Learning Journey: The Plant and Butterfly Cycles

Age: 5-6 years old
Learning Activities: Designing investigations; Gathering and recording evidence; Making connections; Explaining evidence.
Creative dispositions: Curiosity; Ability to make connections; Motivation; Thinking skills
Synergies: Play and exploration, Motivation and affect, Problem solving and agency
Contextual factors: Grouping

Background Information

School setting: Suburban Private kindergarten.

School policy for science: Encouragement of inquiry-based approaches in science education.

Curriculum links:

The engagement of preschool children with science contributes to the development of:

1. Children's curiosity and intrinsic motivation
2. Scientific literacy
3. Positive attitudes to science

Setting the Scene

Focus

The focus of this project was for me (the teacher) to develop strategies to give children the ability to **design their own strategies for solving a problem**.

Rationale

Taking into account my focus and having recorded observations about "how children learn", I wanted **to motivate children to participate and empower groups to solve their own problems**. Given that children love experiential-active learning, I have used new educational strategies to encourage **curiosity** about **scientific inquiry** and to plan activities both outside the classroom and inside, having the ultimate goal of each child to be challenged to design his/her strategy and reach the limits of his/her own abilities.

Implications for my planning and teaching

Encouragement of children's emotional engagement in learning, increase of motivation and interest, positive climate in the group and progressive association of abstract language with daily communication.

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Outline of learning activities and resources

Starting points

Free play in the school's garden was the starting point for:

- observation;
- the emergence of questions and interests of children about the cycles of plants and butterflies.

Learning journey

- Discussion in plenary with a view to the emergence of previous knowledge.
- Brainstorming of ideas and suggestions for new investigations, and extension, clarification and understanding of the issue.
- Identification of priorities.
- Definition of mode of work (creation of sub-groups), cooperative process.
- Definition of a timeframe within which the investigations will be completed.
- Materials, equipment required.
- Recording of questions to determine the course of activities.

Developing the learning journey: The Plant's Cycle

Starting points 1

Activity: What do kids want to do to understand about the development of a plant?

In plenary, children exchange their views, their ideas and write in their own words on the web their own learning needs and activities that involve them.

Rationale

The rationale for the activity was to focus on what we will do but also on the way we will work.

We agreed that both sides (teacher - children) will say what we think, ask questions, give ideas and make suggestions to solve the issues that will concern us.

