

## Learning Journey: Germination and Growth

**Age group:** 4-5

**Learning activities:**

Planning investigations, observing, questioning, explaining evidence, communicating explanations

**Creative dispositions:**

Motivation, ability to make connections, curiosity, thinking skills

**Synergies:**

Play and exploration, questioning and curiosity, dialogue and collaboration, reflection and reasoning

### Background information

**School setting:** Bucharest, 6<sup>th</sup> ward

**School policy for science:** The school policy follows the national curriculum objectives for preschool education, but the teacher is free to decide on and organize all the activities, including science.

**Curriculum links:** Science activities are derived from the annual planning and they are consistent with the national curriculum for the preschool education:

- The pre-schoolers will develop skills associated to scientific investigation such as: observation, formulation of hypothesis, experiments planning and making, interpreting of data obtained from experiments.
- The pre-schoolers will be encouraged to make experiments, to use instruments or equipments, to register and communicate the results of the scientific observations, to use different sources of information, to solve problems, to look for solutions, to synthesize valid conclusions

### Setting the Scene

#### Focus

My main objective was to increase children knowledge regarding our environment by developing their curiosity and involvement. The focus of the lesson was also to help children ask scientific questions, formulate hypothesis, make observations and communicate explanations.

#### Rationale

- I observed that the previous science activities were not so attractive and challenging for all the children because information was transmitted mainly through images, pictures, etc. and not very much by direct involvement, interactivity, experiments. Inquiry activities made children more motivated and they felt responsible for their scientific work.

- Even if the work should be done individually due to the observations and measurements each child had to do, they discussed and communicated their findings by comparing the results.
- Implications for my planning and teaching:

## The implications for my planning and teaching

My planning intended to have a subject for the science lesson to motivate children be engaged in all activities and also to ensure all materials and resources needed. I planned also to encourage children share their ideas and observations for the whole duration of the investigation.

### Learning activities

- The children ask questions from the beginning of the activity, communicating with the teacher and with peers
- The children plan the activity by observing their own plants and correlate their behavior with some parameters: water, light, temperature, etc. They make connections and decide on their work plan (how frequent they do watering, change the container location to a better/sunny one, etc.).

### Grouping:

- The children work individually, but they observe and compare their work with that of their peers. Some give advice to the others.

### Materials and resources:

- All the needed material is provided by the teacher. The children understood how to use it, but their questions show that they make predictions on the future process they have to follow.
- The children receive also worksheets and they carefully register their measurements. At the end of the activity they are able to draw conclusions of their work.

### Teacher role:

- The teacher assists children when necessary by asking questions that help them to find out explanations
- The teacher does not suggest solutions, but she allows children to explore and make mistakes.

## Developing the Learning Journey

### Starting point

#### Activity: The story of the wheat grain

- The activity started with a story: “The story of the wheat grain” that introduced children into the subject and made them curious. Complementary materials, pictures and short videos were used.

- By asking questions I tried to find out children's prior knowledge and to provoke discussions between them.
- I offered initial information to children for starting the activity: what the activity is about, how it will be performed and what they would have to do.

### **Rationale**

The purpose of the activity was to foster children's curiosity, find out about children's ideas and prompt questioning.

Many questions arose: How can such a small grain produce a big plant? How many grains can live together in this container? Can we make bread from these small grains?

### **Reflections and implications**

Children expressed many ideas. It will be important to encourage children to make connections to these ideas in making predictions.

## **Developing the learning sequence**

### **Stage 1 - Preparing the containers and sowing the wheat grains**

**Activity:** Each child received a container filled with soil and wheat grains that have to be covered with soil and watered. Deliberately I gave children transparent containers as they can see in time how the roots will develop. I asked questions in order to give children the possibility for making predictions.

**Rationale:** The aim was to introduce the investigation and to encourage children's predictions.

#### **Children's responses**

The children are very motivated and start to talk about a competition: Some ideas came from the children. Water was the first suggestion, then light and then temperature.

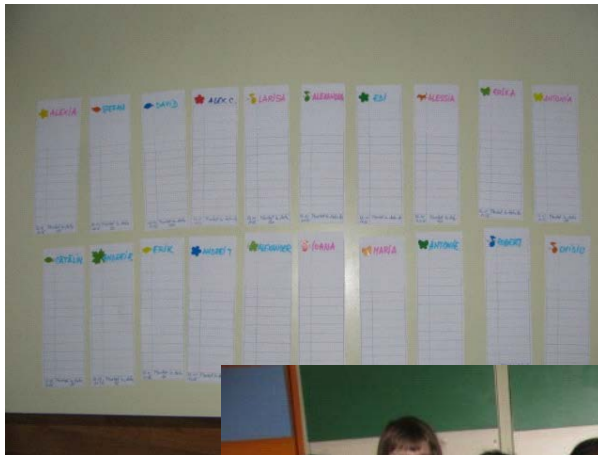
**Activity:** I gave the children 2 cardboard worksheets so they could record their results.

**Rationale:** This meant they could compare their results over time and decide what action to take next.

#### **Children's responses**

Children attached one worksheet to the container for their wheat grains. It had a scale of different colours so children could measure the height reached by the majority of their

plants over time. The children recorded their results on a blank worksheet and displayed them for comparison across the class.



