

Cell Diffusion Explorer Activity: Transport Across Membranes

High School (NGSS Aligned) Teacher Guide

Overview

This guide supports implementation of the Cell Diffusion Explorer Activity: Transport Across Membranes using the 5E instructional model.

Learning Objectives

- Students will analyze how surface area to volume ratio affects diffusion efficiency
- Students will evaluate why cells must remain small to survive
- Students will explain how cell shape adaptations maximize exchange rates

Standards Alignment

See activity-specific standards in the curriculum guide.

Prerequisites

- Understanding of diffusion and concentration gradients
- Basic geometry (surface area and volume calculations)
- Cell membrane structure

Time Estimate

50 minutes

Materials Needed

- Computer/tablet with internet access
- Student handout

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

NGSS Three-Dimensional Learning

- **Science Practices:** Developing and using models, analyzing data, constructing explanations
- **Crosscutting Concepts:** Patterns, cause and effect, systems thinking
- **Disciplinary Core Ideas:** See standards alignment above

Remember:

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

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