

Ecotoy Innovators: Trash to Treasure Toy Lab

1 hour · 4th – 5th · After School · Teacher: Vanessa Chen

Instructions: This lesson plan is your starting point — feel free to edit, rearrange, or customize it to fit your teaching style and your students' needs! These notes are yours. They will not be published anywhere.

Topics Covered

Sustainable design · Creative engineering · Upcycling techniques · Game design principles · Problem-solving · Environmental awareness

Lesson Plan

1. Eco-Inspiration Circle (10 min)

- Show students 2–3 completed ecotoy examples and ask them to guess what materials were used
- Facilitate quick pair-share: 'What's something you threw away this week that could become a toy?'
- Introduce today's design challenge with specific parameters (e.g., 'Create a toy that moves' or 'Design a game for 2–4 players')
- Review the 'Designer's Mindset' poster: Imagine, Plan, Build, Test, Improve

2. Material Exploration Station (8 min)

- Students visit the material bins and select 4–6 recyclable items for their project
- Guide students to sketch a quick design plan in their Inventor's Journal (paper provided) with labeled parts
- Teacher circulates asking: 'How will this part work?' and 'What will make your toy special?'
- Students share their plan with one neighbor for quick feedback

3. Building Workshop (25 min)

- Students construct their toys using selected materials, tape, glue, scissors, and connectors

- Teacher demonstrates key techniques as needed: reinforcing joints with cardboard strips, using rubber bands for tension, creating axles from skewers
- Implement 'Ask Three Before Me' rule: students consult three peers before asking teacher for help
- Play background music and circulate to provide specific encouragement and troubleshooting tips

4. Test and Tinker Time (10 min)

- Students test their toys or games with a partner, noting what works and what doesn't
- Guide students to make one specific improvement based on testing feedback
- Teacher asks: 'What surprised you during testing?' and 'What would you change if you had more time?'
- Students add notes and sketches to their Inventor's Journal about improvements

5. Showcase and Reflection (7 min)

- Create a gallery walk where students display toys on tables with name cards
- Students do a 3-minute silent gallery walk, leaving sticky note compliments on 3 different projects
- Gather in circle for 3-4 students to share their favorite challenge or discovery from today
- Preview next week's challenge and assign optional 'Material Hunt' homework: bring in interesting recyclables

Materials Checklist

- ☐ Recyclable materials: cardboard boxes, tubes, bottle caps, plastic containers, egg cartons, newspaper
- ☐ Fasteners: tape (masking, duct, scotch), white glue, hot glue guns (teacher-supervised station), rubber bands
- ☐ Tools: scissors (10-15 pairs), hole punches, rulers, markers, colored pencils
- ☐ Connectors: wooden skewers, pipe cleaners, brass fasteners, string, straws
- ☐ Inventor's Journals: stapled paper booklets or composition notebooks (one per student for series)
- ☐ Design inspiration cards with toy/game examples printed on cardstock
- ☐ Material sorting bins or baskets (labeled: tubes, flat cardboard, containers, small parts)
- ☐ Aprons or old t-shirts for messy work (optional but recommended)

Age Adaptations

Younger Kids: Provide pre-cut cardboard shapes and templates for more complex designs. Offer more structured challenges like 'Build a car that rolls' rather than open-ended toy design. Partner 4th graders with buddies during building time. Use simpler game mechanics (spinner instead of dice, shorter boards). Limit material choices to 3-4 items to prevent overwhelm.

Older Kids: Introduce engineering constraints: 'Your toy must use exactly 3 materials' or 'Design a game that

teaches a math skill.' Encourage written instructions or rules for their games. Challenge students to incorporate moving parts, pulley systems, or lever mechanisms. Have them create prototypes first, then build refined versions. Assign peer mentor roles where 5th graders help troubleshoot others' designs.

Movement Break

Robot Recycle Race: Students move around the room like recycling robots, freezing when you call out a material type (plastic, cardboard, metal, glass) and making that shape with their body. Call 'sorting time!' and students rush to tag the bin with that material.

Bonus Activities

- Create packaging or instruction manuals for their toys using cardboard and markers
- Design advertising posters for their toys featuring the eco-friendly materials used
- Start a 'Toy Swap' where students trade toys with classmates and provide feedback
- Build a group Rube Goldberg machine using everyone's toys and recyclables together

Series Outline (8 Weeks)

Week	Theme	Key Activities
1	Launch: Rolling Racers & Moving Toys	Introduction to upcycling and sustainable design principles, Build vehicles or toys with wheels using bottle caps, cardboard, and skewers, Host mini races or movement tests to compare designs
2	Launchers, Flingers & Projectile Play	Engineer catapults, slingshots, or tossing toys from recyclables, Learn about force, trajectory, and safe design considerations, Target practice challenge with student-designed launchers
3	Board Game Bonanza Basics	Analyze elements of successful board games (path, rules, goal, chance), Create simple roll-and-move games on cardboard with recycled game pieces, Playtest games with partners and iterate on rules
4	Puzzle Makers & Brain Teaser Toys	Design mazes, tangrams, or matching games from cardboard and containers, Create 3D puzzles using nested boxes or layered materials, Challenge exchange: solve a classmate's puzzle

Week	Theme	Key Activities
5	Spinners, Tops & Balancing Acts	Build spinning toys using cardboard, skewers, and bottle caps, Explore balance and center of gravity through hands-on experimentation, Host a 'Spin-Off' competition for longest-spinning creation
6	Strategy Game Design Challenge	Introduce strategy game mechanics (resource management, player interaction, decision-making), Design two-player strategy games using recycled materials as game boards and pieces, Tournament play with revised rules based on feedback
7	Musical & Sound-Making Ecotoys	Create instruments or noisemakers from containers, rubber bands, and tubes, Experiment with pitch, volume, and rhythm using different materials, Form an 'Ecotoy Orchestra' and perform a short rhythm piece
8	Ecotoy Arcade & Showcase Celebration	Students choose their best creation from the series to refine and display, Set up an 'Ecotoy Arcade' with game stations for families to visit and play, Reflection activity: students present their design journey and favorite innovations



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