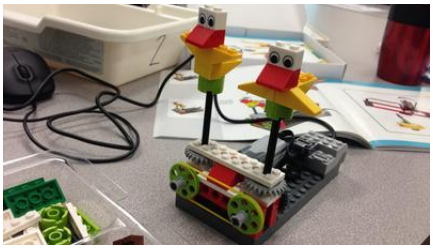
Photo Description



This image shows LEGO structures that students have built, including two bird-like figures standing on platforms and a wheeled vehicle with moving parts. The structures demonstrate how different colored blocks can be stacked and connected to create objects that move and stand up. Students are using simple tools like a mouse and computer to interact with their designs.

Scientific Phenomena

Anchoring Phenomenon: Students are designing and building structures using engineering materials (LEGO blocks) to solve problems and create objects that work.

Why This Happens: When we stack and connect blocks in certain ways, they support each other and stay standing. The wheels on the vehicle spin because they are attached with a rod that allows them to turn. This is engineering—using science and materials to build things that do what we want them to do. Students are discovering that how you arrange materials affects whether something works.

Core Science Concepts

* Structures and Stability: Blocks stay standing when stacked in a balanced way. Wide bases help structures not tip over.

* Movement and Wheels: Objects with wheels can roll and move in different directions when pushed or connected to moving parts.

* Problem-Solving with Materials: Different building materials can be combined in many ways to create the same object.

* Design Process: Builders plan, create, test, and sometimes change their designs to make them work better.

Pedagogical Tip:

First graders learn best through hands-on exploration. Allow extended time for building without predetermined outcomes. Celebrate creative solutions and "productive failures"—when something doesn't work, it's an opportunity to investigate why and redesign. Resist the urge to fix structures for students; instead, ask guiding questions like "What happens if we add another block here?"

UDL Suggestions:

Provide multiple means of representation by offering: (1) visual building instruction cards with pictures only (no words), (2) verbal descriptions and demonstrations, and (3) peer modeling. Allow students with different motor abilities to participate by offering larger building blocks as an alternative and permitting partners to assist with fine motor tasks. Create a "building inspiration board" with photos of various structures so students with limited prior experience can see possibilities.

Zoom In / Zoom Out

Zoom In: Inside the LEGO Brick
When we look very, very closely at a LEGO brick (with a magnifying glass or microscope), we can see tiny bumps and hollow spaces inside. These bumps and holes fit together like a puzzle! The plastic material is made of tiny atoms arranged in chains—kind of like beads on a string. When blocks snap together, the plastic doesn't change, but the way they lock together creates strength. Engineers who design LEGO bricks think carefully about the exact size and shape of those bumps so blocks stay together securely.

Zoom Out: LEGO in the Wider World
LEGO structures like the ones in this photo connect to how real buildings, bridges, and machines are made. Architects and engineers use the same ideas: stacking materials, balancing weight, and making wheels turn to solve real problems. Cities have buildings that stand tall and stable (like the bird structures), and vehicles with wheels that transport people and things (like the wheeled creation). When First graders build with LEGO, they're practicing the same thinking that engineers use to design skyscrapers, hospitals, fire trucks, and playgrounds in their community.

Discussion Questions

* "What happens when you stack the blocks in a tall, thin tower versus a short, wide tower? Which feels more steady?" (Bloom's: Analyze | DOK: 2)

* "Why do you think the wheels help the vehicle move? What would happen if we used blocks instead of wheels?" (Bloom's: Evaluate | DOK: 3)

* "If you wanted to build a bridge that goes across the table, what would you need to think about before you start building?" (Bloom's: Evaluate | DOK: 3)

* "Can you tell me the story of how you built your structure? What did you try first? What changed?" (Bloom's: Remember/Understand | DOK: 1)

Potential Student Misconceptions

Misconception 1: "Bigger always means stronger or more stable."
Clarification: A very tall, skinny tower made of many blocks can actually be weaker and more likely to fall than a shorter tower with a wider base. Stability depends on how the blocks are arranged, not just how many you use. A wide foundation helps structures stay balanced, like how a table with four sturdy legs doesn't tip over, but a table balanced on one leg would fall.

Misconception 2: "Wheels need to be pushed hard to roll."
Clarification: Wheels are designed to roll smoothly with just a gentle push because they spin freely on an axle (rod). A small push makes a wheeled vehicle move because there's less friction than sliding a block across the table. This is why wheels are so useful—they help things move more easily!

