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EED 480, Belgrad

Student Project-Based Learning Outlines

A. Title and Grade Level: Plants and Kindergarten

B. **BIG IDEA:**

*Why do plants need soil, water, and stems to live?*

*Where can we find the best plants?*

*Let's investigate the different things plants need to live.*

*Let's be engineers and scientists by planning and carrying out investigations.*

C. TASK A: We will investigate and observe what happens when seeds are planted in our school soil, rich compost, and sand.

TASK B: We will explore and discuss how plants drink water.

TASK C: We will observe and investigate why the leaves on a plant are so important.

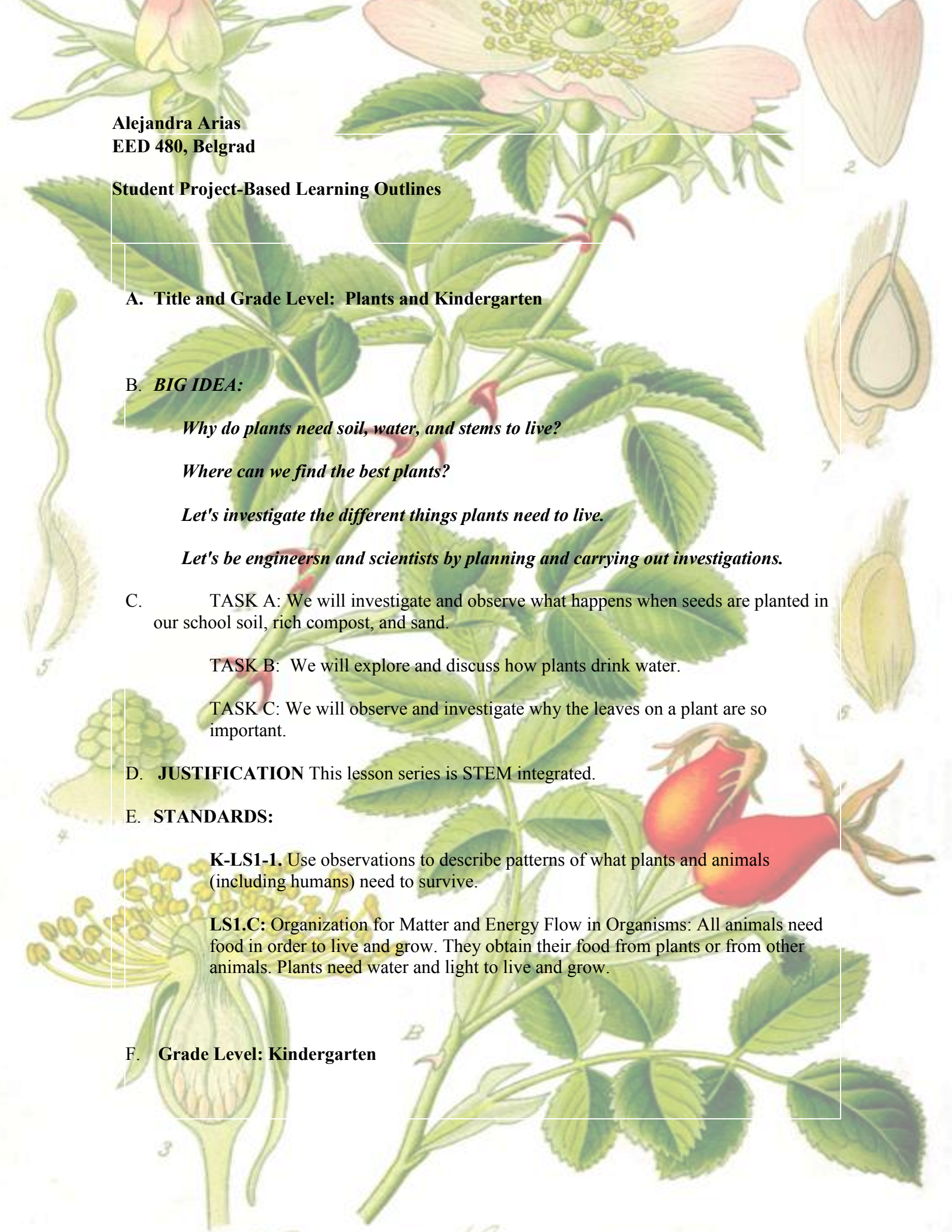
D. **JUSTIFICATION** This lesson series is STEM integrated.

