Epigenetics Activity: Gene Expression Regulation

Middle School (NGSS Aligned) Teacher Guide

Overview

This guide supports implementation of the Epigenetics Activity: Gene Expression Regulation using the 5E instructional model.

Learning Objectives

- Students will trace how DNA instructions become proteins
- Students will identify the main steps in making proteins
- Students will observe how changes in DNA affect the final product

Standards Alignment

- **MS-LS3-1:** Develop and use a model to describe why structural changes to genes (mutations) may affect proteins
- **MS-LS4-5:** Gather and synthesize information about technologies that have changed the way humans influence inheritance

Prerequisites

- Basic understanding that DNA contains instructions
- Knowledge that proteins do work in cells
- Awareness that traits come from genes

Time Estimate

45-50 minutes

Materials Needed

- Computer/tablet with internet access
- Student Activity Sheet
- Colored pencils (optional)

Teaching Tips by Phase

Phase 1: ENGAGE (5-10 minutes)

- Start with the phenomenon or problem presented
- Elicit student predictions and prior knowledge
- Create cognitive dissonance if possible
- Build excitement for investigation

Phase 2: EXPLORE (15-20 minutes)

- Allow students to investigate with minimal guidance
- Circulate and ask probing questions
- Encourage systematic data collection
- Note common discoveries and difficulties

Phase 3: EXPLAIN (10-15 minutes)

- Have students share their findings first
- Build on their observations to introduce concepts
- Address misconceptions directly
- Connect to broader biological principles

Phase 4: ELABORATE (10 minutes)

- Apply knowledge to new scenarios
- Make real-world connections
- Encourage deeper investigation

- Support transfer of learning

Phase 5: EVALUATE (5-10 minutes)

- Use varied assessment strategies
- Focus on conceptual understanding
- Provide immediate feedback
- Plan follow-up based on results

> **Remember:**
>
> The goal is student discovery through guided inquiry. Resist the urge to explain concepts before students have explored them!
