understand what polluted water, air and land look like. Ask them how they could help the environment to be cleaner. Bring recycling into question and ask them what type of things they think we can recycle. Illicit the question and the hypothesis.

B. Exploration:

Bring in the class three bags of unsorted litter containing non-recyclable trash and also recyclable items made of different materials: paper, glass, plastic and aluminum. Divide the children into three groups and tell encourage them to sort the litter into non-recycle and recyclable trash. Try to interfere the least possible but encourage talking and sharing ideas within the three groups. Once ready, each team will present results and here the teacher reinforces good choices and corrects the mistakes. The other groups will learn from the first presentation and correct their own mistakes.

Next, the children will receive a cut and paste worksheet as a feed-back for understanding. Here is a scan of the worksheet the children worked on during this lesson:

The next step is an environmental activity that came from the comments of one of the children: ”we can clean the forest when we go to have a picnic there. I went with my parents there last week and we saw a lot of litter on the ground”. Before doing this activity, you may want to make a list of rules for kids about litter that they should not pick up, such as broken glass o metal, anything sharp, or any object that they don’t recognize. Encourage children to take you to any object they are unsure about before picking it up.

Go in the forest (well-known picnicking places are the best choice) and encourage them to pick up any litter that they know is safe, using disposable plastic gloves, and to place the litter in the plastic sacks. We will divide our two classes totalizing 25 children into four groups and will set a cleaning contest among the children.

After cleaning up the forest go and set four large paper bags in the classroom, and label them “paper,” “plastic,” “metal,” and “trash.” Have groups of kids work to glue pieces of crumpled paper onto the first bag, some plastic lids or bottles onto the second bag, some metal cans onto the third bag, and pieces of a black garbage bag onto the fourth bag. Then let children sort the litter in their litter containers into each of the bags, using their disposable gloves.

Make sure to do this activity near a sink, and encourage children to wash out items that have visible residue on them. Show them how many materials they have collected that can be recycled, and talk about why recycling these materials is important for the environment. Listen to their reasoning, as this discussion will allow you to assess whether they have understood the concepts of recycling and helping the environment sufficiently.

C. Discussion questions:

What is Earth day? When is Earth day? Is it important to take care of our environment? Why? What can we (as children) do to protect our environment? What means recycling? What objects/materials can be recycled?

D. Conclusions:

This activity about the environment will teach children about the importance of recycling materials and working to keep the Earth clean.

E. Assessment:

First the children worked independently but they enjoyed communicating to one another and sharing with enthusiasm their new discoveries. It was quite easy for the teacher to observe children working. The teacher appreciated their involvement, curiosity and creativity. They tried patiently to collect the garbage.



Further investigation:

The kids will be participating in an "at home" service learning activity. Along with their families, they will be collecting trash from their homes or neighborhoods and create a sample display of their findings to be shared with the class. The kids will have the opportunity to share what they have found as well as reflect upon why the items existed in their environment and how the cleanup has helped.

Inquiry and creativity elements:

Sorting the garbage within a group based on previous knowledge and without the teacher's intervention encouraged thinking and debating.

Teacher's notes:

The children enjoyed cleaning up the forest. They easily learnt how to keep the environment clean. They also enjoyed sorting the litter in the proper litter containers.

Kindergarten / School: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science and Mathematics, Age group: 6-7 years old
Teacher: Laura Popescu

Treasures of the Earth

Introduction:

Within the project theme **Earth day is every day**, the students aged 6-7 were introduced to treasures inside the heart of the hearth like salt and gem stones. Even if it is not part of our curricula, gemstones are present everywhere: in the necklace hanging at my mother's neck, in your sweetheart's earing, in the objects we decorate our house, in my bag (the lucky stone never leaves it). Students often admired my necklaces, so I said, why not? If you inquire about precious stones let's have a fun lesson!

Background:

Gemstone or precious / semi-precious stone is a piece of mineral crystal which can be found in the layers of the Earth. In its polished form, they are used to make jewelry because their nice colours and shapes glitter in many shades. Others can be organic materials like ember or even rocks like lapis lazuli.

The myth about gemstones talks about a king of demon called Bali. He wanted to win the Heaven with Indra and all the other gods. However, in the battle of gods and demons Indra hit the demon king Bali on the head and his different body parts converted into gems: his teeth became Peals, his blood Ruby, his eyes Blue Sapphires, the juice of his heart Lapis Lazuli, his flesh – Coral, etc. Those gems were taken by the Sun and the different planets.

(Source Wikipedia https://en.wikipedia.org/wiki/Gemstone#Gemstones_Mythology)

Purpose:

Acquaint children with the fact that the Earth is a treasure in itself both on the outside and in the inside, that the layers of our planet hide (semi) precious-stones which enchant us with their beautiful shapes, colours and shades.

Aims:

The children will:

- Understand that our planet is precious and we must take good care of it
- Identify semi-precious stones according to shape and colour
- Match pictures to numbers
- Develop their communicational skills and group-working skills
- Develop an awareness of the need to conserve our planet.

Vocabulary/Key words:

Gem, gemstone, semi precious stones, amethyst, turquoise, amber, malachite, Jade, Onyx, Agate, Aragonite, Mother of Pearl

Process skills: observe, analyze and describe, identify, draw conclusions, insert into table, label, communicate observations, information and conclusions.

Time/Duration:

50 minutes for activity

Materials and resources:

Worksheets, gemstones, number cards.

Question:

Can we identify some gem-stones by shape and colour?

Hypothesis:

Gem-stones belong to different groups and these have certain characteristics of shape and colour.

Procedure:

A. Preparation:

Make a collection of gem-stones and divide them into three groups. For this first step, when the children just become acquainted with them, it is useful to select a variety which differ in colour and shape as much as possible. Then look for photos on the internet and insert them all in a worksheet, so that every gem stone selected can have a correspondent picture on the worksheet. Also, write the name of the precious stone next to the picture. Prepare some number cards and put each gem on a different number card. I prepared three different groups of such gem stones.

B. Exploration:

The children will form three groups and give each group a set of numbered stones. Magnifier glasses could help, too. Each group will get a worksheet. Their task is to match the picture

and the name on the worksheet with the real gem and write the number of that precious stone in the corresponding slot.

When each group is done switch them so that every group can have access to all the stones. Some of the gems appeared in more than one group. That has raised no problem to the children. They quickly understood that it is the same kind of gem appearing twice or even three times.

C. Discussion questions:

What colour / shape is the gem? Can you find its match on the worksheet? Can you read the name of the gem stone? Everybody agrees in this group?

D. Conclusions:

- There are many stones inside the earth that look nice because of their colour combinations and shapes.
- The gems can be identified by comparing them to pictures
- Children like the names of these stones very much
- Children did well in reading the numbers and introducing data in the table.

Assessment:

The students liked the stones very much from the very beginning. They immediately associated them with the jewels on the princess' and kings' crowns. They worked with pleasure and talked to each other within the groups. In the end, we checked each other's answers. Of course there were mistakes but that is the main idea: we can learn from our mistakes more than we learn from the right answers.

Further investigations:

If mothers agree, their children could bring some of their not so expensive jewels to school and the students could try to identify the stones in it. It would also help visiting a museum of precious stones / mine crystals.

In other activities we experimented with salt ("another treasure from inside the heart of the Earth" as the children say) and visited a salt mine which was really nice.

Inquiry and creativity elements:

Children enjoyed identifying gems in groups. They often exchanged ideas and opinions with their partners and admired the beauty of the stones.

Teacher's notes:

Here is the number list for the gems followed by a model of worksheet:

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24

Enclosure 1:

WORKSHEET GEMSTONES

Find the name of the precious stones and write the corresponding number in the empty box:

Order	Name of the precious stone	Drawing	Number on the stone
a.	Amethyst Ametist (Ro)		
b.	Jade Jad (Ro)		
c.	Onyx Onix (Ro)		
d.	Agate Agat (Ro)		
e.	Turquoise Turcoaz (Ro)		

f.	Malachite Malachit (Ro)		
g.	Aragonite Aragonit (Ro)		
h.	Amber Chihlimbar (Ro)		
i.	Mother of pearl Sidef (Ro)		

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Language and Art, Age group: 6-7 years old
Teacher: Mihaela Balint

I'm an alien

Introduction:

This activity is part of the theme **Earth Day is every day*.***

The following activity deals with both extra-terrestrial worlds and our home planet, the Earth. By educating children about the life-essential conditions here on Earth and comparing them to those of other worlds, they learn that this is the only place in the universe that is suitable for life as we know it, which promotes respect for the environment and a sense of a global community.

The students have the opportunity to review the environmental factors (water, atmosphere, gravity, distance from the sun) that make the Earth habitable and compare them to other worlds from deep space. Thinking creatively they design an alien life form adapted to specific environmental conditions from another planet (or satellite).

Background:

Life can be found almost anywhere on Earth, from the poles to the equator, from the bottom of the sea to miles above the surface, and from dry valleys to groundwater miles below the Earth's surface. Over the billions of years, life on the Earth has adapted to almost every environment imaginable. But what is it about Earth that makes it so perfectly suited to supporting life? The main factors are: *water, atmosphere-air, distance from the Sun and gravity.*

On Earth we didn't discover yet an organism that doesn't need water to survive. It acts as both a solvent and a delivery mechanism, dissolving essential vitamins and nutrients from food and delivering them to cells. Our bodies also use water to flush out toxins, regulate body temperature and aid our metabolism. Water makes up nearly 60 percent of our bodies and we can't live for more than a few days without it. Water also promotes life in other ways: we use it to grow crops, keep livestock and wash our food (or our bodies). Earth's oceans also help regulate the planet's climate, absorbing heat in the summer and releasing it during winter. In addition, of course, those same oceans serve as a home for many plants and animals.

Earth's atmosphere has just the right thickness to sustain life. Without it, we wouldn't be able to breathe. Space is an airless vacuum in which any life form would quickly suffocate. The blanket of our atmosphere also regulates the surface temperature by keeping out the freezing cold of space at night and the furious heat of the Sun during the day. The atmosphere also acts as a protective barrier that absorbs harmful rays from the Sun and other cosmic bodies before they reach the surface.

