Agnetencollege Peer

STEM-project

T³ VLAANDEREN

Woodlice biotope

Teacher's bundle

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T³-Flanders en T³-Netherlands

Evelyn Blocken, Ann-Kathrin Coenen and Natalie Dirckx are science teachers at Agnetencollege Peer. They also belong to the teacher network of T³ Flanders that works closely with the Netherlands. T³ stands for Teachers Teaching with Technology. The goal of this organization is to promote the professionalization of teachers in the field of ICT and technology in education using technology from Texas Instruments.

Figure 1:
www.t3vlaanderen.be

Introduction

In the first grade in Flanders students have already learned about the classification of organisms and drawing a food web during science classes.

In the second grade students go deeper into the classification of organisms during biology classes and also learn that each organism has a habitat suitable for it, a biotope. The relationship between matter and energy flows in an ecosystem is further discussed in the carbon and nitrogen cycles. The food web also returns in second grade with students learning to discuss food relationships.

This STEM project can thus be linked to many goals within the second grade science curriculum. It can be done either during biology classes or as a STEM assignment. Depending on how much time is available, you can choose which lesson sheets are covered. This allows the teacher to differentiate depending on the group of students in front of him/her.

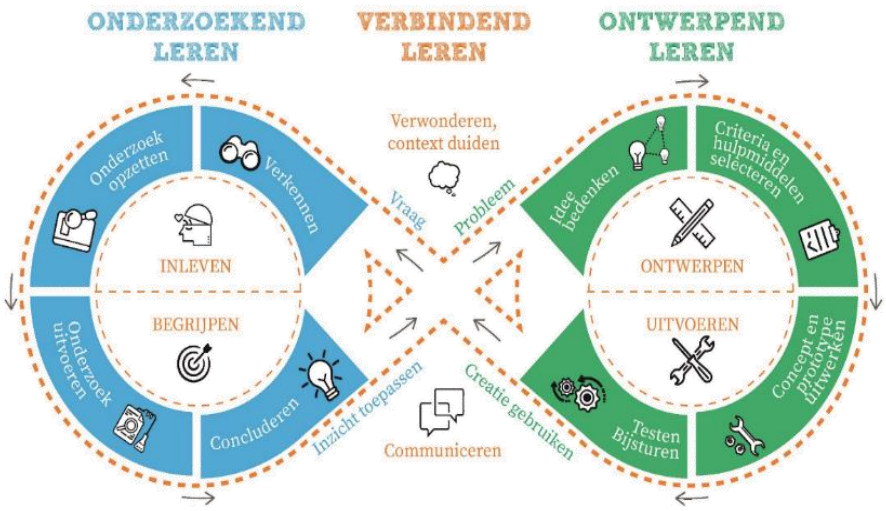
These lesson sheets are a defined unit, which students can complete within one lesson hour. This also makes it clear to the student what is expected of him/her within one lesson time. Moreover, at the end of this lesson, direct feedback can be given by the teacher on this unit with the aim of closely monitoring and directing the student's learning process.

Associated with each of our STEM projects are general goals that we expect students to master by the end of the second grade. By spreading these general goals across the various STEM projects, we try to shift the focus in each project to a different aspect of scientific research. For example: learning to formulate research questions, learning to look up information from sources, drawing up one's own working method for an investigation, clearly displaying measurement results, ...

The overall goals for this study are:

- Looking up information from sources
- Learning to formulate a research question
- Working in a lab with organisms
- Making graphs

This project is structured according to the STEMOOV model. First, students will go through the investigative component using a literature review and experiments. After this, they will go through the designing part in building the woodlice biotope.



How do we address this in our lessons?

The shared student bundle contains all the lesson topics as one continuous bundle. However, we have chosen in our STEM lessons to break it down into lesson sheets. This way, students can review what is expected of them per lesson and what assignments need to be completed.

We offer the lesson sheets together with all the necessary material in a learning path. This learning path contains per lesson the necessary documents, weblinks, bookwidgets and upload zones. This provides a clear structure for both students and teacher.

Since we believe that the student goes through a learning process within a STEM project, no scores are assigned to the bookwidgets and documents. In addition, their knowledge on certain topics is also already evaluated within the directional subjects. Assignments are reviewed and feedback is shared. Accuracy of completion does factor into the teacher's assessment.

The survey

Students are introduced to the project using the following problem statement.

In the lab, Professor Marijns is at her wit's end. She is a professor of biology and is looking for woodlice to start her research in January. She wants to investigate whether these animals can help with composting in greenhouse farming. If they can help make the soil more fertile, then greenhouse production could increase. So to do this, the professor needs woodlice and more importantly ...

She needs terrariums in which she can make her woodlice live in the lab. Such a terrarium should be a perfect home for the woodlice. However, the professor's assistants are abroad on another research assignment. She herself has no time to build perfect terrariums. She now asks for your help to research how to build a woodlouse terrarium to give the woodlice an ideal home, where they feel happy and have enough to eat during her research.

Prof. Marijns wishes you the best of luck in creating a monitored terrarium!

Ideally, students should be divided into groups of 3 to 4 students.