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Children's responses

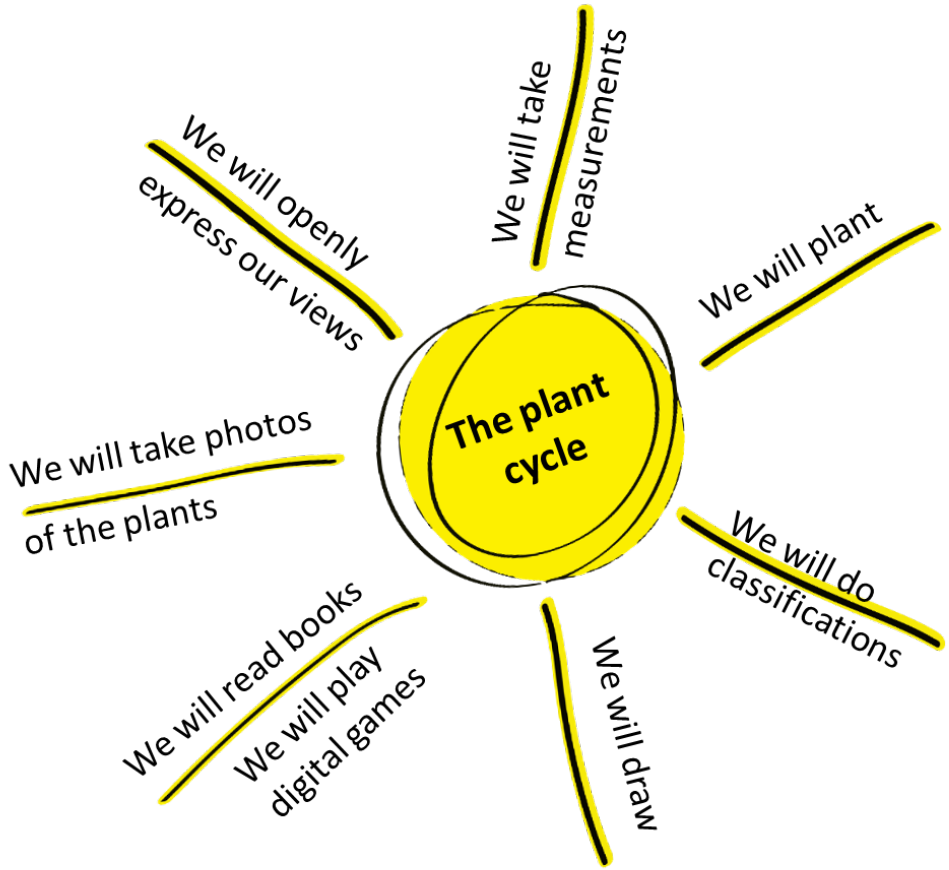

Figure 1: Children identify activities to do

Reflections

Creation of incentives, emotional engagement and exploration games.

Changing classroom practices can bring change in learning outcomes.

Starting points 2

Activity: How can children perceive the development of a plant?

- The planting process in the garden flower beds began in small groups.
- Exchange of ideas on the process' progress.
- Recording of ideas about the stages involved (raking – weed clearing – grooves – opening of small pits – planting – watering).

Rationale:

The purpose of the activity was for the children to define the course of the activities.

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Children's responses

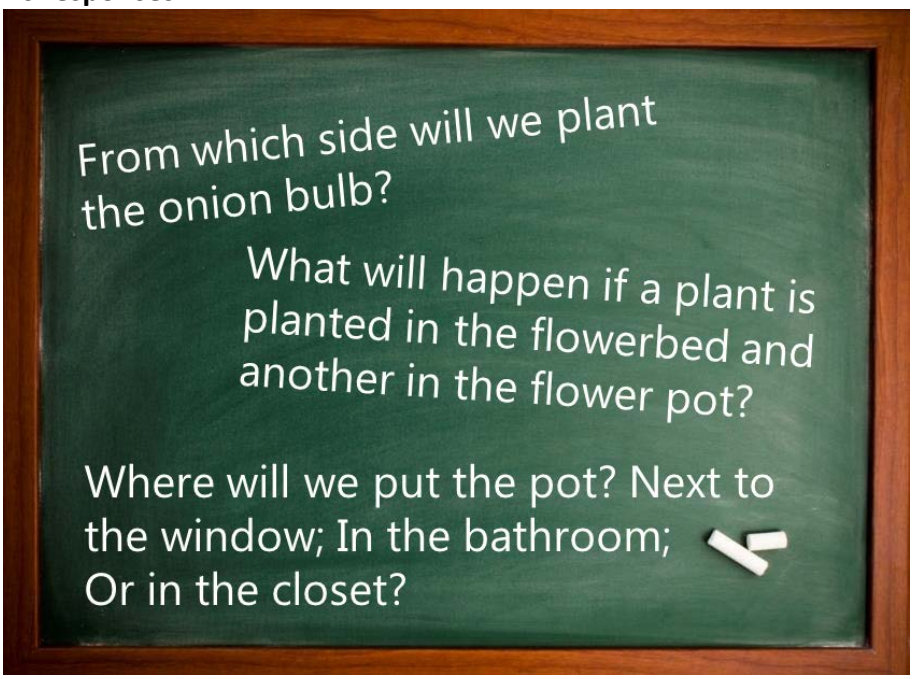

Figure 2: Examples of children's questions

Reflections and Implications

Children's **creative dispositions** develop when they set themselves the priorities. **Making meaningful connections**, are at the heart of learning.