Misconception 3: "If my structure falls, my building failed."
Clarification: Engineers learn from structures that don't work the first time. When a LEGO structure falls, it's not a failure—it's information! It tells us what didn't work so we can try a different design. Real engineers test their ideas many times before getting them right. "Falling down" is part of the engineering process.

Extension Activities

* Build a Tower Challenge: Provide students with different LEGO pieces and challenge them to build the tallest tower that doesn't fall over. Ask them to measure their towers and compare which shapes were most stable. Discuss why.

* Vehicle Race Track: Create a simple ramp or track and have students build wheeled vehicles, then test which designs roll the fastest or farthest. Students can adjust their designs based on what they observe.

* Problem-Solving Story: Present a scenario like "The birds need a nest to rest in" or "We need to build a wall to keep the toys safe." Have students design and build solutions, then explain their choices.

Cross-Curricular Ideas

Math Connection: Measuring and Counting
Have students count how many blocks they used to build their structures and record the number. Then, measure the height of towers using non-standard units (like "10 blocks tall" or "as tall as my hand is wide"). Create a simple bar graph showing which student's tower was tallest or which used the most blocks. This connects engineering to data collection and comparison.

ELA Connection: Story Building and Communication
Ask students to draw pictures of their LEGO creations and write or dictate simple captions or stories: "This is my bird. It stands on two legs. I made a nest for it." Students can share their building stories with classmates, practicing oral communication and descriptive language. Create a class book titled "Our Amazing Structures" with each student's page.

Social Studies Connection: Community Helpers and Builders
Connect LEGO engineering to community workers like construction workers, architects, and electricians who build things in their neighborhood. Invite a local contractor or architect (or someone who works in construction) to visit the classroom and talk about how they design and build. Students can discuss how the structures they see around them (schools, homes, playgrounds) were built by engineers and builders working together.

Art Connection: Color, Design, and Creativity
Have students notice the colors and patterns in their LEGO structures (the red roofs, yellow bodies, green bases). Challenge them to create a color pattern as they build, or to redesign their structure using only certain colors. Students can also draw or paint their LEGO creations, focusing on how the colors make the design look interesting and beautiful. This connects engineering to artistic expression and planning.

STEM Career Connection

Mechanical Engineer — A mechanical engineer designs machines and moving parts that help people do things. The person who designed the wheels and axles in LEGO toys is a mechanical engineer! They think about how pieces fit together, how things move, and what materials work best. These engineers work for toy companies, car companies, and many other places that make machines. Average Annual Salary: $90,000–$95,000 USD

Architect — An architect is like an engineer, but they specialize in designing buildings and spaces where people live and work. Architects draw careful plans for houses, schools, libraries, and hospitals before construction workers build them. When First graders stack blocks and plan their structures, they're thinking like architects! Average Annual Salary: $85,000–$100,000 USD

Roboticist — A roboticist designs and builds robots that can do amazing things—like moving, picking things up, or exploring dangerous places. Some roboticists work with LEGO Robotics programs to teach students like you about how robots are built and programmed! They combine engineering, computer science, and creative thinking. Average Annual Salary: $80,000–$110,000 USD

NGSS Connections

Performance Expectation: K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Disciplinary Core Ideas:
- K-2-ETS1.A Students recognize that people design and make things to solve problems.
- K-2-ETS1.B Students understand that before building, people imagine what they want to make and plan it.

Crosscutting Concepts:
- Structure and Function The shape and materials of an object determine what it can do.
- Systems and System Models Parts of a structure work together to make the whole thing function.

Science Vocabulary

* Structure: Something that is built or put together, like a building or a tower made of blocks.

* Stable: When something is steady and doesn't tip over or fall down easily.

* Engineer: A person who designs and builds things using science and materials.

* Wheel: A round object that spins to help something move.

* Design: A plan for how to build or make something.

* Balance: When weight is spread out evenly so something doesn't tip to one side.

External Resources

Children's Books:
Rosie Revere, Engineer* by Andrea Beaty (celebrates creative problem-solving and perseverance)
The Little Blue Truck* by Alice Schertle (simple vehicles and movement)
DK Findout: Simple Machines* (introduces basic engineering concepts with pictures)