The schedule

The study is structured according to the following schedule:

- Lesson 1: introduction + exploring
- Lesson 2: exploring + setting up the research
- Lesson 3: testing the environmental factors
- Lesson 4: process the data and conclusion + brainstorm on the biotope
- Lesson 5: building the biotope

Lesson 1 introduction and exploring

In the first lesson, students are introduced to the project and divided into groups. In doing so, they form a hypothesis on the following research question:

“What does the ideal biotope for woodlice look like?”

After this, they start exploring the research using a literature review. This bookwidget is available through the following teacher link.

Figure 2: Woodlice

Lesson 2 exploring and setting up the research

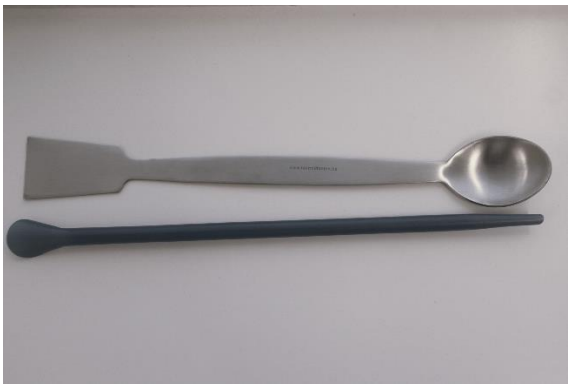
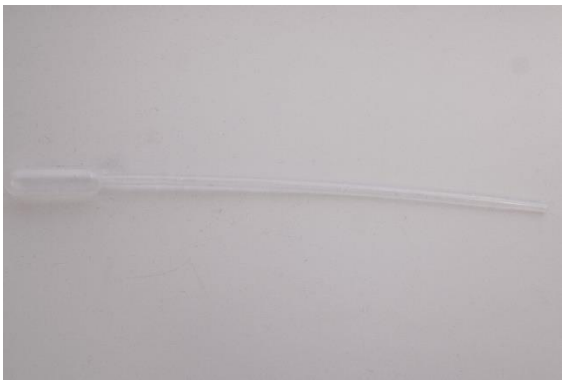
From the literature review, students already know more about the woodlouse and its habitat. In this lesson, they will continue the exploration. The food web will be drawn and a woodlouse will be determined. The determination can be done via the following search card.

Afterwards, they will set up the investigation for the next lesson. The found knowledge of the woodlouse is first compiled in the form of keywords. This can be done either in each group or in class. Four key environmental factors should be revealed, namely temperature, humidity, light intensity and soil type. In the next lesson, students will investigate these. In preparation, students will prepare a sub-question for each environmental factor.

Lesson 3 testing the environmental factors

In this lesson, the research will be conducted. The procedure for each experiment can be found in pdf format at the following link. The supplies are listed below, a clarifying image has been added where necessary.

Students can record their observations in the following excel document.