Developing the learning sequence

1 Gardeners in action: planting in flower beds

Photo 1: Children planting in flower beds

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Photo 2: Children labelling and watering their plants

2 Gardeners in action: planting in pots


Photo 3: Children planting in pots outside the classroom


Photo 4: Children planting in pots inside the classroom

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3 Investigations and predictions

Activities:
In small groups children exchange their views about potential variables (light, water, air)

Rationale
The purpose of the activity is for the children to develop **'scientific way' of thinking** through hands-on activities that make sense for them.

Children's responses

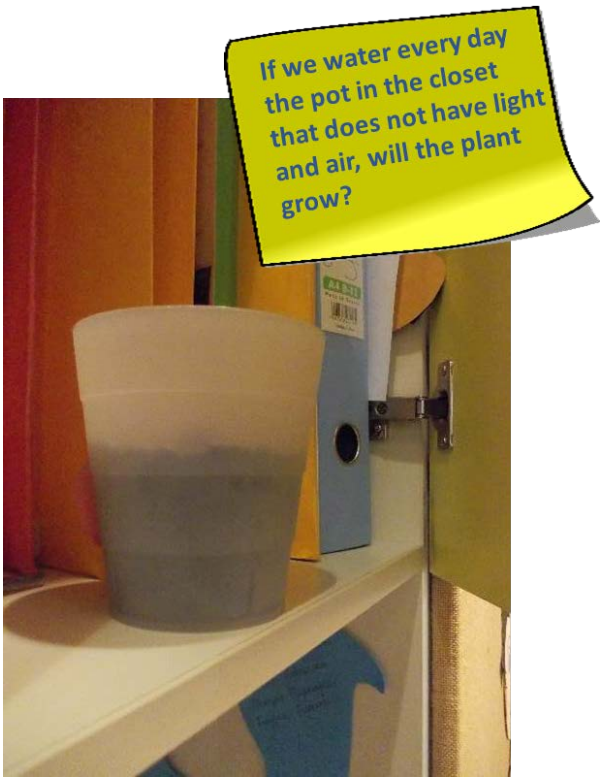

Photo 5: Examples of children's investigations to find answers to specific questions they themselves posed

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Reflections and Implications

Reflection and reasoning from the group members.

Formative assessment does not only affect children's learning but also their self-esteem.

4 Measurements of plants - Conclusions

Activity:

We measure the development of our plant and capture it by making our own drawing.

Rationale

The purpose of the activity was to collect data on the development of the plant and record our conclusions.

Children's responses

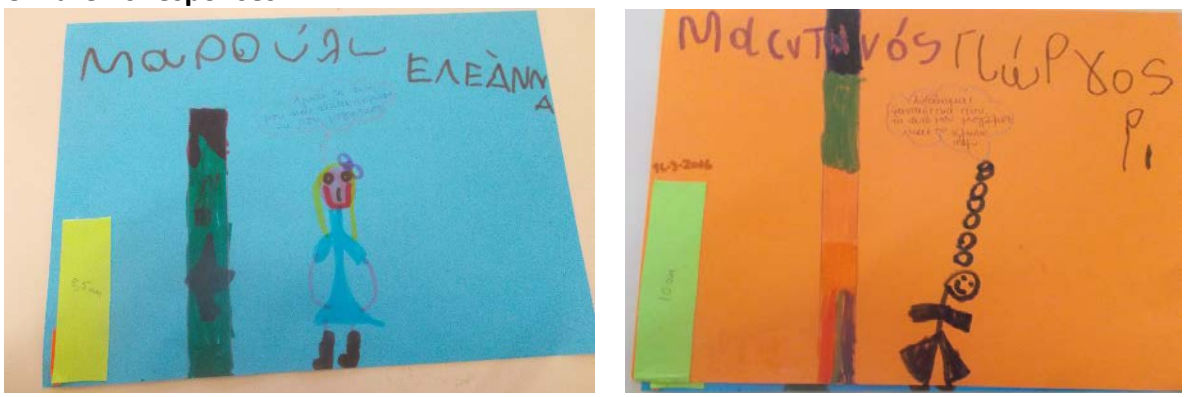

Photo 6: Examples of children's individual drawings of their plants growing

Photo 7: Examples of children's drawings showing the factors the affect a plant's development

Reflections and Implications

Individual work of children with the aim to present in plenary.

