LOESS INTEGRATED LEARNING SCENARIO TEMPLATE

Introduction

In LOESS, the acquisition of soil health knowledge is facilitated using integrated STEM teaching and learning, which is carried out via the Biology Science Curriculum Study (BSCS) 5E Instructional Model by Bybee and colleagues (Bybee et al. 2006) as well as the application of innovative pedagogical approaches (PBL, IBL, etc).

Keywords

Soil, STEM, Inquiry-Based Learning, Environment, Early Childhood Education

Title

"Digging Into Soil: A Hands-On STEM Adventure!"

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Summary

This learning scenario introduces young learners (ages 4-6) to soil through a STEM-integrated, inquiry-based approach following the BSCS 5E model. Students will explore soil components, understand its importance for plants and the environment, and conduct hands-on experiments. Engaging activities will encourage curiosity, critical thinking, and collaboration.

Subject(s)
Real-life questions

-Science (Earth Science, Biology)
-Technology (Using simple digital tools for exploration)
-Engineering (Building simple soil models)
-Mathematics (Sorting, counting soil components)
-Real-life questions:
-What is soil made of?

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-Why do plants need soil to grow?
-How does soil help our environment?

Learning objectives

-Identify different components of soil (sand, clay, silt, organic matter).

-Understand why soil is important for plants and the environment.

-Conduct simple hands-on experiments to observe soil properties.

-Develop basic problem-solving and observational skills through guided exploration.

Link to curriculum

This scenario aligns with early childhood science and environmental education standards by fostering exploration, observation, and hands-on experimentation. It also supports UN Sustainable Development Goal 15: Life on Land by promoting awareness of soil conservation and plant growth.

Age of students

4-6 years old

Time

Preparation time: 15-20 minutes
Teaching Time: 3 sessions, 30-45 minutes each

Teaching resources (materials & online tools)

Soil samples (garden soil, sand, clay, potting mix)
Magnifying glasses
Small shovels or spoons
Water droppers
Clear plastic cups
Seeds (bean or grass seeds)
Printable worksheets (coloring, matching activities)
Digital microscope (if available)

STEM Strategy Criteria

Elements and criteria	How is this criterion addressed in the learning scenario?

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Elements and criteria	How is this criterion addressed in the learning scenario?
Instruction	
Personalisation of learning	The learning scenario is entirely based on the personal needs of the age group 4-6 years old students with various adjustable activities.
Problem and project-based learning (PBL)	“Soil and water test” -lesson 2
Inquiry-Based Science Education (IBSE)	"Soil Exploration Walk"-lesson 1
Curriculum implementation	All the activities and goals are allying with the Greek Kindergarten Curriculum
Emphasis on STEM topics and competencies	
Interdisciplinary instruction	In this Learning Scenario, we will examine and implement a variety of activities by connecting Science with math and environmental education as well as socio-cognitive skills.
Contextualisation of STEM teaching	
Assessment	
Continuous assessment	In this learning scenario we implement continuous assessment by engaging our students to questions, decisions and feedback.
Personalized assessment	In this learning scenario we implement personalized assessment by providing each student with the pace ant time they need, create safe environment for personal growth and adjust assessment methods when nessesary
Professionalization of staff	
Highly qualified professionals	Local farmers or gardeners share insights about soil and plants in the final Wold soil Celebration Event.
Professional development	Study multiple resources and attending additional workshops- collaborate with local experts to create a better learning experience for the students.
School leadership and culture	
High level of cooperation among staff	School staff collaborating to co-organize workshops and events at school.
Inclusive culture	Activities are adjustable and easy to implement to special needs students.
Connections	
With local	Local farmers or gardeners share insights about soil and plants in the

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Elements and criteria	How is this criterion addressed in the learning scenario?
communities	Wold soil Celebration Event
School infrastructure	
Access to technology and equipment	School provides computers and electronic devices to help research information.
High quality instruction classroom materials	Yes

Description of activities

Name of activity	Procedure	Time
1st Lesson:		
5E Phase	**Engage**	
Brainstorming and discussion	**"Soil Exploration Walk"** Students will explore the schoolyard or garden, feeling and collecting different soil types in small containers. They will describe what they see and feel, engaging their senses.	20-30 minutes
Discussion and preparation for the next lesson	**Discussion Questions:** -What does the soil feel like? -What colors do you see in the soil? -Do you see anything living in the soil? **Annex 1-work sheet**	
2nd Lesson		
5E Phase	**Explore and Explain**	
Subject	**Science, Mathematics**	
"What's in My Soil?"	Students will examine collected soil samples using magnifying glasses. They will separate different components (rocks, roots, organic matter) and sort them into groups.	30 Minutes