The composition of Earth's atmosphere is also very important to life here. Some of the gases act like a greenhouse, keeping heat at the surface. But if these so-called 'greenhouse gases' become too abundant, either naturally or from artificial causes, the planet could warm too much and become uninhabitable for many types of life.

The Earth lies within our Solar System's 'Habitable Zone', which is the narrow band within which liquid water can exist. If the Earth were much closer to the Sun, its oceans would vaporize, preventing the existence of life as we know it. If our planet orbited much farther from the Sun, the oceans would freeze and the water cycle that enables life would be non-existent.

Gravity holds both living and non-living things to the Earth's surface and keeps them from flying off into space. It also holds our atmosphere in place, stopping it from dissipating into space. Many worlds in the Solar System are smaller than the Earth, meaning they have weaker gravity. Therefore, objects are 'lighter' in these worlds. Other planets are larger than the Earth and have much stronger gravity, which can have a large effect on the environment of these worlds: for example, the pressure at the surface of one of the gas giants is so intense that any life there would be crushed within seconds.

Becoming aware of all of these factors and about the strong connections between them, life on Earth can be seeing as a miracle. Everything seems to be in the right place, at the right time, in the right proportion.

Purpose:

- to understand the characteristics of habitable and non-habitable planets.
- to explore our Solar System and learn about the conditions on other planets.
- to encourage creative thinking, environmental awareness and a sense of global citizenship.

Aims:

The children will:

- Use the idea of extra-terrestrial life to encourage their interest in science
- Identify which conditions make Earth habitable for life
- Understand how the conditions on Earth affect life
- Develop an in-depth knowledge of the various environments on our planet, and on at least one other world within the Solar System or beyond it
- Design an alien life form suited for the specific environmental conditions on an extra-terrestrial world. Promote respect for the environment
- Improve creative thinking
- Practice effective teamwork.

Vocabulary/Key words:

Planet, satellite, air, atmosphere, gravity, water, environment, habitat, living and non-living life forms, life forms, life conditions

Process skills: describe, compare, analyze, conduct an experiment, communicate, critical thinking, solve problems, design, play-dough modelling.

Time/Duration:

60 minutes

Materials and resources:

Problem: *We just landed on the Planet X. Before we go outside we have to check the life support conditions: the presence of the water, the composition of the air, the gravity level. The computers from our space ship detect the presence of the water and indicate that the planet's atmosphere contain more carbon dioxide than Earth's atmosphere. We have to wear a special costume with oxygen supply. We already know that the distance between the planet X and it's Sun is a little bit longer than the distance between Earth and our Sun (comparable with the distance between Mars and Sun).*

Question:

What kind of life forms can we meet on this planet? How do they look like? What are their specific characteristics due to planet's conditions?

Procedure:

A. Preparation

First ask students what life forms need to exist on Earth. Discuss:

- a way to breathe
- a food source, feeding type
- protection from heat and/or cold//adaptation to the environment
- protection from other life forms
- a way to sense their environment/adaptation to the environment
- a way to move (based on strong/weak gravity)

Discuss with your students about the conditions on Planet X. Compare these conditions with the ones from planet Earth.

B. Discussion questions:

What are the exact condition on planet X? What kind of plants and animals can live on this type of planet? Can you design a life form adapted to these conditions? Is it a plant or an animal? Can it breathe? How does it breathe? Does it need oxygen? What and how does it eat? What does it look like? (height, shapes, colors) What senses can it use? How does it move? (walk, fly, swim, jump, crawl).

C. Exploration:

- Split the class into pairs or teams of up to four children.
- Distribute the play-dough, paper and pencils /crayons.
- Ask students to discuss about the life forms which can possible live on Planet X.
- Instruct them to design an alien based on the environmental factors provided in the previous part of the activity.
- Each team must draw a detailed representation of the alien life form or/and modelling a play-dough figure.

- Have the students present their work to the colleagues and explain the different characteristics of their life form as well as how they would be beneficial in the chosen environment. Allow them to be creative but make sure they talk about the specific characteristics and the reason behind their choices.

D. Conclusions:

The life forms can be bigger than the ones on Earth because the gravity is smaller. Also they can move, fly or crawl. Due to the longer distance from the Sun the planet X is colder. Water can be found in the form of ice or underground liquid water. A far distance from the Sun means also less light and heat. The alien plants must be adapted at these conditions.

E. Assessment:

The evaluation of the activity included the observation of the children's work, their involvement, teamwork, their drawings, notes, play-dough figures, the appreciation of the questions raised, of the observations/answers/ conclusions:

- Ask students what would happen to humans if the environments on Earth changed in specific ways (e.g., thicker atmosphere, further from the Sun, weaker gravity).
- Ask students to give examples of the characteristics of life forms from different environments (e.g., polar regions, desert and rainforest) and explain why they think these are necessary to its survival.
- Allow students to describe their alien life form and the specific characteristics due to the environment.

Further investigations:

- Split the group in pairs or small teams and give each team a different description of the planet. A planet entirely covered with ice for example, or water or a planet with many active volcanos and large rain forests.
- A different kind of investigations could be the design of a planet rover, a sophisticated on wheels machine who must explore the new discovered planet's surface, take samples and analyze them, take pictures, mapping the land and so on.

Inquiry and creativity elements:

Students review the environmental factors that make the Earth habitable and compare them to other possible worlds beyond our Solar System. Creative thinking is used to design an alien life form suited for specific environmental conditions on this extra-terrestrial world. Children modelling with play-dough this alien life form as a reflection of these specific features. Also they describe their work, talking about the features they selected for this alien as adaptation of his own extra-terrestrial environment.

Teacher's notes:

The search for extra-terrestrial life is undoubtedly one of the most attractive topics in science, particularly to children. With increasing evidence to suggest that the majority of Sun-like stars play host to their own planetary systems, the idea of alien life is seeming ever-more realistic. This activity utilizes the topic of alien life to demonstrate that science can be an exciting, cutting-edge subject and that, like the universe, the opportunities for further discovery in astronomy are almost infinite.

School/Kindergarten: Ecole Maternelle J. Jaures Brignoles, France
Subject: Integrated Science, Art and Literature, Age group: 3-4 years old
Teacher: Christiane Coumoul

Selective sorting and recycling

Introduction:

This activity is part of the theme **Earth day is every day.**

Background:

Each one of us throws more than 1kg of waste per day, 60% of packaging. The contents of our dustbins become very cumbersome and the waste problem concerns all of us. There are 3 possibilities: discharge (we accumulate), incineration (burning) and recycling (which requires prior sorting). Proper waste management is now an unavoidable question for 3 reasons:

- *On the environment:* recycling makes it possible to conserve natural resources such as wood, oil or minerals. And everything recycled is no longer piled or eliminated.
- *We can avoid waste:* paper is produced with recycled paper; toys can be manufactured with plastic bottles.
- *Recycling helps to create jobs* because people must collect, package and process materials.

Therefore, recycling is an important subject of study from pre school because it prepares children for a responsible adult life and to be concerned about our environment. "Awareness of hygiene and consumption problems" is registered in the French preschool program.

Purpose:

To identify the various waste materials generated in the school and increase awareness of how to reuse, recycle and reduce.

How do we sort the waste? Why do bins have different colors? Why should we always throw? How to avoid wasting? What does "reuse" or "recycle" mean? How to buy less but better?

All these individual and collective attitudes about the question "waste" are based on a reflection in part of an environmental education.

Aims:

- **Design Objectives:**

  - from a bunch of miscellaneous objects (no garbage) children will discover the concept of waste: the distinction between what we throw and what we do not throw in the trash.

  - bring out the sorting concept: why sorting waste and with what criteria?

- **Objectives of knowledge:**

  - learn to make simple observations: Is the object a waste or not? Observe the particularities of some waste.

  - build a classification, sort: identification of common features and distinctive features.

- **Objectives of life skills:**

  - allow children to work together and put them in a position to communicate with their peers.
  - discover the interest there is for man to protect its environment by sorting household waste.

The children will:

- observe various objects, name them and describe them orally, one after the other and say "yes" discarded "no", we do not throw it.
- Say why they throw certain objects; give a definition of waste.

- Separate waste by material and put in bins of different colors.
- Approach the concept of recycling.

Vocabulary/Key words:

Trash, glass container, waste, wood, plastic, polystyrene, glass, cardboard, metal, packaging: cans, bottles, cans, jars, food cartons, trays, selective sorting, categorize

Process skills:

Observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

2 sessions of 30 minutes

Materials and resources:

A pile of clean objects and waste; 3 bins of different colors (blue, yellow, and green); an extra bag; practical guides and posters presenting the official recycling.

Questions:

How can we sort all this waste? What is the criteria we use?

Procedure:

A. Preparation:

Observation phase: We brought a bag full of various objects (all clean). A woman from the SIVED association (that manages waste in our region) was present. The children named and described the objects presented one by one. They made two piles of objects: those we throw and those we do not through.

B. Exploration:

Hypothesis formulation from the question "why do you think we separated these objects into 2 lots, those that we throw and those we do not throw?"; for the objects we throw away, the children made the following assumptions: there is no more coca; it's empty; it does not work anymore; we no longer need it.

C. Discussion questions:

Introduction of the concept of waste: Where do you throw the litter? (... In the trash bin); Why? (... Because it is dirty, empty, it no longer serves); How do we call these objects that we throw away? (Those which are thrown in the trash are called "garbage" (repulsive objects) or dirt.) Then we brought up the expected word **"**WASTE**".**

Recycling: we gathered the children in small groups; each group had different waste and 3 bins; they had to sort and rank based on the determined criteria. The groups sorted according to very different criteria: color, size, shapes, type, materials.