Assessment of the factors that affect the development of plants.

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Developing the learning journey: The Butterfly Cycle

Starting point 1

Activity: What do kids want to do to understand the butterfly cycle in practice?

The butterflies which came to the garden of the school provided the trigger for an exchange of views in the classroom.

Rationale

The rationale behind the activity was to work in the same way we worked with plants. The investigations will again be based on questioning, making hypothesis, trying things out and planning strategies to solve a problem and draw conclusions.

Children's responses

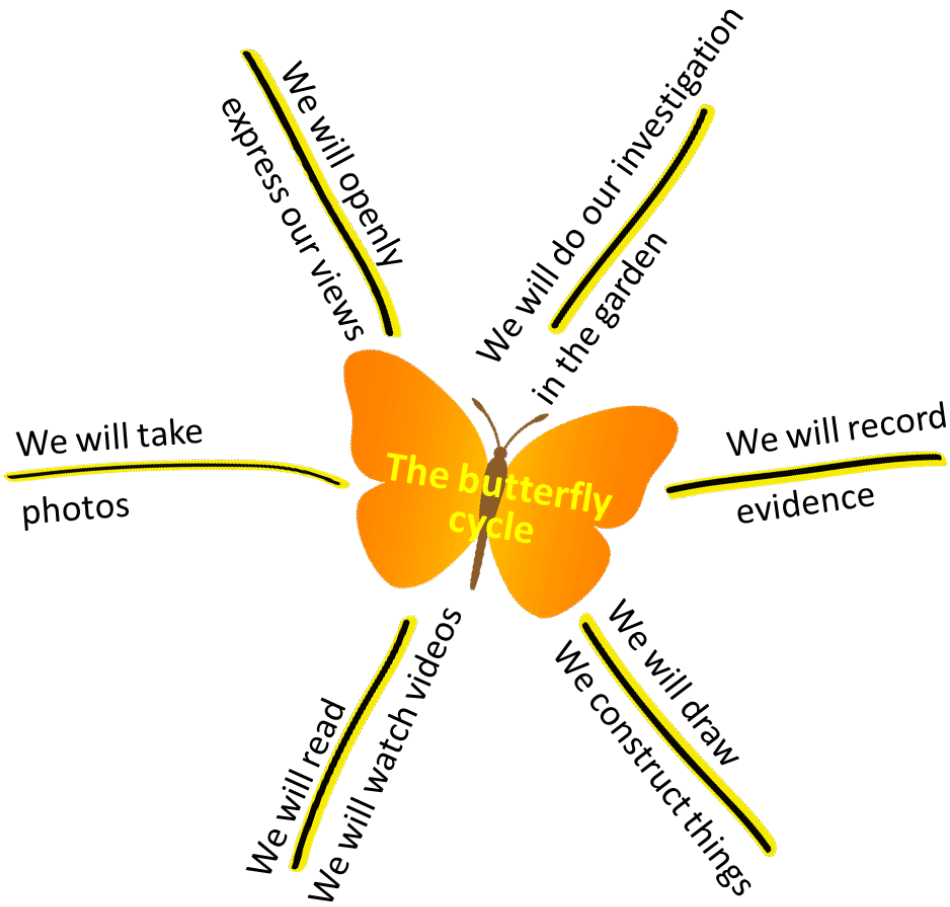

Figure 3: Children identify activities to do

Reflections and Implications

Play and exploration, dialogue and collaboration, children's agency.

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Starting with the initiation of scientific thinking from an early age, we achieve better understanding in the later more "scientific teaching". (Eshach 2006)

Starting point 2

Activity: How is a butterfly born and growing?

