# The Secret Life of Seeds: From Dormancy to Sprout

## Lesson Overview

In this lesson, students will explore the hidden anatomy of seeds, understand the biological "triggers" that cause them to wake up, and start their own germination experiment to witness the life cycle in real-time.

## Learning Objectives

By the end of this lesson, the learner will be able to:

- Identify the three primary parts of a seed (seed coat, embryo, and endosperm).
- List the three environmental factors required for germination (Water, Oxygen, Warmth).
- Predict and document the stages of seed growth through a hands-on experiment.

## Materials Needed

- Large dried beans (Lima beans or Kidney beans work best)
- Small clear jars or plastic zip-top bags
- Paper towels or cotton balls
- Magnifying glass (optional)
- A bowl of water
- "Seed Journal" (a notebook or printed observation sheet)
- A marker

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## 1. Introduction (The Hook)

**The Mystery Box:** Hold up a dry bean. Ask: "*Is this alive or dead?*"

Discuss the concept of **dormancy**. Explain that a seed is like a tiny "survival suit" for a baby plant. It can stay asleep for months or even years, waiting for the perfect moment to wake up. Today, we are going to learn how to be the "alarm clock" that wakes the seed up and see what is hidden inside.

## 2. Body: Content & Practice

### I DO: Modeling the Science (The "Seed Anatomy")

Explain that every seed has a "lunchbox," a "baby," and a "jacket":

- **Seed Coat (The Jacket):** Protects the seed from cold and predators.
- **Embryo (The Baby):** The tiny plant waiting to grow.
- **Endosperm (The Lunchbox):** The stored food the plant uses until it can reach the sun.

Demonstrate how to gently rub a soaked bean to see the seed coat slip off. Point out that seeds need

**W.O.W.** (Water, Oxygen, Warmth) to grow. Note that they do *not* need soil or light to start—only to continue growing later.

### WE DO: The Seed Dissection (Guided Practice)

*Note: Use beans that have been soaked in water for at least 4-6 hours for this activity.*

1. Give the student a soaked bean and a dry bean for comparison. Ask: "*What do you notice about the size and texture?*"
2. Carefully peel the **seed coat** off the soaked bean.
3. Gently split the bean into its two halves.
4. Use a magnifying glass to find the **embryo** (it looks like a tiny leaf or root).
5. Identify the **endosperm** (the meaty part of the bean).
6. Draw the "insides" of the seed in the Seed Journal, labeling the three parts.

### YOU DO: The "Greenhouse in a Jar" (Independent Practice)

The student will now set up an experiment to watch the seed grow over the next week.

1. Wet a paper towel so it is damp but not dripping.
2. Fold the towel and place it inside a clear jar or plastic bag.
3. Place 3-4 unsoaked beans between the paper towel and the glass/plastic (so they are visible from the outside).
4. Seal the bag or leave the jar lid loose (remember: seeds need **Oxygen**!).
5. Tape the bag to a window or place the jar in a **Warm** spot.
6. **Prediction:** In the Seed Journal, have the student write or draw what they think will happen first (the root or the leaf?).

## 3. Conclusion (Closure & Recap)

**Summary:** Recap the "W.O.W." acronym. Ask the student to explain why the seed in the jar doesn't need soil yet (Answer: It has its own "lunchbox" or endosperm).

**Takeaway:** Gardening isn't just about dirt; it’s about understanding the needs of a living organism. When we provide the right environment, life "wakes up."

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## Assessment

- **Formative (During):** Observe the student during the dissection. Can they identify the embryo without help?
- **Summative (End):** Ask the student to list the three things a seed needs to wake up.
- **Ongoing:** Check the Seed Journal over the next 5 days. Success is defined by the student accurately recording changes (root emergence, stem growth) and comparing them to their initial prediction.

## Success Criteria

The lesson is successful if the student can:

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- Point to and name the seed coat, embryo, and endosperm.
- Successfully set up a germination environment that results in sprouts within 3-7 days.
- Correctly explain why the seed grew even without being buried in dirt.

## Adaptability & Differentiation

- **Scaffolding (Struggling Learners):** Use a pre-printed diagram of a seed that they can color-code as they dissect. Focus primarily on the "W.O.W." concept.
- **Extension (Advanced Learners):** Set up a second jar in a cold area (fridge) or a jar with no air (vacuum sealed) to test how missing "W.O.W." factors affect growth. Research the difference between "Monocots" and "Dicots."
- **Environment Adaptability:** For a classroom, use staple-mounted bags on a bulletin board. For a training/workplace context (e.g., community garden training), focus on the "Seed Viability" test—using this method to see if old seed packets are still good to plant.