

Science Connections: Systems Thinking & Design

Using transportation data to practice systems thinking and engineering design

These activities ask students to think at the systems level — how individual choices scale up and how infrastructure shapes behavior.

Activity 1: Scale-Up Modeling

Use your classroom's active transportation rate to model what would happen if the whole school matched it.

"If every class matched our rate, how many students would be walking, biking, or busing each day?"

"What would the school arrival zone look and feel like? What would change about noise, crowding, and the overall atmosphere?"

"Is that scenario realistic? What would need to change about sidewalks, bike parking, or crossing guards?"

MA Framework: MS-ESS3-3 (design a method for monitoring/minimizing a human impact on the environment), MS-ETS1-1 (define criteria and constraints)

Activity 2: Design Your Ideal School Zone

Engineering design challenge: redesign your school's arrival area.

1. **Observe:** Walk the school zone during drop-off. Sketch the current layout.
2. **Identify:** Where are the safety concerns? Where is it confusing?
3. **Research:** What have other schools done? (The SRTS Engineering Solutions Guide has examples.)
4. **Design:** Sketch your improved school zone. Label each change and explain why.
5. **Present:** Share with the class. Take questions. Revise.

MA Framework: MS-ETS1-1 (define design problem), MS-ETS1-2 (evaluate competing solutions), MS-ETS1-3 (analyze data to determine best solution)

Activity 3: Physical Activity & the Brain

Research project: investigate the scientific evidence linking physical activity to cognitive performance.

"What does research say about how exercise affects concentration and test performance in students?"

"Design an experiment: How would you test whether walking to school affects focus in your own classroom?"

MA Framework: MS-LS1-3 (body is a system of interacting subsystems), MS-LS1-8 (sensory information processed by the brain)