Using technology to research the issue as it cannot be covered by observation alone. Watching in the plenary of the video "The monarch butterfly" and reading the story "A very hungry caterpillar" by Eric Carle.

Rationale

The development of educational interventions for understanding of the immediate environment provides opportunities for children to formulate hypotheses, explanations and causal relationships about the functioning of the world around them.

Children's responses

Figure 4: Examples of children's questions

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Photo 8: Examples of children's drawings showing understanding of butterfly cycle

Reflections and Implications

Motivation for inquiry. **Questions** and **curiosity** about the issue.

To think, you first need to know.

Knowledge is built through evidence.

1 Factors affecting the life of a butterfly

Activity: **What are the life conditions of the butterfly?**

Small group inquiries in the garden of the school. Investigation – recording of results – drawing of conclusions.

Rationale

The purpose of the activity is to investigate the life conditions of the butterfly.

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Children's responses

Photo 9: Children exploring the factors affecting the life of a butterfly

Reflections

Assessment of the factors that affect the life of a butterfly.

The **inquiry model** in the teaching process promotes the child's **critical thinking**.

2 Recording evidence - Conclusions

Activity: **What are the life conditions of the butterfly?**

- Butterflies love the sun and the warm weather.
- We noticed that the days with air and clouds the garden never had butterflies.
- They like to sit on the aromatic plants (lavender, dill, parsley) and the flowers in bright colours.

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Children's responses

Because we did not manage to take pictures of true butterflies, we made our own.

Photo 10: Children's hand-made butterflies

Reviewing learning across the project

Through the course of our activities, children have had the opportunity to explore; were given incentives which strengthened their interest and **motivation** and had had **opportunities for dialogue and collaboration**. The formulation of **questions**, the **testing** and **exploitation of errors**, as well as the carrying out of iterative cycles of **investigation**, were the best strategies for **solving the problems** that arose.

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Photo 11: Examples of children's work

Overall Reflections

Children's progress

Child 1 (M.)

M. helped the team, made systematic observations, recognized recurring patterns, made predictions, but sometimes wanted more time than she had at her disposal.

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Photo 12: Child 1

Child 2 (A.):
He made clear open questions, had personal motivation and emotional involvement with the issues. He showed great interest in the action, but he needed more practice in communication to tame his leadership tendencies and become an equal member of the team.

Photo 13: Child 2

Child 3 (I.):
Despite her introvert character, she demonstrated organizational and methodical abilities and surprised the team with her targeted observations and strategies for problem solving.

Photo 14: Child 3

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Review of children's progress

Children through **Play and Exploration**, **Questioning** and **Curiosity** had the opportunity to develop a sense of interest in nature and the environment and to cultivate the sense of being part of it. The systematic involvement of children in activities has resulted in the development of positive attitudes towards science as well as in their empowerment through collaboration in small groups. Children's agency in defining their own strategies in solving problems has been significantly enhanced.

Children's responses

Children made targeted comments and represented their new knowledge with **drawings** and **constructions**.

Teacher role

Action research creates incentives for redefining the learning process. My role as the teacher was that of the co-creator of knowledge, the facilitator, the coordinator and the animator. Important factors were also my organization and discreet guidance of children's learning so that they could reach new knowledge and reflect on what they had learned.

Classroom environment

Other aspects of the spider web that contributed to children's inquiry and creativity:

- **Location**: activities outside the classroom
- **Grouping:** working in groups of 4-5

Unexpected results

The weather conditions were not always favorable, but they gave the opportunity to find alternatives within the classroom, but also to make valuable conclusions about the issues we were investigating. For example, on rainy days plants do not need watering, and also on rainy days there are no butterflies in the garden.

Next steps for learning and teaching

A key point is the conclusion that changing classroom practices causes changes in learning outcomes. It is therefore necessary to strengthen and maintain this change

Reflection questions for the reader

- In what ways would you support children's understanding of plants' growth cycle?
- How could you help children recognise and talk about the scientific inquiry processes and skills they are developing when problem solving?

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