E. **STANDARDS:**

**K-LS1-1.** Use observations to describe patterns of what plants and animals (including humans) need to survive.

**LS1.C:** Organization for Matter and Energy Flow in Organisms: All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.

F. **Grade Level: Kindergarten**



## G. Subject Area:

**SOCIAL STUDIES:** K.4 Students compare and contrast the locations of people, places, and environments and describe their characteristics.

**ELA/Literacy:** ELA/Literacy

W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-LS1-1)

## CCSS MATHEMATICS:

**K.MD.A.2** Directly compare two objects with a measurable attribute in common, to see which object has “more of”/” less of” the attribute and describe the difference.

## NGSS (Next Generation Science Standards)

### A. Disciplinary Core Ideas

#### **LS1.C: Organization for Matter and Energy Flow in organisms**

- All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K-LS1-1)

### B. Science and Engineering Practices

**Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.**

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-LS1-1)

**Connections to Nature of Science** *Scientific Knowledge is Based on Empirical Evidence*

- Scientists look for patterns and order when making observations about the world. (K-LS1-1)

### C. Crosscutting Concepts

#### **Patterns**

- Patterns in the natural and human designed world can be observed and used as evidence. (K-LS1)



# Day 1

## I. ENGAGING CONTEXT: Hook- Launch activity

1. Ask the students a broad question: What is dirt? Is some dirt better than others? How do you know which dirt is better?
2. Watch SciShow Kids Video: What is dirt? <https://youtu.be/f29mjed3bc>

## II. MEASURABLE OBJECTIVES

- A. As student thinking drives this lesson, students can pursue their own inquiry of exploring which types of “dirt” is the best to grow plants in.
- B. As the culminating activity of this PBL students will create a project or presentation that meets the objective of the Big idea.

## III. TOTAL TIME:

Launch Event- One: **Class Periods of 30 minutes;**

Building Knowledge- Two: 30 Class Periods: 6 minutes

Showing Knowledge (Claims and Evidence) 120 minutes  
Students develop and revise products and perform

## IV. Social Skills and or Habits of Mind to Engage/Assess

<input checked="" type="checkbox"/> Persistence	<input checked="" type="checkbox"/> Problem posing
<input type="checkbox"/> Decreasing impulsivity	<input checked="" type="checkbox"/> Drawing on past knowledge
<input checked="" type="checkbox"/> Empathic listening	<input checked="" type="checkbox"/> Application to new situations
<input checked="" type="checkbox"/> Flexibility in thinking	<input type="checkbox"/> Precision of language and thought
<input type="checkbox"/> Metacognitive awareness	<input checked="" type="checkbox"/> Using all the senses
<input checked="" type="checkbox"/> Checking for accuracy	<input type="checkbox"/> Ingenuity, originality, insightfulness and creativity
<input checked="" type="checkbox"/> Questioning	<input checked="" type="checkbox"/> Inquisitiveness, curiosity
<input checked="" type="checkbox"/> Employment of problem solving	



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V. Level of Voice Appropriate for Activity: **Super Team Task**

**Noise Levels**

	<b>SILENT MISSION:</b> Silent - No talking at all
	<b>TOP SECRET PLAN:</b> Quiet - Only you and a partner
	<b>SUPER TEAM TASK:</b> Normal - Just your table team
	<b>POWER VOICE:</b> Strong - Hear it across the room
	<b>BIONIC NOISE:</b> Loud - Only used outside



VI. **BSCS 5-E Framework**

**Engage:**

A. DIRECT INSTRUCTION: forming groups, assigning roles, describing roles and tasks

1. **Materials Manager/ Spy Tasks:** Make sure your team receives and uses the materials without spilling; If the team has a question following **Three Before ME** go to another team to answer your question [or see what they have learned.
2. **Checker's Tasks** - Make sure the time limits are observed. (20 minutes) Help others complete their tasks. Let instructor know when your team has completed the soil experiment.
3. **Recorder's Tasks:** Carefully observes and measures the amount of dirt, compost, and sand that is being placed in the pot. Carefully draws a picture to represent what went in each pot.
4. **Encourager/Observer' s Task** - Coach the team to persevere and stay together while sharing and turn-taking. Notice identify and record occurrence of team members' social skills and habits of mind.

(Observer records individual performance of each of their teammates)

**Checklists and Rubrics** provided for student goal setting and self-assessment; Peer Assessment (Team Performance Rubric) [Rate Your Mates]

**Explore:** We will use our inquiry skills of predicting (hypothesis testing) comparing and analyzing t which type of soil is the best for growing plants.