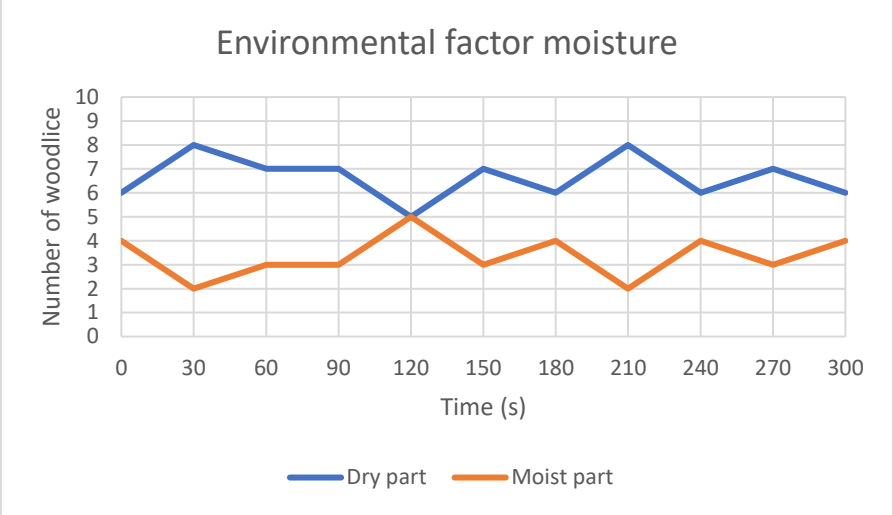
	
Petri dish	Filtration paper
	
Spatula/spoon	Pasteur pipette

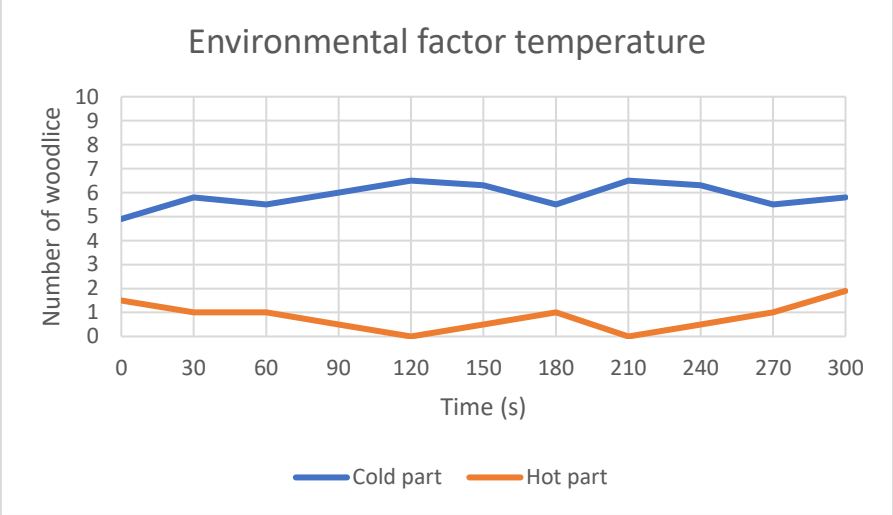
	
Humus (forest soil)	Sandy soil

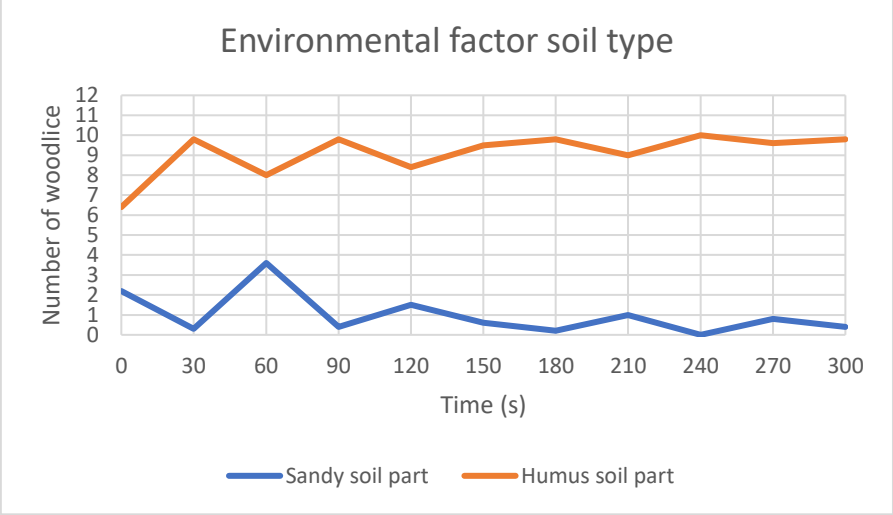
Other supplies:	
Measuring cup	Scissors
Dark plastic bag (garbage bag)	Woodlice
Ice cubes	Pencil
Stopwatch	Hot and cold water

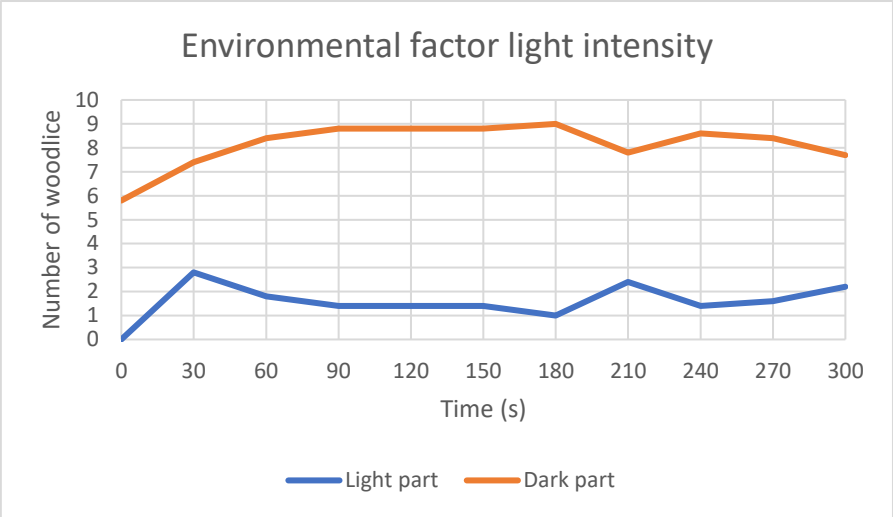
Lesson 4 process the data and conclusion + brainstorm on the biotope

To form a conclusion, the results must first be processed. All results are collected and shared with students who create graphs from them. A model example of these graphs is attached below. From these graphs a conclusion and answer to each sub-question is formed.









Using these results, students build their biotope. They brainstorm the necessary materials and make a sketch.

Lesson 5 building the biotope

Finally, the biotope is built. Students are responsible for bringing their own materials from which to build their biotope. The teacher provides only the plastic boxes in which each group may build his/her biotope. Along here is a picture as an example of a finished biotope.

Figure 3: a biotope built by students

Evaluation

Evaluation of the project will also take place during lesson 5. Students will evaluate their own (30%) and a peer (20%) for the predetermined goals using a bookwidget rubric. The teacher's evaluation will count for 50% of the points. Here it is important that students be honest during this evaluation. If their score differs too much from the teacher's score, their score may not count towards the final result.