How to get kids in the Official sorting?: After invalidating several rankings we asked the group that had sorted materials to explain to the other children their choices. Then we added that those concerned with sorting in France, do the same. We showed some practical guides illustrating sorting. We also said that leftovers, polystyrene, plastic bags, diapers and bottles of oil are put in a "trash" apart from the rest of the garbage. Then children threw objects one by one in the bins to make sorting respect the criteria defined officially. We watched a movie with Gandy and Gouzou about environmental pollution: Gouzou is a rough lion who does not take care of sorting; Gandy is a cute seed who respects sorting and takes care of the Earth.

D. Conclusions:

Children well attended these sessions on sorting objects; they took home recycling guides. During school outings they noticed some garbage thrown on the floor and said they should be thrown in proper garbage cans.

Further investigations:

- Pick up papers in the playground
- Make an outing close to the school for a fair statement found on waste ground
- Shopping at the supermarket
- Recycling Activities

Inquiry and creativity elements:

Make artistic productions with sorted waste: paintings and sculptures like animals, robots, houses.

Selective sorting in 2nd and 3rd level class

Gandy and Gouzou Film

RECYCLING: Artistic productions : colors and waste BLUE YELLOW GREEN RED 3rd LEVEL

RECYCLING : making a turtle and a tortoise using cans, coffee capsules, aluminum paper 2nd and 3rd level class

Exhibition at the "Gueules rouges museum"


Kindergarten/School: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science and English, Age group: 5-6 years old
Teachers: Laura Popescu

Terraformation

Introduction:

This activity was part of the theme **Earth Day Is Every Day** and was performed on a special day when the whole preschool embarked on an imaginary journey into space. The voyage included visiting other planets, building of a space-colony and the present English lesson on Terrafomation. However, the ideas presented here can very well be part of a lesson on animal habitat. We started by presenting a spacecraft and telling the children that it first landed on a small planet covered with ice and salty water. The next planet it visited was also a small one but different, as this one had rich, rainforest-like vegetation, sweet water and plenty of insects. On both planets breathable air was present and low and high temperatures were comparable to those on the Earth. The first planet was of course cold and the life forms were just algae present in the salty water. The climate on the second planet was hot and wet with daily showers. A small, colourful flag was presented to the class and the children were asked to read the word on it: it was *Terraformation*.

Background:

Terra = the Earth, formation = forming, shaping. Even the 5 year-olds realized what the term means, that is *making a planet Earth-like*. It is the name given to the process of deliberately modifying the conditions on a planet (atmosphere, temperature, surface topography and ecology) to make it habitable by Earth-like life. The term is synonym for planetary engineering and it is an idea present both in science fiction and in scientific debates. Of course, terraforming was not put into practice yet but, as we well know, the environment can be altered on purpose. Indeed it can be a slow process, depending on the conditions of the specific planet and the present development of the technology and economy does no allow for such large investments. Scientists already thought about terraforming Venus, Mars, the Moon, Europa or other bodies in the Solar

System. (source Wikipedia) Of course, for us, adults, the question of how ethical terraforming is may rise. But to children this new concept is appealing and may startle their imagination. Prior to this lesson, it would be useful to discuss with the children about different animal habitats, food chains and life-cycles.

Aims:

The children will:

- Observe different habitats
- Analyze and choose the animals that would survive in a specific habitat
- Describe food chains
- Present their choices and reasons in front of an audience
- Analyze, debate on each other's choices

Vocabulary/Key words:

Terraforming, space, planet, Terra, The Earth, climate, survive, wet, cold, hot, rainy, algae, types of animals, snow, ice, vegetation, plants.

Process skills: observe, analyze and describe, gather information, draw conclusions, communicate observations and conclusions.

Time/Duration:

50 minutes

Materials and resources:

Small hand-made flag with the word terraformation on it, a large variety of plastic animals, plastic container, plastic tray, plasticine or play-dough, glass bottle, pebbles, different plastic shapes imitating ice / ice shapes, salt, water, smartboard, scanned worksheet with the information on the two planets.

Question:

What animals could you as scientists take to the two planets in the process of terraformation?

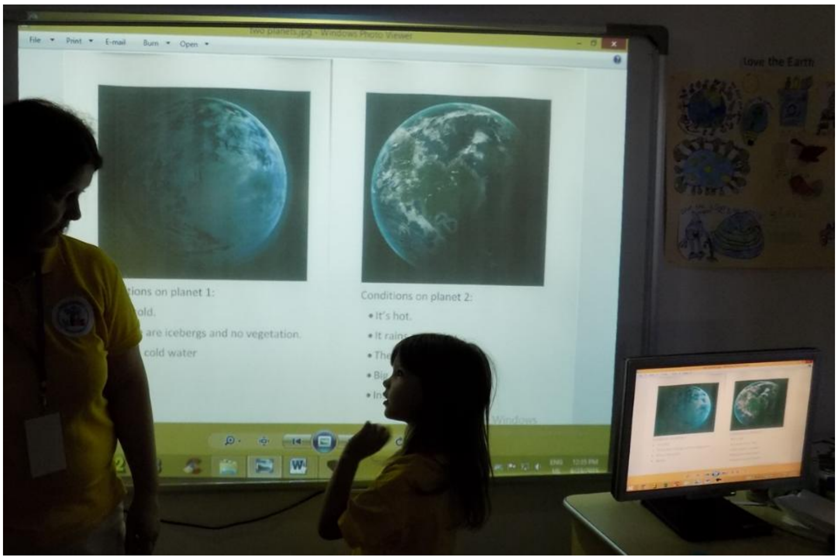
Hypothesis:

On the cold planet we could bring animals that live at the poles while the hot planet we could inhabit with animals that live in the rainforest.

Procedure:

A. Preparation:

After presenting the class the flag with the word terraformation and asking about the possible meaning, explain in simple words what terraformation is. Present the rocket, mimic its voyage and tell the children about the two planets as presented above. I projected the scan of worksheets with the image of the two planets and some brief information about each of them.



The children read and offer feed-back on the information to make sure they understand exactly the nature of the two planets. Next, they are presented two models: a plastic container, with ice, white pebbles in which we introduce salty water for the cold planet and a tray covered with colourful playdough, vegetation represented by plastic trees. On this tray I earlier covered a small size bottle with play-dough to get the shape of a volcano. To make sure everything is ready for the final surprise, I have previously filled the bottle with vinegar and red food coloring.

B. Exploration:

Give children a large number of plastic animals that live in different places on the Earth. Tell them that they are the scientists that will have to decide which animals they will try to adapt to each of the two planets. Divide the class into two and give them ten minutes to think over and place the animals.

C. Discussion questions:

Which animals can survive in a cold / hot / wet environment? What would it eat? Which animals would feed on the chosen animal? Are the features of this animal compatible with the environment?

B. Exploration:

- Let the children make their own choices; they will surely start discussing and debating on different animals. I try to make myself invisible and interfere in any way. However, I am attentive to the exchange of ideas.

- M. put in the water an animal that lived in salty water but not in cold areas. A. drew his attention that this animal lives in warmer waters.
- The children will intuitively place water animals and land animals in their natural habitat.
- Interesting topics were discussed within the two groups: the monkey should be placed in the trees, while the gorilla lives on the ground, you should not place the bird next to the crocodile as the parrot could be easily eaten, that we need more animals that feed on insects due to the fact that there are many creepy-crawlies on this planet.

D. Conclusions:

The animals that live at the poles are the best suited for the cold planet. Small fish could feed on algae, and bigger fish, whales, seals and penguins could eat the fish while polar bears could feed on seals and fish. Reindeer and other grass eating animals could not survive even if they are adapted to cold temperatures.

The hot, wet planet inhabited by a large number of insects could accept some insect eaters as lizards, frogs, snakes, birds and also fruit eaters like monkeys, rodents or toucan birds. Tigers and panthers could feed on monkeys and other small animals.

E. Assessment:

In this lesson assessment is as important as exploration. Get all the children together in a large circle so that each of them sees the two planet models. The children will present their work and they will motivate their choices. Let the children from the other groups analyze their classmates' choices, make comments and say which animals would not be suited / should be added to the environment.

Further investigations:

Dry ice can be a fantastic surprize to end this lesson. A little dry ice made our vocano smoke and the bicarbonate made it errupt. On the other hand, the children who worked on the icy planet could make their own icebergs by combining water and dry ice in cone-shaped glasses.

Inquiry and creativity elements:

Children made their own choices based on prior knowledge, they later learnt from their own mistakes acquiring new information about animals and their habitats. The terraformation background enhanced their imagination and they felt like real scientists.

School: Ş. Jan. Uzm. Çvş. Ahmet Güngör Anaokulu, Tarsus-Mersin, Türkiye
Subject: Integrated science, Drama and Music, 4-6 years old
Teachers: All teachers

Our life sources: water and soil

Introduction:

Activities in these lessons were done as a part of the theme **Earth Day is every day.**

The Earth is getting more polluted and our life sources are decreasing day by day. We must raise our children's awareness about the importance of our sources such as water and soil. Not only the human beings but also other living creatures need them.

Purpose:

Raising awareness towards the importance of water and soil in our life.

Key words:

Earth, water, rain, water cycle, soil, worm, plants

Process Skills: observation, questioning, discovering, learning by doing, experiment, communication

Time:

2 hours

Materials:

Water, soil, onions and potatoes, audio-visual materials

Questions:

- ***How does it rain?***
- ***Why is water important?***
- ***Why is soil/earth important?***
- ***What lies beneath the earth?***
- ***What can we do to protect our life sources?***

Procedures:

A. Preparation:

The activies were grouped into two: the first lesson focused on the water, rain, water cycle and water sources. The second part emphasized the importance of soil and the correlation between water and soil in nature.

B. Exploration:

Introduce the topic with some videos about water cycle in nature. Then, the teacher makes an easy experiment with boiling water to demonstrate basic facts of the water cycle in nature: the heated water evaporates and when it reaches the upper, colder strata of the atmosphere it turns into tiny drops. When these drops get big and heavy, it rains.

Talk with the children about the importance of water in our daily life. Our kids made some drama activities and drawings about water and saving water.


C. Discussion questions:

- What are our water sources in nature?
- What is water cycle? How does it rain?
- Why is soil so important? For us? For animals? For plants?