### **5 groups of 4 students**

**Explain:** As students complete the launch, inquiry, culminating activity they share...

- their prior knowledge about growing plants and how they might grow.
- observations and questions about why the different soil makes plants grow or not grow.

**Extend/Elaborate:** In their groups the students have opportunities to extend their knowledge and to elaborate on their ideas. The teacher provides a mini-lesson to extend student thinking and understanding. The teacher will provide the students with seeds planted weeks prior in sand, school dirt and compost to have students compare and contrast.

### **VII. Materials List**

- 16 small pots
- Grass seeds
- 5 cups of sand
- 5 cups of soil
- 5 cups of compost
- Water

### **Evaluate: (Assess):**

There is a formative and a summative assessment. Both of these ways to assess learning in this engaged portion of my PBL.

#### **Formative Assessment**

The first assessment is an individual formative assessment. In this assessment the students will be analyzing their predictions and results in the students' science journal. This will assess my students' original predictions and/or questions and compare it to the knowledge they acquired after doing the project.

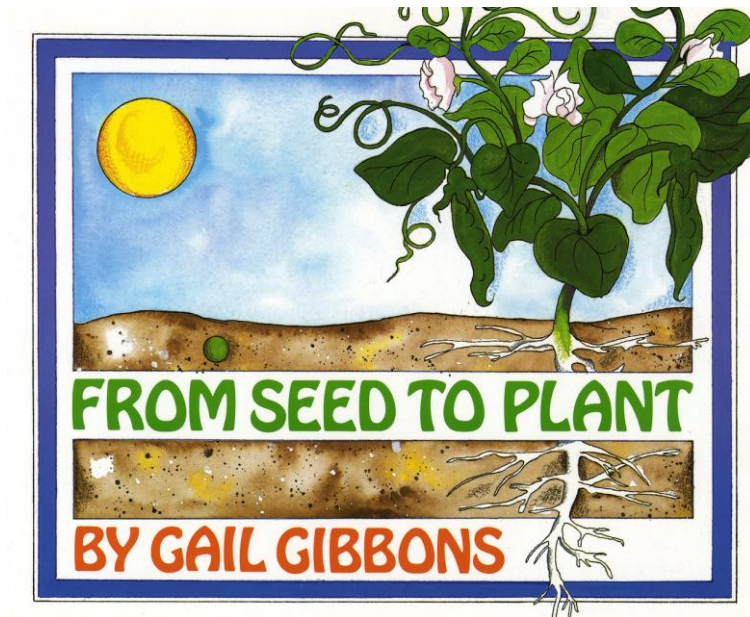
The students will also keep record in their science journal by writing a sentence and drawing a picture of how their pots are OR are not growing using a checklist.

## Summative Assessment

Poster and visual presentations where each group will come up and present how their seeds grew in the different soils. The students will use elements of art to draw a visual representation of each pot to help them to describe their results to their peers.

Children's Literature that Supports the PBL:

From Seed to Plant by Gail Gibbons



## Day 2

### VIII. ENGAGING CONTEXT: Hook- Launch activity

- Big driving question: How do you think that a big tree like an oak tree gets water to all the tree-tops?
- Make a chart: How do trees drink water?
- Show video, “How Do Trees Transport Water from Roots to Leaves?” [California Academy of Sciences]

### IX. MEASURABLE OBJECTIVES

A. As student thinking drives this lesson, students can pursue their own inquiry by learning that stems take in water and help the plant grow.

B. As the culminating activity of this PBL students will create a project or presentation that meets the objective of the Big idea.

### X. TOTAL TIME:

**Launch event-One:** Class Periods of 30 minutes;

**Building Knowledge:** Two- 30 Class Periods; 60 minutes

**Showing Knowledge** (Claims and Evidence) 20 minutes  
(Students develop and revise products and or performances)

### XI. Social Skills and or Habits of Mind to Engage/Assess

[ X] Persistence	[X] Drawing on past knowledge
[ X] Decreasing impulsivity	[X] Application to new situations
[ X] Empathic listening	[ X] Precision of language and thought
[ X] Flexibility in thinking	[ X] Using all the senses
[ X] Metacognitive awareness	[ X] Ingenuity, originality, insightfulness and creativity
[ X] Checking for accuracy	[ X] Inquisitiveness, curiosity
[ X] Questioning	[ X] Enjoyment of problem solving
[ X] Problem posing	