It is not difficult, I am sure we can do it, even if I never took care of plants...



Our cardboard sheets will be very nice if we color them.

Mine will grow faster as I understood how to take care of it.

- For the experiments to be scientifically done, I gave the children two worksheets, cardboard sheets, one with 11 coloured lines as reference and the other uncoloured, where they can register by colouring the sequences of the wheat growth. The photo below left shows the worksheets with each child name. On these individual worksheets children registered the wheat growth by colouring the same section as that on the sheet attached to each container, reached by the majority of the wheat plants.
- After discussing, children decided to make observations and measurements twice a week, to allow wheat to grow for 2-3 days.

**Stage 1 continued: Sowing the wheat grains.**

**Activity:** Children discuss and make decisions about how to plant their grains.

**Rationale:** This activity enabled children to come up with their own ideas. They were responsible for their own investigations.



Children prepared the containers. They are very engaged in this activity and happily are waiting for the wheat to grow...

**Children's responses**

The children are enthusiastic and express their ideas and worries..

**Reflections and implications**

Working in groups supports children in talking about their strategies and ideas



- dialogue and collaboration: even if the children work individually they promised each other to take care about the containers if some of them will be absent from school.
- Children were curious and motivated to look after their containers. After the preparation is finished they tried to find the most appropriate place for the future plants.

## Stage 2 – Observing and measuring (gathering evidence)

**Activity:** Each day over two weeks children observed and measured their own plants . They used their observations to make hypotheses about the future development of the wheat and discussed what they might need to change to make their plant grow better.

**Rationale:** The purpose of this activity was to encourage children to observe plant growth closely and begin to suggest connections between how well the plant grew and the decisions they had made, for example related to water, light and temperature.

### Children’s responses

The children discussed and shared their ideas about what their plants needed to grow well. The children were excited to record and discuss the growth of their plants.

### Reflections and implications

It will be important to encourage children to discuss what they notice and suggest ways to improve the growth of their plants.



I know how much water my wheat needs. Teacher said until the soil is shiny ...

Children make hypothesis about the future development of the wheat on the basis of how the plants look like or according to their prior knowledge. They discussed their opinions. I encouraged them to formulate the questions as well as the answers.

Measurements were done twice a week on Monday and Thursday. Children did this with care for the plants and with a high sense of responsibility when numbering the coloured lines and colouring their own worksheets.

I could observe that the children permanent observation on their wheat growing helped their understanding and the ability to make connections.

This activity fostered also reflection and reasoning because by looking to their peers containers children could see the differences in the plants development: some are higher than the others, some are getting yellow, some are getting bent, etc.

I would like to add one more colour, can I?



I am really happy about my wheat. It grows nicely. I can draw now the 8<sup>th</sup> coloured line.

## Reflections

### Children's progress

- Every morning children went to the "Science corner" to see what the wheat looked like. They were very **motivated** by seeing the results of their work and showed involvement in this inquiry activity.
- Children tried to **solve problems** that appeared in time as they observed some plants turning yellow and bent. They expressed **some hypotheses** about why this happened. I also helped with some ideas, and finally I let them **choose their own solutions**.
- Children's **curiosity and their involvement in their observations** was shown also by **many questions they asked**: *What are the little white fibres in the soil (wheat roots)? How high the wheat will grow? What about the wheat kept in the dark, will it still have the yellow colour or it will turn to green if we put it in the sun?* They **tried to find the right answer by themselves**.
- Through **reflection and critical thinking** children took decisions for **solving their problems**. For example they moved the containers as close as possible to the window for the wheat to have much light (when they observed that the wheat in the container kept in dark was shorter than that kept in light).

### Unanticipated outcomes

- Many children were doing **parallel observations at home** too, where they prepared a similar container and involved also their parents in the investigative work.
- At the end of the activity when the wheat was higher than our measuring cardboard sheets, the children proposed to transfer it into the school garden.

### Children's reflections on their learning

- The children **came up with the conclusion** that is not so difficult to grow plants, but you have to know how to do it (reference to needed conditions: light, water, etc)
- Some **expressed the wish to repeat the investigations** with other plants. One child said: When I shall go to my grandmother's village I shall teach her how to sow the wheat...

### Teacher role

- **My questioning** was important to important in fostering sharing and **discussion of ideas and strategies**.
- Encouraging children to check the growth of the plants every day promoted interest and ongoing **reflection and reasoning** about the best conditions for growth

### Reflection on other aspects of the spider that contributed to children's inquiry and creativity

- The **assessment** of the activity was a discussion with the whole group. The children could learn also from their peers' opinions and comments and by comparing the results of their work.





- I plan to use **other locations** too, not only the classroom, and extend this activity with visits at museums and farms.

#### **Next steps for learning and teaching based on evidence of learning.**

- Considering my experience and the children's motivation I am confident that I can use inquiry for some other science lessons that will lead undoubtedly to the increased creativity of children.
- My future plans are to help children to **ask questions** as I observed that they offer many opportunities to foster children's creativity and investigative skills; they make children to think.

#### **Reflection questions for the reader**

- How do you encourage children to share their ideas and questions?
- What opportunities do you provide for children to discuss the results of their investigations?
- In what ways do you make links with children's experiences outside school?



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