D. Conclusions:

They grew some potatoes and onions in water and saw how they began to develop in water.


In the next lesson, the children went out-door and dogged the garden to see what lies beneath. They found a lot of worms in the soil. They understood that soil and water is also important for other living beings.

They planted the onions and potatoes in the garden and watched them growing.

E. Assessment:

Children always like outdoor activities, especially when they are there to discover new things. When they digged the garden and found the worms, they were very excited. They were not afraid to hold them. They understood that another life lies beneath the earth for other living beings.

When they planted their onions and potatoes in the soil, they were proud of themselves.

They very well understood the importance of water for people, plants and animals.

Water is life; don’t waste your life!

Save water, then it will save you!

Water means purity, water means beauty.

If there is no tree, then there is no water; if there is no water, then there is no life.

The legend of a flower - Lesson Plan Synopsis

Lesson plans	Partner Country	Synopsis
A bouquet of floral thoughts	Poland	A fun activity to learn about the parts of a flower and its life cycle.
Dandelion – The legend of a flower	Austria	The activity starts with exploring a dandelion and then moves to studying the flight of a parachute or helicopter to better understand the pretty flower's dissemination.
From seed to leaf	Turkey	What are the phases of a plant when it is growing?
The tiny seed	Romania	An example of summer show based on *The Tiny Seed* by Eric Carle to encourage creative thinking and environmental awareness.
The legend of a rose	Romania	The lesson provides the children with background knowledge to create their own legend and to practice their presentation skills in a storytelling group.
The legend of Peony	Romania	A beautiful flower, an impressive story and a science investigation in a mixture which captivates.
Watch our Amaryllis grow	France	A long term activity which focuses on observing the growth of a new plant from a bulb.
The legend of a flower	Romania	This activity gives lots of good ideas about the content of a comprehensive book on flowers.

School: Szkoła Podstawowa Nr 2 in Siewierz, Poland
Subject: Integrated Science and Language, Age group: 4-6 years old
Teacher: Dagmara Malota-Machura

A bouquet of floral thoughts

Introduction:

These activities are part of the theme **The legend of a flower**. May is the month of flowers. We can expect to see lilac, lily of the valley and many others. Children often bring flowers to the kindergarten and this is the best opportunity to talk about them.

Background:

Most plants pass on life to future plant generations by seeds. It is the work of a flower to make seed. All its beauty serves this one purpose. Color and perfume attract insects and hummingbirds to aid in the flower's pollination. Some flowers are so formed that they admit certain insects and no others.

(Source: http://kids.britannica.com/comptons/article-9274354/flower)

Purpose:

Children know anatomy of a flower and its life cycle.

Aims:

The children will:

- ask questions and draw conclusions
- know anatomy of a flower
- know what the flowers need to survive
- know the role of flowers

Vocabulary / Key words:

A flower, anatomy of a flower, a stalk, petals, roots, pollen, a bulb, a mind map, brainstorming.

Process skills: observe, analyze and describe, conduct an experiment, gather information, draw conclusions, communicate observations, information and conclusions, brainstorming, mind map.

Time/ Duration:

45 min

Materials and resources:

Cross-sectional model of a flower, illustrations of a tulip, a white cardboard sheet, colored pens, atlas of flowers.

Question:

What is a flower?

Procedure:

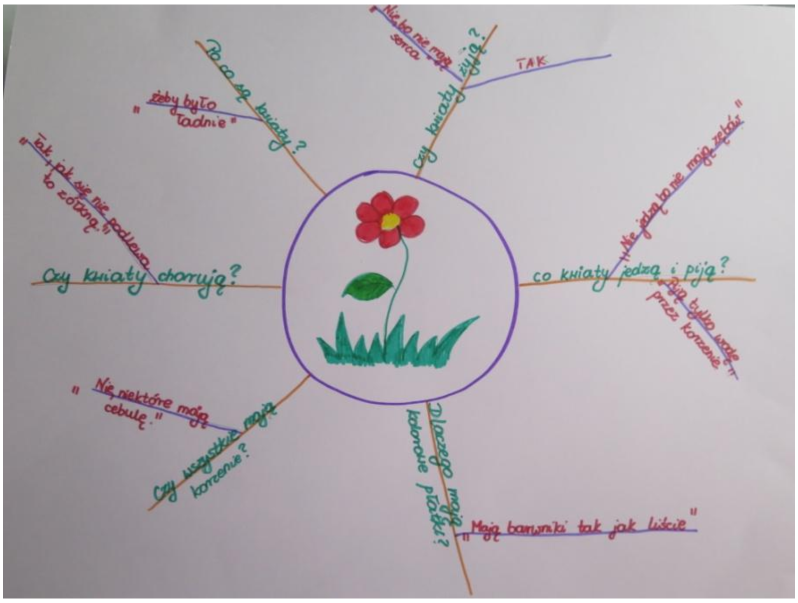
A. Preparation

Talk with children about flowers. Ask them some questions: *What flowers do they know? What are their functions? Why do they grow? Where are they from?* Show the children atlas of flowers. Let them indicate flowers they know and can name. Now, show them a cross-sectional model of a flower and discuss it together with children.

B. Exploration

It's time to create a mind map. In the middle of a white cardboard sheet draw a reasonably sized flower. Now, draw a few branches radiating outwards from the flower. On each branch write a question:

- Do flowers live?
- What do they eat and drink?
- Why are the petals so colourful?
- Do they all have roots?
- Do they get sick?
- What do we need flowers for?



Mind map with children's answers (hypotheses)

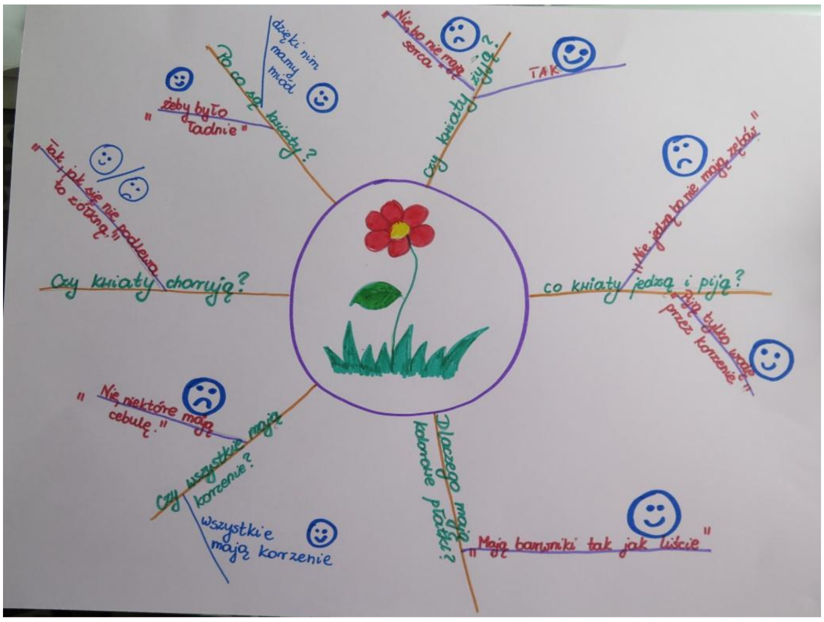
Now try to answer all the questions by putting forward hypotheses.

Hypotheses:

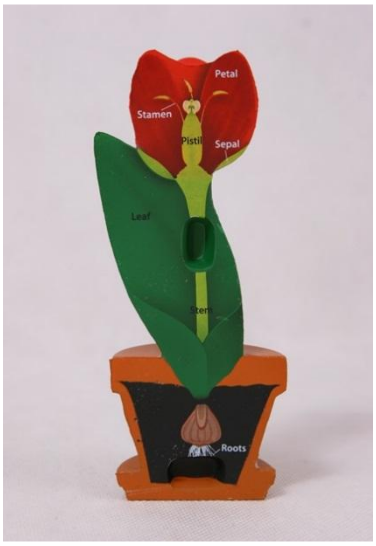
Questions	Children's hypotheses
Do flowers live?	No, because they haven't got hearts.
What do they eat and drink?	They don't eat because they haven't got teeth, they drink water thanks to the roots.
Why are the petals so colourful?	Because of dyes.
Do they all have roots?	No, some of them have got bulbs.

Questions	Children's hypotheses
Do they get sick?	Yes, if you don't water them they are going yellow.
What do we need flowers for?	To make the world more beautiful.

Using the cross-section model, together with children, support or refute their hypotheses. Put correct answers on the mind map.



Mind map with supported and refuted hypotheses.



The cross-sectional model of a flower

C. Discussion questions:

What is a flower?

D. Conclusions:

Thanks to this simple question children are familiar with the anatomy of a flower, its life cycle, nutrition process etc. They know that flowers are living things and they gain 'food' from the sun and soil. The children also noticed that some flowers have got roots and some of them have got bulbs and roots. They know why the flower's petals have so many colours and that they can get sick. Moreover, the flower pollen is used by bees to make delicious honey.

E. Assessment:

The children really liked the classes. They enjoyed working with a mind map and liked brainstorming technique. It was quite easy for the teacher to observe children working. They enjoyed communicating with each other and shared their observations spontaneously. The teacher appreciated children's involvement, creativity and curiosity.

Inquiry and creativity elements:

Theatrical performance *The History of the Daisy.*

Setting an indoor 'garden' with a few plants.

School/Kindergarten: Kindergarten der Volkshilfe Rosental a. d. K., Austria
Subject: Integrated Science - Biology, Botany, Physical Phenomena – Fly, Waft & Trundle
Age group: 3-6 years-old
Teacher: Sabine Hirschmugl-Gaisch

Dandelion - The Legend of a Flower

Introduction:

This activity is part of the theme: **The legend of a flower** – Research on the Dandelion

Background:

All children like the dandelion, a widespread wild plant. The name "devil flower" was possibly given this plant, because it is almost ineradicable and can spread again very quickly. It is also an important plant in medicine (tea) and in the local cuisine (salad, honey, jam). By means of many different experiments, we want to explore this plant in more detail.

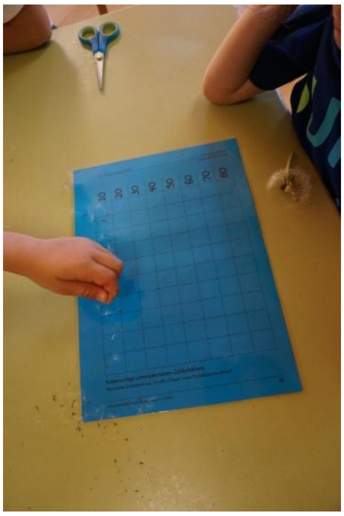
Purpose:

In addition to the observation, the detailed description and the different growing stages of this plant (often all these stages are observable at the same time, because some plants flower when others cease blooming), we want to raise awareness this small wonder, which can give pleasure to people in many different ways.

Aims:

Additionally to many experiments concerning the fields of physics, chemistry, mathematics and biology, we deal with the special characteristics of Dandelion seed, which play an important role in the dissemination of this plant.

The children will:



The children have the opportunity to conduct their own dandelion stories, rhymes and songs (language training) as well as to deal with the plant in a creative-sculptural way: laying mandalas, gluing pictures, creating pictures, threading beads, building wells and water pipes, creating flower decoration, cooking jam, honey and salad, tasting tea, observing the growth of the plant, examining the characteristics of the individual plant parts (milk of the stem, roots, seeds,…)

Vocabulary/Key words:

Dandelion, flower head, taproot, flying seeds, flight characteristics (fly, waft, trundle), parachute, helicopter, multiplication, distribution / dissemination, stem, flower, root, leaves, jagged, to estimate ("How many seeds are on one flower head?")

Process skills: observing, analyzing and describing, planning, conducting an experiment, gathering information, collecting data, interpreting data, drawing conclusions, communicating observations, information and conclusions.

Time/Duration:

Approx. 1 hour – 6 children per unit

Materials and resources:

Parachute: Colourful paper napkins or colourful tissue paper, thread, tape, scissors, wooden beads or a small Lego figure

Helicopter: paper template helicopter, scissors, paper clips.

Questions:

How about the different flight characteristics of a parachute and a helicopter? Which is more similar to the flying seeds of the dandelion? Why does the dandelion need its flying seeds? What is the difference between flying, wafting, trundling…? What influence do the different sizes of the aircraft have?

Procedure:

A. Preparation:

First the dandelion is observed closely and its seeds are examined with magnifying glass as well as under the microscope. - A sample blast of air shows how far the seeds can spread and what flight behaviour they have. With the help of a grid with 100 fields we can detect, how many seeds can be spread with a single blast (we counted more than 100 pieces!).

B. Exploration:

Parachute - The napkin is laid out and the threads are fixed with tape at all 4 corners (the length of the threads should extend the napkin centre just a little). After the threads are tied together in the middle, a Lego figure or the wooden beads is/are placed on it. Subsequently, the parachute can be left wafting to the ground from a great height.

Helicopter - The helicopters are cut out, folded and weighed down with a paper clip. Then the helicopter can be released from a great height.

C. Dicussion questions:

Which aircraft can stay in the air the longest period of time? Which aircraft is most similar to the flying seeds? Why/How can parachutes or paper-helicopters fly?

How does the size influence the flying characteristics? Why do we need a weight at the end of the thread? Would the devices also fly without the weights?

D. Conclusions:

The dandelion needs seeds to spread and the wind can carry them very far. What happens when parachutes or helicopters waft through the air towards the ground? Parachutes are pulled down by gravity – but under the parachute the air is accumulated and so it is wafting down slowly.

Similarly, the air strikes the helicopter rotor blades from the bottom and is urged by them to the side – so it also starts to waft and to sink to the ground slowly.

E. Assessment:

The project on the dandelion was really appreciated by children and their parents because of its broad diversity, which motivated them to use their pre-knowledge to do some own research at home.

Further investigations:

In addition to the flight characteristics, we examined the parts of the dandelion – e.g. the stems, from which we made water pipes, jewelry and beads (the stems curl when put into water – "cell-research"). We also used their milk as glue and made salad, tea, jam and honey out of the flowers and leaves.

Inquiry and creativity elements:

To designate, to observe and to explore the dandelion plant in its entirety gives children an opportunity to develop and refine their skills and talents at all levels (language, vocabulary, observation, perception, cognitive skills, fine motor skills, imagination and creativity). For a project on "Research-based learning" the dandelion simply provides an ideal research object.




Teacher‛s notes:

The project on the dandelion let us draw more attention to a plant, that often is not noticed when it grows on the roadside. However, it provides us a wide range of opportunities if we use it as research object, because - due to its fast growth – all its stages of development can be observed within a short period of time.

We will certainly take this topic up again in order to deal with its elements in a more creative way.

School: Ş. Jan. Uzm. Çvş. Ahmet Güngör Anaokulu, Tarsus-Mersin, TÜRKİYE
Subject: Integrated science, Drama and Music, 5-6 years old
Teacher: All teachers

From seed to leaf

Introduction:

The activities described here were carried out for the theme **The legend of a flower.** There are many kinds of flowers, plants and vegetables around us in nature. Each of them has a different life cycle. The experimental and hands on activities in this plan enlightens the visage of the life story of plants "from seed to leaf".

Purpose:

Process Skills: observation, learning by doing, experiment, questionning.

Time: 1 month

Materials:

Different kinds of seeds (sunflower, bean), water, soil, cotton.

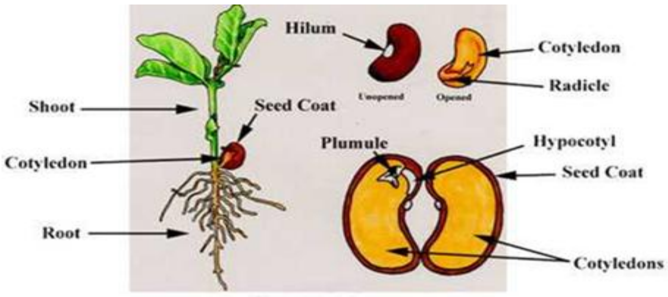
Question:

What are the phases of a plant when it is growing?

Procedures:

A. Preparation:

First, the children were taught the phases of a growing plant from seed to sprout and germination till it develops a flower. They were shown some videos and drawings in the class.



Cotyledons

B. Exploration:

The seeds of bean and sunflower were placed in some cotton and watered. The chidren observed their growth in the class for a month. When they started to germinate, children planted them in the garden but continued observing the plant regularly.

C. Discussion questions:

- Now that we have planted the seeds under cotton, what will happen?
- Will they grow up when we water them?
- Do they need only water? Or they also need sun light and fresh air?

D. Conclusions:

Students observed their plants and made some handcraft activities about how to grow a plant. Within these weeks, they made several activities about flowers and other plants. They made observations in the garden, they watced cartoons adn documentaries about plants, etc. Then, after their seeds started to give green branches, they planted it in the soil in the school garden.

They also compared the stages of a sun flower while it is growing up:

Assessment:

Planting the seeds, seeing how it grows up gradullay was a kind of real-life story for the children. They now know how to plant something and what are needed for it: water, soil, sun, air and PATIENCE!

Further investigations:

This topic can be carried out with different kinds of flowers and other plants. Students can be taken to a botanical gardens to make observations about other types of plants.

School/Kindergarten: Happy Kids Kindergarten, Discovery Kids Primary School, Ramnicu Valcea, Romania.
Subject: Integrated Science, Drama, Art and Literature
Age group: 2-6 years old, Teacher: All teachers

The tiny seed

Introduction:

Even if this is not an inquiry-based learning story, the activities described below can certainly be part of a Guide of Good Practices, as an example of creative way of approaching the theme **The Legend of the Flower.**

Background:

While talking about life cycles of plants, we told the children the story *The Tiny Seed* by Erik Carle, one of the most beloved ones. Their very good response to the story, gave us the idea of starting the end of the year pageant from Carle's story. And so we did!

Just like in the original story, a very tiny seed, along with other bigger seed sisters is blown away by the wind. It reaches the cold tops of the mountain. Here it is cold and freezing and most of the seeds freeze. Luckily, a new wind starts blowing and the tiny seed along with a few other survivors is blown away from the cold mountain in the hot dessert. Now the sun is too hot, the weather is too dry. Most of the seeds die in the heat, but just then, a sand storm approaches quickly. The seed is up in the air again and the strong wind takes her far away till it drops in a lake, apparently a good place to be. However, here other dangers like fish and birds lurk in the dark waters. Finally, the seed reaches some good land where its roots start growing. The sun, the rain, the rainbow, the earth and the air help the new plants appear. But while the other plants growing around it develop nice, colourful flowers, our seed produces only a feeble and fragile seedling. A child with a pure soul is walking by when he sees the poor plant. He wonders what the problem could be, when the spirits of the forest appear and say *This is not an ordinary flower. It needs not only water, earth, air and sun. It needs lots of love and caring and the touch of a pure heart because…this is the flower of love.*

Indeed the feeble seedling is given lots of love and it starts growing and growing and….growing till it becomes the biggest plant with the most beautiful flower ever seen. This is the flower of love!

Step by step, the story grew into an original one, which not only gave us an image of the dangers that a seed has to surpass in order to sprout again but it also talks about lots of the children in our preschool or primary-school. They arrived here, shy and not too promising but their striving gave results and they finally *bloomed* into wonderful, talented people. Just like the seed, they needed not only some physical conditions but lots of love and caring! Isn't that true for all of us?

The pageant gave us the opportunity to discuss with children about:

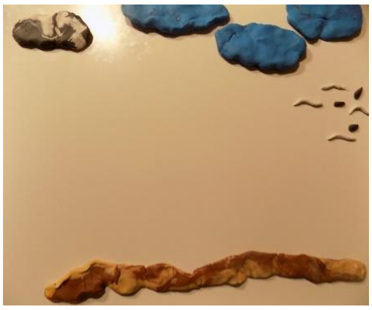
- How seeds travel
- Proper environments for seeds to develop
- What does a seed / plant need to grow
- Plants respond to love and care
- Any of us can get far if we try hard

Purpose:

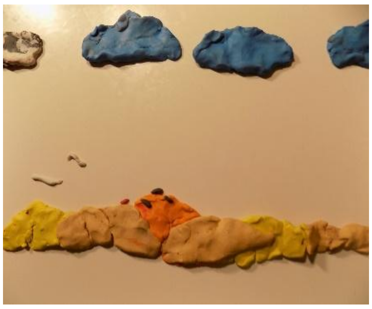
- Understand that seeds are the promise of future life and they need proper conditions to develop roots and seedlings
- Encourage creative thinking and environmental awareness.

Aims: the children will:

- Learn that seeds come in different shapes and sizes
- Understand that some seeds travel with the wind distant places
- Understand that a seed needs certain conditions to develop into a new plant
- Learn that plants respond to love and caring
- Act in front of an audience and on a professional stage
- Dance and move to music impersonating different characters
- Wear outfits and costumes in accordance with their character

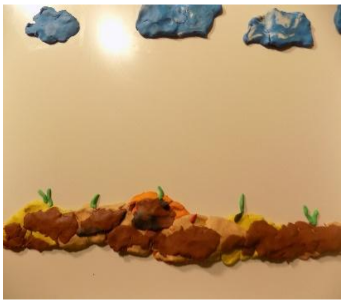
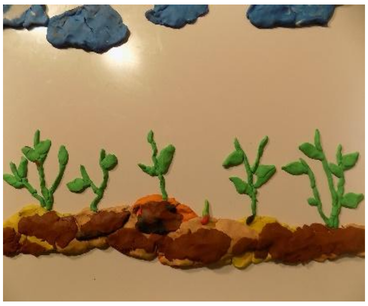
















Vocabulary/Key words:

Seed, wind, blow, freeze, mountains, cold, frost, snow, ice, desert, hot, lake, frog, swan, fish, turtle, flowers, bloom, plant, air, rain, rainbow, earth, sun, love, care, bloom, flower.

Process skills: observe, plan, communicate and draw conclusions.

Time/Duration:

About three weeks.

Materials and resources:

- Photos of the story in clay turned in a video-file
- Scene set, lights, music, sound and light systems
- Special costumes and outfits
- Lots of patience!

Questions:

What does a seed need to develop into a plant?

Procedure:

A. Preparation:

1. Teachers along with children started from Eric Carle's story *The tiny seed* and developed an original story about the seed of the Love Flower.
2. The staff discussed the scenes and, along with the children developed characters for those scenes.
3. Some of the teachers wrote the scripts, others came along with the proper music, while teacher assistants prepared the costumes.
4. The children prepared the decorations for the set. On a giant screen, all along the play, the story of the tiny seed was projected. In order to do this, a group of school children along with one of the teachers shaped the story in clay, took photos of the story while moving the little parts bit by bit. Finally the photos were put together in a video file and this was the story which served as a background set for the children who acted.

B. Exploration:

Scene I: On the background, projected on the screen, begins the story of the *Tiny Seed:* The wind is blowing and it takes up some flower seeds. One of the seeds is small and red. All of them are blown up the mountain where they meet Snowy, Frosty, Icy, Windy. The children learnt that while the snow protects the seed from freezing:

Snowy: Here, where the air is so rare

The landscape is breathtakingly fair

The seeds, like a blanket I will gently cover

If they freeze, they will never turn into a flower.

…the frost can freeze them forever:

My name is frosty and I turn everything to ice
I can freeze all creatures with a blink of my eyes
Even the eagles and the bears from me they hide
No living creature with me can really fight.
Run seeds, run because if cherish the life in you
Or forever stay here, up in the mountains too.

Luckily, a wind starts blowing hard the seeds are blown away from the top of the mountain. However, Luck is not on their side and they land into the desert. The children learn in this scene (no 2) that hot sun can be as harmful as frost. Through the desert comes a caravan with beautiful Arabian princesses, sheiks and a funny camel.

Next, a tremendous sand storm picks up the still surviving seeds and drops them into a lake. Here, they are almost eaten by a beautiful fish but a swan comes, and the fish has to find quickly shelter. Food chains make the subject of this scene (3). Children learn that fish feed on seed and small water plants while birds feed on fish. They also have the chance to meet some other animals from the water habitat: frogs, turtles, fire-flies or ducks.

For every scene, the children dance to the music and move as their characters would do.

In scene four, the remaining seeds can find some good earth to grow roots into. Here the elements of nature: rain, earth, air, sun and even some cute rainbows do their magic and the seeds start growing. In this part, the children remembered the essential elements that a plant needs to grow. For example the air says:

I am everywhere, but you can't see me
You can't touch me but you can't live without me.
I am the air, most important for plants and you
Of course I give life to animals, too
I have no colour and I am so light
But life depends on me all right.

The flowers start blooming in splendid colours. Girls dressed in beautiful costumes imitating hula dancers enter the stage. Each of them marvels on her beautiful colour and wonders what colour the flower growing of the tiny seed will be.

Bees, butterflies, ants, ladybugs invade our garden of flowers:

The lyrics tell us about specific feathers (*My name is ladybug / I have spots on my back / On red wings, my spots are black),* life cycles *(once a caterpillar, now a butterfly),* what they can do *(crawl, fly, hop),* way of life *(I work and work day by day/it's my job I don't play./In my hill I take the food /In winter it's really good.*)

All the flowers are marvelous except for the thin, weak seedling coming out of the tiny seed. A child with a pure soul comes along. She wonders why this plant is so feeble. The elves of the forest appear and say that this is the flower of love and what it needs is love, care, friendship, happiness. (*Love and care for the flower / Gives it power…If you care and love share / It grows really fair… Friendship if you show / It will glow, glow, glow / For the flower to be glad, / Happy and not sad /Give her a smile / Then wait for a while. / A wonder you will see / Just love her and be happy!*)

The messengers of love come with their positive feelings and messages:

Love flowers are special, you know

They feel your nice thoughts

If you think the world is good

That for her is tasty food

If you think of something kind,

The prettiest flower you will find.

Finally, love makes the tiny seed grow into the most beautiful flower ever seen!

C. Discussion questions:

What conditions does a seed need to grow? Can a seed develop if it is extremely cold / hot? What is the life-cycle of a plant? How can snow, sun, rain, earth, air help a plant to fulfil its life-cycle? How do insects and bugs help the plant? What red/ yellow/ blue / purple / pink flowers do you know? How do you take care of plants? Do you ever stroke / tell a plant you love her?

D. Conclusions:

Yearly activities include Christmas and end of the year pageants. It is a wonderful idea to combine such important events with a theme that would make all people involved (children, parents, staff and community) better persons.

E. Assessment:

The children were thrilled about this play. We talked it over several times to make sure they understand all the elements involved (especially since for each of the three pageants, two or three classes collaborated). They simply loved the dances, the parts, the costumes and the whole idea of the show. And when children love doing something, they do it in a natural and joyful way.

Further investigations:

The videos and photos used for the above described event were used by the staff to visually represent the needs a seed.

Kindergarten/School: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science, Math, Sensory, Practical Life and Art; Age group: 4-5 years old
Teachers: Cristina Preduca, Georgiana Boaza

The legend of a rose

Introduction:

The legend of a rose is part of **The legend of a flower** project. A legend is a story created about a certain person, object or place. Many legends are created as a way of explaining history. Most legends are based on fiction, which means they are not necessarily true. However, the real magic of a legend exists in the fact that it is a story passed on from generation to generation.

Background:

Legends are traditional stories of marvelous character recounting the deeds and bravery of saintly men or characters, used to inspire people to do good and saintly deeds and instill in children pride and the desire to follow in the foot-steps of their heroic trek to salvation. Legends are non-historical narratives, originally applied to the lives of Saints and other Great Spirits, which had to be read or listened to, as a religious duty. In an effort to find commonality on first contact, Europeans applied the label of 'Legends' to Native stories recounting the exemplary lives and deeds of animals, human beings, and the natural spirits of God. Legends were tales given to the Native People by the Creator to bring balance and maintain harmony, reminding all Native People of the respect needed so they would live in Oneness with All Life. Legends taught all people that every living thing was a Child of God, with purpose. A good legend was told in such a way, that no matter the age of the listener, they would understand aspects of the spiritual teachings contained in the legend, depending on the individual's level of spiritual understanding.

Purpose:

The purpose of this lesson is to foster in kids a deeper understanding and appreciation for legends, stories and storytelling. The activity will provide them with background knowledge to say their own legend and to practice their presentation skills in a storytelling group.

Aims:

The goal of this project is to create a legend about something, in this case about the rose and to develop the children's narrative and descriptive skills.

The children will:

- Know the parts of a story or a legend.
- Narrate the beginning and the ending of the legend.
- Be able to utilize descriptive skills in their stories.
- Work collaboratively to guide each other's piece.
- Use specific phrases and words in key parts of the legend (introduction, middle section, ending)
- Be able to draw a conclusion.

Vocabulary/Key words:

Legend, describe, story, action, introduction, middle section, plot, phrase, key words, different attributes to characterize objects, animals or persons, ending, conclusion, narrate.

Process skills: observe, analyze and describe, plan, gather information, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

40 minutes

Materials and resources:

Chart paper, crayons, watercolors, pencils, white paper, pictures and images from books, computer, glue, different materials or fabrics.

Question:

Can we create an interesting legend?

Procedure:

A. Preparation:

Open the lesson with a class discussion about legends and stories. On a whiteboard or chart, write LEGENDS/STORIES in the center of a large space and ask students to share name of stories that they know. As they offer their ideas, write them onto the whiteboard surrounding the center area. The goal is to brainstorm a variety of stories that will help to define how they will be able to create a legend.