### XII. Level of Voice Appropriate for Activity: SUPER TEAM TASK

## Noise Levels

	<b>SILENT MISSION:</b> Silent - No talking at all
	<b>TOP SECRET PLAN:</b> Quiet - Only you and a partner
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### XIII. **BSCS 5-E Framework**

#### **Engage:**

- B. DIRECT INSTRUCTION:** forming groups (same groups from task A), assigning roles, describing roles and tasks

**Materials Manager/ Spy Tasks:** Make sure your team receives and uses the materials without spilling; If the team has a question following Three Before ME go to another team to answer your question [or see what they have learned]

**Checker's Tasks** - Make sure the time limits are observed. Help others complete their tasks. Let instructor know when your team has completed the project.

**Recorder's Tasks:** Carefully observes and provides illustrations for the experiment as it is being carried out. The recorder completes the team's analysis page to represent what the team is doing.

**Encourager/Observer' s Task** - Coach the team to persevere and stay together while sharing and turn-taking. Notice identify and record occurrence of team members' social skills and habits of mind.

(Observer records individual performance provides the teacher with students in their team that have been doing an excellent job.)

**Checklists and Rubrics** provided for student goal setting and self-assessment



Peer Assessment (Team Performance Rubric) [Rate Your Mates]

**Explore:** We will use our inquiry skills of predicting (hypothesis testing) comparing and analyzing to:

**5 groups of 4 students**

**Explain:** As students complete the launch, inquiry, culminating activity they share...

their prior knowledge, observations and questions about how plants can drink water and how the celery may change depending on the different color water.

**Extend/Elaborate:** In small groups and in the final performance students have opportunities to extend their knowledge and to elaborate on their ideas. The teacher provides further examples of how plants drink water as needed to scaffold student thinking and understanding.

#### XIV. **Materials List**

- A Stalk of Celery
- Red, Blue, Green, and Yellow Food Coloring
- 5 Tall Clear Cups with 3/4 of water
- Plastic knife

#### **Evaluate: (Assess): Day 2**

There are several formative and summative ways to assess learning in this engaged learning PBL.

The first is in the individual \_\_\_\_\_ that show students' original predictions and/or questions they have . . .

#### **Draw conclusions. Communicate results. (Day 2) –**

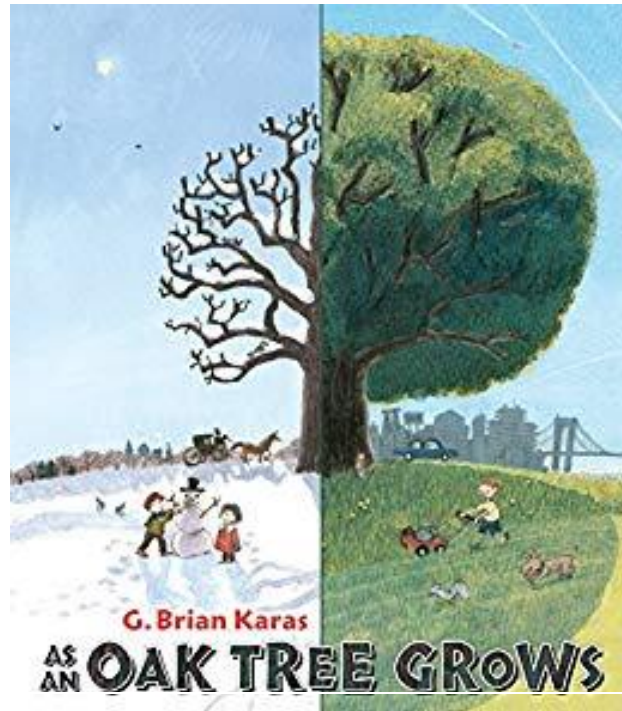
On the next day, students observe the celery. Use a plastic knife to cut the bottom of celery about 1 inch, so they can see how the food coloring has travelled through the stem. Have them record their findings on their lab sheet.

Each group is then given an opportunity to share their findings with the class. It is important that students share what they know about how the water defied gravity by telling or showing others the bottom and top of their celery stalk. This permits them to work on the science process skill, communicate.

Then display images of trees pulling water (and nutrients) from their roots (ground water) to their branches and leaves.

**Formative Assessment of Non-Cognitive Factors:** Self Assessment Using the Habits of Mind Check Sheet and Write-up Form (Google Docs).