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Name of activity	Procedure	Time
"Soil and Water Test"	Students will add soil to clear cups with water and observe how it settles into layers. This helps them see the different soil particles.	15 Minutes
Discussion Questions:	What happens when we mix soil with water? Why do some things float, and some sink? What do you think soil is made of?	15 minutes
3rd Lesson		
5E Phase	**Elaborate & Evaluate**	
Subject	**Science, mathematics**	
"Planting in Soil"	Students will plant seeds in different soil types (sand, clay, potting mix) and predict which one will help plants grow best. They will observe plant growth over time (Annex 6)	30 minutes
4th Lesson		
	To reinforce learning and celebrate **World Soil Day** (December 5th), an engaging event will be organized	Open School Day
"Soil Day Celebration" Event	"Soil Detectives" Station: Students use magnifying glasses to explore different soil samples and identify living organisms. "Grow a Plant" Activity: Each student plants a seed in soil to take home and observe growth. "Mud Art" Corner: Kids create paintings using different soil types mixed with water. "Soil Stories" Read-Aloud: Teachers read fun books about soil and worms. "Soil Science Show": A simple demonstration of how soil filters water. Parent & Community Involvement: **Parents invited to assist in activities.** Local farmers or gardeners share insights about soil and plants. A "Soil Pledge" where families commit to soil-friendly	5-6 hours Rotating through workshops 15 minutes each

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Name of activity	Procedure	Time
	actions (composting, planting, reducing waste). This celebration will enhance students' appreciation for soil and its role in sustaining life!	

Initial assessment

-Class discussion about prior soil experiences.
-Draw what you know about soil-work sheet annex 2

Formative evaluation

-Sorting activity (students group soil components on a worksheet-annex 3

Final assessment

-Students explain their experiment results through a simple drawing or verbal presentation.
-Final Assessment Quiz (annex 4)

Student feedback

-Smiley face rating on how much they enjoyed the activities (annex 5)

Teacher feedback

-Noting student engagement and understanding for future lesson improvements.

Reflection on the development process

- My initial ideas came after studying world Soil Day site (https://www.fao.org/world-soil-day/en/) and completing the Soil education: an integrated STEM approach MOOC Modules resources.

- I have learned that the holistic approach is much more efficient to teach students at younger ages (4-6) so I have to adjust ideas and materials to complement my students needs.

- I didn't use many ready made resources and rather had to improvise and create my own as a kindergarten teacher to meet my students needs and create an efficient age appropriate LS for 4-6 year old students.

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Annex 1 – Discussion Questions

Discussion Questions

-What does the soil feel like?

-What colors do you see in the soil?

-Do you see anything living in the soil?

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Annex 2– What do we know about soil -Innitial assesment

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Annex 3– Formative evaluation_Sorting activity (students group soil components on a worksheet

Soil Components

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Annex 4– Final Assessment Quiz

https://gamma.app/docs/Soil-Science-Superstars-vpzd7cdgxh70c96

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Annex 5– -Smiley face rating on how much they enjoyed the activities

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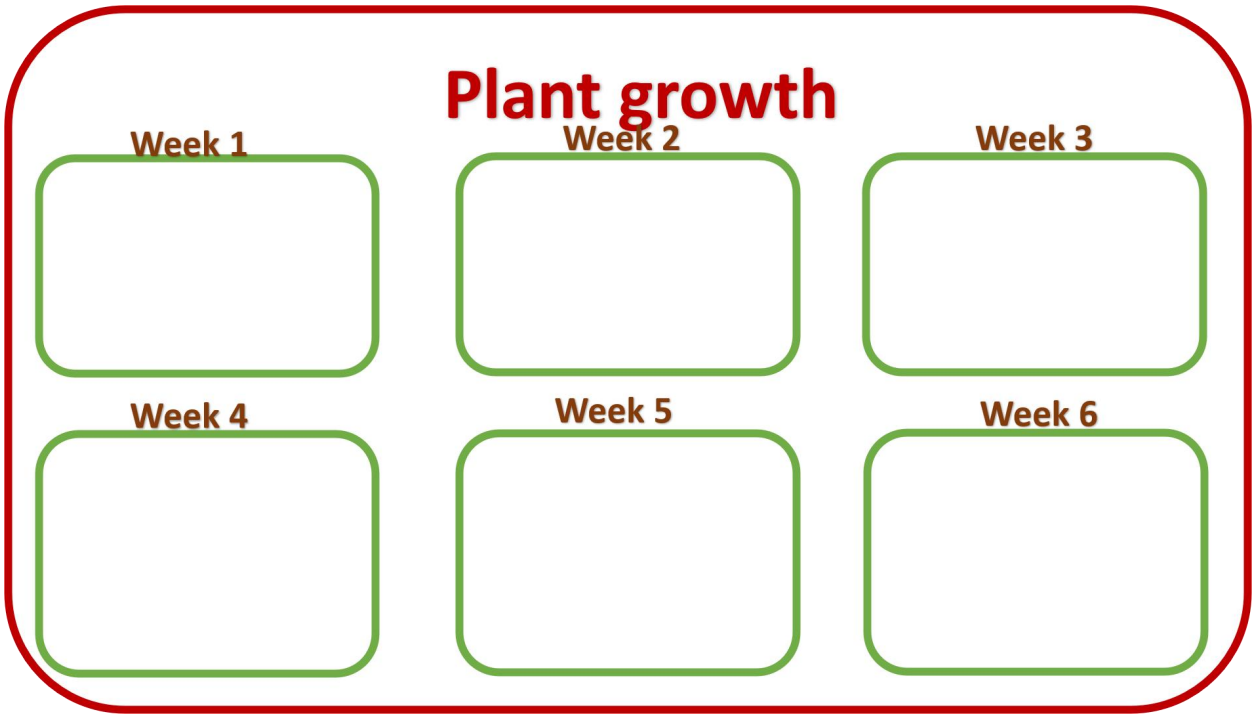
Annex 6– Plant Growth



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