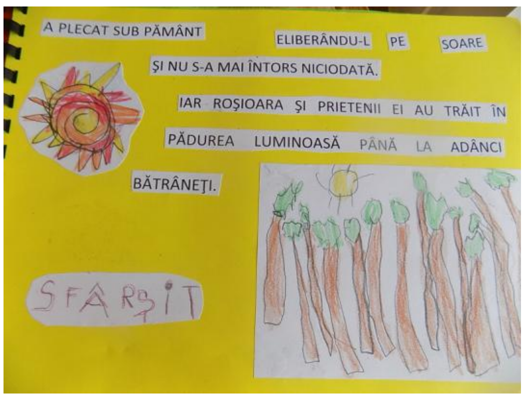
B. Exploration:

Let the children know that they'll become storytellers for this lesson. A good idea is to review children behavior expectations prior to beginning. In addition to regular class expectations of cooperation and good listening skills, kids should demonstrate respect for the storyteller by paying attention and not speaking out. This is a very important aspect of traditional storytelling.

Creating in groups is also a great opportunity for kids to practice their presentations skills. They should be reminded to use a clear, projected voice and to take time to use facial expressions, eye contact and voice intonation to help bring the story to life. All children should be able to see one another.

Every child will say something that will help to create the legend. The legend is about a rose that goes through many interesting events and succeeds to rescue her house and garden with the help of her friends.

All the goods ideas will be written on a whiteboard and in the end we will write them on our book entitled "The legend of a rose". On the book we will glue the drawings of the kids.



C. Discussion questions:

What is a legend? What are the parts of a story? What are the characters in a legend? Who are the good characters? Who are the bad characters? Where is the story taking place? What can the plot of the story be? What interesting ending could there be to our story? What happens to the characters in the story? What are the conclusions?

D. Conclusions:

When we create a story or a legend we must remember what a story means, what are the parts of a story and that we must have some character that will make the legend much more interesting. Children behaved very well, each of them contributing to the creation of the legend. They were very excited when they heard the whole legend.

E. Assessment:

The children enjoyed communicating to one another and sharing with enthusiasm new ideas. It was quite easy for the teacher to observe children working. The teacher appreciated their involvement, curiosity and creativity. They tried patiently to draw all the characters of the legend.

Further investigations:

Have kids work in pairs or small groups and tape-record them as they tell their story. Share the video with the class and learn how to develop stronger presentation skills.

Inquiry and creativity elements:

Children enjoyed creating their own story. They easily learnt about the steps to create an interesting legend, even though in the beginning they needed help to coordinate. They also enjoyed drawing the characters of the legend.

School/Kindergarten: Discovery Kids Primary School, Ramnicu Valcea, Romania
Subject: Integrated Science, Language and Art, Age group: 6-7 years old
Teacher: Mihaela Balint

The Legend of Peony

Introduction:

This activities are part of the theme **The Legend of a flower – The legend of Peony/ Bujor** (in Romanian).

The limits of human imagination are indeed the space frontiers. For every flower, bug, tree, mountain or spring from this world we call Earth, human minds have been creating stories and legends since immemorial times. All legends start with something real, with something characteristic of the subject of the story. In this case our imagination made a connection between peonies-large flowers, with delicate colors (red, pink, white) rich in petals, with a delicate perfume and the blush in the children' cheeks.

Background:

Peonies are hardy *flowering plants* that need little care and live through severe winters. After becoming established in a garden, peonies bloom each spring for many years. Peonies are also extensively grown as ornamental plants for their very large, often scented cut flowers.

Like many other plants, peonies "drink" water from the ground through their roots. The water travels up the stem of the plant into the leaves and flowers where it makes food. When a flower is cut, it no longer has its roots, but the stem of the flower still "drinks" up the water and provides it to the leaves and flowers. In the stem there are many long, tiny tubes through which the water moves up. This works in the same way as sucking on a straw. Coloring the water with food coloring does not harm the plant in any way, but it allows us to see the movement of water through the roots (stem in our case) to the flowers and buds.

Purpose:

- observe and describe plants with flowers and buds (peonies flowers)
- starting from the description of the flower and using a Romanian expression "Bujori in obrajori- blushing children's cheeks" imagine/read a story/legend about it
- demonstrate how the plants take up water for photosynthesis process through a simple experiment.

Aims:

The children will:

- observe the peony plant
- describe the plant (different colors, different sizes)
- compare different parts of the plant
- label the parts of the plant
- describe the role of each part in the plant's life
- draw conclusions based on an experiment
- write and illustrate a story based on observations

Vocabulary/Key words:

Plant, the parts of the plant (root, stem, leaves, flower, buds, petals, pollen), the life cycle of the plant, seed, embryo - baby plant, the plant's needs - air, water, soil, the life process in a plant (photosynthesis, respiration), bigger/smaller, perfume, large, green, red, pink, round, oval.

Process skills: observe, analyze and describe, compare, conduct an experiment, communicate observations, draw and label the drawing, listening/retelling and illustrate a story.

Time/Duration: 4x20 minutes

Materials and resources:

Peonies flowers with different colors (at least one white peony for the experiment), camera, white papers for drawings, colored pencils, pencils, crayons, magnifying glasses, water, tall glasses, red or/and blue food coloring, pipets, scissors.

Questions:

What does a peony plant look like? Why do we use the expression "Bujori in obrajori"? Does it really look like children's cheeks? Can I see how the peony drinks water through its stem?

Procedure:

A. Preparation:

Bring in classroom a nice bouquet of peonies. Yes, it will smell like spring and the classroom will instantly seems to be more colorful and cheerful. Make sure you have at least one white peony for the experiment.

Split the children in small teams or pairs. Each team has a peony flower, white paper, a magnifying glass and pencils.

B. Exploration:

- Ask children to observe the flower carefully and describe it with as many details as they can. Help them communicate their observations with open questions: *What color is your flower? How big it is?* (compare with something like a child's hand, for example, or another well known flower like rose, tulip, snowdrop), *What does it look like? Are there many petals or just a few? All the petals look the same?* Peony flower is large with many petals and a delicate perfume. *Can you feel a smell, a perfume? Do you like it? How about the leaves? Are they big or small, simple or compound? What color are the leaves? Look at the bud. What does it look like? Is it round or oval? Can you feel a smell of the bud? Look at the ant on the bud! Why is it there?*
- Ask children to draw and color the flower on papers using the colored pencils or crayons.
- Talk with the children about plants, about parts and the role of each part in the plant's life.
- Ask them to label the parts of the plants on their drawings.
- Each team has a tall glass of water, a white peony, a bottle of food coloring and a pipet. Ask children to fill the glass half full with water and add 30 drops of food coloring using the pipet.
- Before placing any of the flowers in the glasses, help them trim the stem of the peony at an angle to create a fresh cut. For cut flowers, it is important for the stem tubes to be filled with water. If air gets in the tube no water can move up the stem.
- Place the flowers in the glasses and wait. In the meantime make some predictions followed by the story time. Children can also make some drawings for the story or can imagine their own legend about the peony.

C. Discussion questions:

- Are you familiar with the expression "Bujori in obrajori"? Does the peony look like a child's cheek? Did you know that the legend said that Bujor was the name of a young boy bewitched by the forest fairies? Would you like to hear the story?
- Can you see the water running up through the stem? Why? What color is the water? If the water would be red, for example, could we see water absorption? How can we made this process visible?
- What color will the peony have? Which color will be soaked first? Will one of the colors create a more colorful flower or will all the colors be absorbed at the same level? How long will it take to see a red/blue peony? Is it blue a natural color for this flower? What will happen if we use 50 drops of food coloring? Shall we have a more colorful flower tomorrow?

D. Conclusions:

About six hours later the peony's white petals have a pinkish or bluish pale shade. The next day the colors were even stronger. Our blue food coloring seems to be more efficient. The stem and the leaves also presented color modifications.

Peonies are beautiful flowers with a very pleasant perfume. The legend is lovely, perfectly suited to the good hearted and innocent young man charmed by the fairies. The delicate white and pinkish petals look indeed like a child's cheeks.

E. Assessment:

The evaluation of the activity included the observation of the children's work, their involvement, their records (pictures, drawings, notes), the appreciation of the questions raised, of the observations/answers/ conclusions. The teacher also appreciate the children's teamwork, their storytelling skills and use of vocabulary.

Further investigations:

In this experiment children use red and blue food coloring. Which color was soaked up first? How about using more food coloring? How about a mixture between red and blue? What color will have the flower in this case? What other flowers can we color? How the leaves look like? Do they change their color, too? How about the buds? The stem?

Inquiry and creativity elements:

A beautiful flower, an impressive story and a science investigation is a mixture which never fails. Even when they needed to wait for the results till the next day the children enjoyed this activity and they wanted to repeat the experiment with other flowers.

School/Kindergarten: Ecole Maternelle J. Jaures Brignoles, France
Subject: Integrated Science, Math and Art, Age group: 4-5 years old
Teacher: Loth Corinne

Watch our Amaryllis grow

Introduction:

This activity is part of the theme **The legend of a flower**.

Background:

In the previous activities children saw some radish seeds and watched them grow and change into little plants. They already know that plants grow from seeds. But not all the plants grow from seeds. An Amaryllis bulb is a good opportunity for the kids to watch how a beautiful plant with spectacular flowers grow from something different than a seed.

Purpose:

To observe the growing of the new plant - an amaryllis - from a bulb.

Aims:

The children will:

- observe the bulbs, the soil and the gardening tools (flower pot, watering can and shovel)
- plant the bulb in a flower pot using gardening tools
- observe the different stages of a plant' cycle of life
- make daily measurements of the plant height using paper strips
- take care of the new plants (light, water)
- record data through pictures, drawings and paper strips length
- communicate their observations

Vocabulary/Key words:

Plant, bulb, shoots, roots, stem, bud, flower, leaves, petals, sun (light), dark, flower pot, soil, shovel, watering can, water, grow, measure, height, length.

Process skills: observe, describe, analyze (compare), gather information, collect data, measure, communicate.

Time/Duration:

45 minutes for the introduction part. 10 minutes daily

Materials and resources:

Flower pots, soil, gardening tools (shovel, watering can), bulbs, seeds, writting papers, crayons, pencils, colored pencils, camera, strips of paper.

Question:

How does a plant grow from a bulb? What plant will grow from this bulb?

Procedure:

A. Preparation:

The teacher prepares some gardening tools like small plastic shovels, flower pots and watering cans, gardening soil and some water. Children were used to these items during the previous activities. The teacher asks the children to identify and describe the use of these objects. *What is this ? What are we doing with this object ? Show me how you are using the...*

During a previous activity the teacher read to the children the story *Thumbelina* by Hans Christian Andersen. Now she reminded the children how the poor young lady put a big seed in a pot, watched it grow and something magic was happened. And look, another "magic big seed" is here...

The teacher explains that some plants grow from bulbs, not from seeds. They will plant the bulb in a flower pot and watch it grow.

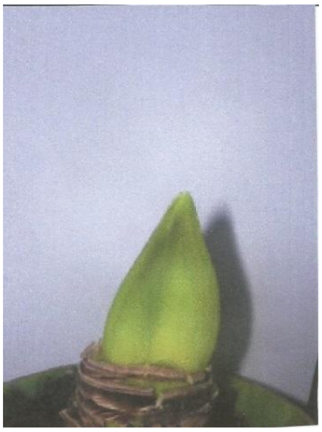

B. Exploration:

Children put some soil in the pots, place a bulb in each pot and cover it with the rest of the soil. The flower pots will be seated in two different places of the classroom. One of the flower pots is placed close to the window and the other one in a dark corner. Children take care of the plants watering and observing them.

After 3 days the first shoot appears; every day children measure it with a strip of paper on which a mark and the date are written. The plant from the dark corner began to grow only two weeks later and it grew more slowly. The children come with hypothesis and a child comes wiht the answer: "*there is no sun, no light so, we have to put it closer to the window.*"

We still observe the stages of the plant's growth.

Differents stages of the amaryllis' growth




C. Conclusions:

- From our bulb grew a beautiful flower. It grew very fast, even 3 cm per day! After the flower faded the leaves grew bigger.
- Some plants grow from bulbs. The bulb is a kind of a big seed. As any other plant, our plant needed water and light to grow.

D. Assessment: the children

- *Science:* identified the parts of the plant, understood the sequence of the life cycle of the plant**,** recognized and identified the gardening tools. Used gardening tools in a proper manner
- *Maths (measurements):* put in the right order the paper strips obtained by measuring the length (height) of the new plant and could compare two lengths, used mathematical vocabulary of height (length)
- *Art:* children used drawings and pictures as representation of their observations
- *Language:* used everyday language to describe activity, used everyday language to communicate with peers.

Further investigations:

Investigate the life cycle of new plants and discover which grow from seeds, from bulbs or from different parts of the plant (leaves, small parts of stem).

Inquiry and creativity elements:

The teacher made a link between this activity and the story *Thumbelina*, by Hans C. Andersen, encouraged children to explore all the materials and made their own investigations. Also, communication between children was attentively guided. She provided support only when it was necessary.

The children were encouraged to represent through drawings their own observations and take pictures with a camera. A nice poster with pictures, drawings and short notes written by the teacher was displayed in the classroom on the wall.

School/Kindergarten: Happy Kids Kindergarten, Ramnicu Valcea, Romania
Subject: Integrated Science
Age group: 5-6 years old
Teachers: Cristina Vacaru, Stefania Roman

The legend of the flower book

Introduction:

This activity is part of the theme **The legend of a flower** which focused on the cycle of life for plants and creation of legends about popular flowers.

Background:

There are so many things to discuss about plants in general! Flowers come in many different shapes and sizes, and there are many variations in colors, number of flower parts and the arrangements of these parts. We noticed that in order to grow, live and develop, plants need special conditions: water, heat, air, light, nourishing earth.

Plants are considered to be the backbone of all life on Earth and an essential resource for human well-being. Just think about how your everyday life depends on plants. Everything we eat comes directly or indirectly from plants.

Plants regulate the water cycle: they help distribute and purify the planet's water. They also help move water from the soil to the atmosphere through a process called transpiration. One-quarter of all prescription drugs come directly from or are derivatives *of plants. So, we thought of making this book on flowers in order to demonstrate their importance in our life.*

(Source: Plant conservation day, http://www.bgci.org/plantconservationday/whyplantsimportant/)

Purpose:

Gather information and creative writing about flowers in a big book in order to demonstrate the importance that flowers have in our lives.

Aims:

Experience and explore the characteristics of flowers.

The children will:

- Observe and analyze the shape, size, colours and parts of the flowers
- Notice, compare and describe types of flowers (fragrant, medicinal herbs)
- Describe the characteristics of plants
- Create awesome flower stories and riddles
- Investigate plants curiosities

Vocabulary/Key words:

Beautiful, abundant, blooming, colorful, delicate, aromatic, freshly picked, silky, pretty, unique, therapeutic, herb, root, stem, leaf, flower, petal.

Process skills: observe, analyze and describe, plan, conduct an experiment, gather information, collect data, interpret data, draw conclusions, communicate observations, information and conclusions.

Time/Duration:

1 week

Materials and resources:

Colored cardboard, different seeds, watercolors, felt, pens, medicinal herbs, blotting paper, buttons, pressed flowers, drawings.

Question:

What are flowers and what is their importance in our lives?

Procedure:

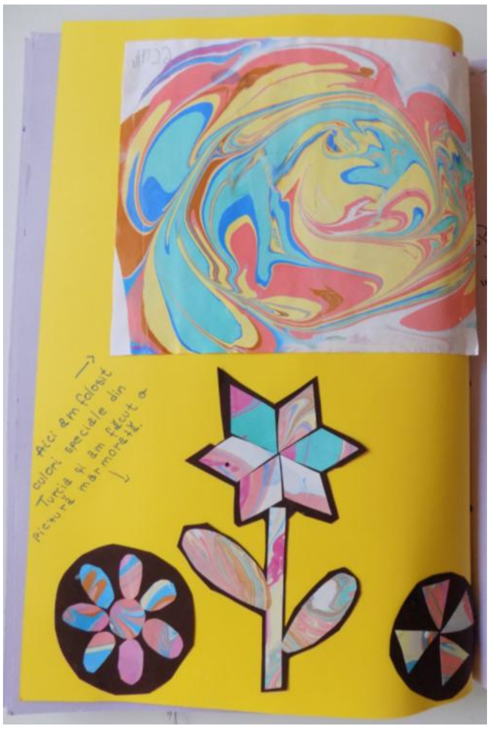
A. Preparation

Start by discusing about types of flowers. Can anyone name some? Write them on the whiteboard and then have a botanical atlas at hand to explain some more characteristics. Talk to them about the making of the book and establish together details and subtopics.

B. Exploration:

The children form three teams each with a different task: team number one will cut flower pictures from magazines, stick them on a paper and continue the drawing using their imagination. This is a techniques that we saw during our mobility to France and we liked it very much because the children have to be both attentive to details and imaginative.

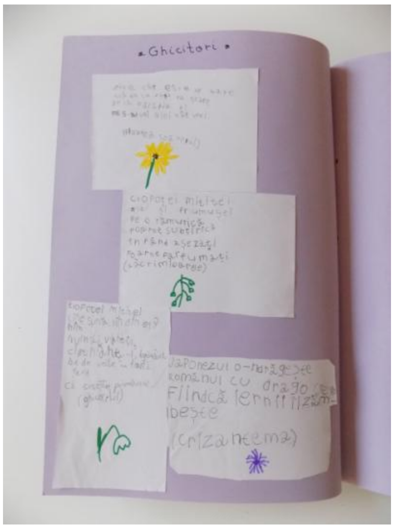
Team number two will marble paint (with a special techniques we learnt during our mobility in Turkey) and then use the paintings to make flower crafts.

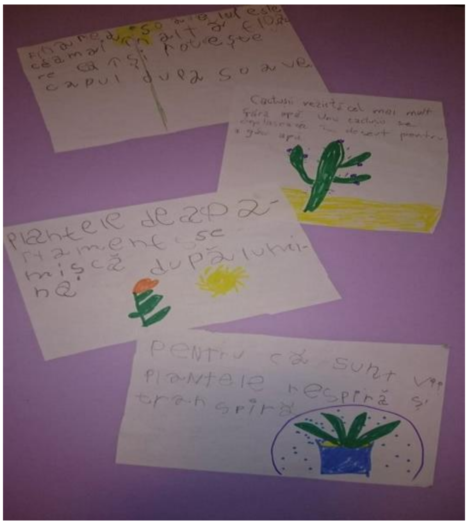


The third team painted wrote about important herbs used in our area.

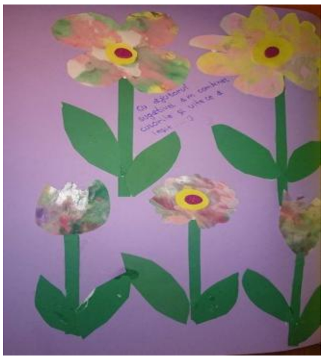
The book was continued at home, where children and parents created together stories / legends about a favorite flower:

The book was completed with riddles and curiosities about plants:





Experiments on colour combinations were also included in the book:



Finally, all the work is collected and made into a book called *The Legend of the*

Flower and completed with other art and craft:

A good idea is to share this book with parents through an exhibition or even by taking the book home in the weekends to follow.

C. Discussion questions:

Why are plants important the for the environment? How can we protect plants? What flowers/plants are protected by the law? What are herbs? What herbs can you name and for what illnesses are they used? What happens if you drip several colours on blotting paper? What curious facts have we learnt about plants?

D. Conclusions:

Gathering important information about flowers in one book proved to have a significant role in revising the *Flowers* topic. Also, the fact that families contributed to the book reflected in the fact that children came with more information about flowers to share with the class.

E. Assessment:

The children were very curious and they showed a great deal of interest in this activity. They were happy and enthusiastic to take the book home and share it with their families.

Further investigations:

What are the endangered species of flowers in our country?

Which are the plants whose flowers we eat?

Inquiry and creativity elements:

The children participated with interest and pleasure to the art and craft activities included in the project. Using ideas and crafts that we learnt from our partners brought beautiful memories to us, teachers.