Children's Literature that Supports the PBL:



## Day 3

### XV. **ENGAGING CONTEXT: Hook- Launch activity**

(On Day 1 of the PBL unit the teacher would have torn the leaves out of a plant.)

Display a plant that has a few leaves on it. Ask the students why they think that this plant looks sad when compared to other plants. Allow students to come up and look at the plant.

Make a chart of the possible predictions for the plant's appearance.

Watch video: Photosynthesis <https://youtu.be/yHVhM-pLRXk>

### XVI. **MEASURABLE OBJECTIVES**

A. As student thinking drives this lesson, students can pursue their own inquiry of why plants need their leaves to survive.

B. As the culminating activity of this PBL students will create a project or presentation that meets the objective of the big idea which is to investigate the different things plants need to live.

### XVII. **TOTAL TIME:**

**Launch event-One:** Class Periods of 30 minutes;

**Building Knowledge:** Two- 30 Class Periods; 60 minutes

**Showing Knowledge** (Claims and Evidence) 20 minutes  
(Students develop and revise products and or performances)

### XVIII. **Social Skills and or Habits of Mind to Engage/Assess**






<input type="checkbox"/> Persistence	<input checked="" type="checkbox"/> Drawing on past knowledge
<input type="checkbox"/> Decreasing impulsivity	<input checked="" type="checkbox"/> Application to new situations
<input type="checkbox"/> Empathic listening	<input type="checkbox"/> Precision of language and thought
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<input type="checkbox"/> Metacognitive awareness	<input checked="" type="checkbox"/> Ingenuity, originality, insightfulness and creativity
<input type="checkbox"/> Checking for accuracy	<input type="checkbox"/> Inquisitiveness, curiosity




[ X] Questioning	[ X] Enjoyment of problem solving
[ X] Problem posing	

XIX. Level of Voice Appropriate for Activity: **SUPER TEAM TASK**

**Noise Levels**

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XX. **BSCS 5-E Framework**

**Engage:**

C. DIRECT INSTRUCTION: getting into groups, assigning roles is students want to trade, describing roles for this lesson and tasks

**Materials Manager/ Spy Tasks:** Make sure your team receives and uses the materials without spilling; If the team has a question following Three Before ME go to another team to answer your question [or see what they have learned]

**Checker's Tasks** - Make sure the time limits are observed. Help others complete their tasks. Let instructor know when your team is done taking the leaves off the flower and recording predictions.

**Recorder's Tasks:** Carefully observes and ensures that one flower has all the leaves and the other does not. The recorder carefully completes the team why do plants need leaves page to represent their predictions.

**Encourager/Observer' s Task** - Coach the team to persevere and stay together while sharing and turn-taking. Notice identify and record occurrence of team members' social skills and habits of mind.

(Observer records individual performance)

**Checklists and Rubrics** provided for student goal setting and self-assessment; Peer Assessment (Team Performance Rubric) [Rate Your Mates] Content Assessment (poster)

**Explore:** We will use our inquiry skills of predicting (hypothesis testing) comparing and analyzing to:

**5 groups of 4 students**

**Explain:** As students complete the launch, inquiry, culminating activity they share...

their prior knowledge, observations and questions about why the substances behave the way they do when dropped one-by-one from the eye dropper.

**Extend/Elaborate:** In small groups and in the final performance students have opportunities to extend their knowledge and to elaborate on their ideas. The teacher provides lesson that expend on the process of photosynthesis scaffold student thinking and understanding. Accommodations and differentiations are made according to the needs of Els, 504 plans, and IEPs.

## XXI. **Materials List**

- Two flowers
- Water
- Vase
- Scissors
- Science journal

## **Evaluate: (Assess):**

There are several formative and summative ways to assess learning in this engaged learning PBL.

The first is in the individual formative that show students' original predictions and/or questions they have and compared to what they have learned about photosynthesis and the importance of leaves.

The students may also keep a science journal that are assessed using a rubric. The journal entry should include what they have been observing between the two flowers.

(Poster and visual presentations where students use Art to draw a visual that helps them to describe the results also serves as an assessment. This assessment will also test how well they

can work in group. Each group will be responsible for one poster as well as a presentation discussing their findings.

**Formative Assessment of Non-Cognitive Factors:** Self-Assessment Using the Habits of Mind Check Sheet.

Children's Literature that Supports the PBL:

