LBDMA Unit Plan
Grades 4/5: DESIGNING A DREAM ROOM
By Kate Klein, Theresa Lee, and Natalie Rivkin

Objectives:
Students will be able to...
- Understand the properties of different materials
- Identify and use the tools needed to manipulate those materials in order to build a prototype of their "dream room"
- Justify material selections based on cost as well as aesthetics in design
- Use the Design Process to develop the ideas in their prototype
- Develop a design plan demonstrating an understanding of structures
- Create a sketch to scale
- Use mathematical operations to find the area and perimeter of their dream rooms
- Create a realistic budget for their dream rooms within a limited set budget.

Prerequisites:
Students must be familiar with basic structures and architectural vocabulary.

Subject Areas:
Arts, Language Arts, Mathematics, Science, Technology

Unit Time:
7-9 classes, 45 minutes each
Please see each section for standards, resources, materials, vocabulary, procedures and teacher reflection.

Part 1: Getting familiar with materials
Resources:
Architecture in Education (AIE), Foundation for Architecture, Philadelphia, PA
A Primer On Sustainable Building, Rocky Mountain Institute, Snowmass, CO
http://www.ted.com/talks/michael_pawlyn_using_nature_s_genius_in_architecture.html
Cue video to 4:20 and stop at 5:10 - Cardboard to Caviar project (mimics a closed loop ecosystem)
or
http://www.ted.com/talks/william_mcdonough_on_cradle_to_cradle_design.html
Cue video to 14:47 and stop at 16:32 - Examples of Cradle to Cradle projects or design examples

MA Sci Standards 3-5 T/E
1.1 Identify materials used to accomplish a design task based on a specific property, e.g., strength, hardness, and flexibility.

Day 1:
Materials: Materials students will use for building
Examples: Cardboard boxes and corrugated Mylar
Laminate
Other materials TBD - based on trip to recycle center
colored pencils, pencils, paper rulers, tape, glue, staples

**Launch:** Use one of the TED Talks to discuss why we use recycled materials in our design activities

**Procedure:**
1) Let the students explore materials.
2) Record properties of 2 or 3 materials in journal.(AIE)
3) Make a chart comparing materials (activity 35, p 45 in AIE)
4) Review scenarios with material choices. Students select a material based on findings recorded on chart.

**Teacher Reflection:**
*(To be completed after lesson implementation.)*

**Part 2: Practicing Manipulating/Using Materials**

**Standards:**

**MA Common Core Comprehension and Collaboration** 2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

**MA Tech Standard: 3.G3-5: 3.5** Demonstrate the ability to use technology for research, critical thinking, problem solving, decision making, communication, collaboration, creativity, and innovation.

**MA Science Standard: T/E Grades 3-5**
1.2 Identify and explain the appropriate materials and tools (e.g., hammer, screwdriver, pliers, tape measure, screws, nails, and other mechanical fasteners) to construct a given prototype safely.

**Resources:**
A Basic Guide to Model Making, Martha Sutherland, W. W. Norton, NY, NY

Build a Cardboard Birdhouse
http://vimeo.com/50849299

Images of bird nests:

**Materials:**
Computer with Internet
Cardboard boxes, enough for each student to have 1’X1’ square of cardboard
Pencil
Sharpie
Masking Tape
Vocabulary:
Horizontal
Vertical
Diagonal
Corrugated

Procedure:

Day 2:
Students will watch a video on how to build a bird house. Why do birds need houses? What types of weather events might influence the design of a birdhouse. Layer in a discussion about sustainability. Birds are the ultimate (recyclers/upcyclers.) Highlight math components of the process.
Outdoor learning extension: Look at bird nests in the neighborhood to determine materials birds re-purpose.

Each student will build a birdhouse.

Part 3: Challenge: Build a dream bedroom

Standards:
MA Sci Standards 3-5 T/E
2.1 Identify a problem that reflects the need for shelter, storage, or convenience.
2.2 Describe different ways in which a problem can be represented, e.g., sketches, diagrams, graphic organizers, and lists.
2.3 Identify relevant design features (e.g., size, shape, weight) for building a prototype of a solution to a given problem.

MA Common Core State Standards for Mathematics
4.MD.2: Use the four operations to solve word problems involving money including problems that require expressing measurements given in a larger unit in terms of a smaller unit.
4.MD.3: Apply the area and perimeter formulas for rectangles in real world and mathematical problems.

4.G.1: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines.
5.NBT.7: Add, subtract, multiply, and divide decimals to thousandths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction
5.NF.5a: Interpret multiplication as scaling (resizing), by: Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
5.MD.1: Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.
Resources:
Design and architecture magazines/catalogs
List of bookmarked websites
Computer lab with Internet access
Design Process Checklist (from workshop materials)

Materials:
paper / graph paper
ruler / tape measure
pencils
colored pencils / markers
tape / glue / staples
recycled materials*
sample floorplan / sketch
room budget handout (see attached) - one per student
calculators (optional)
(*TBD based on availability at recycling center)

Vocabulary:
dimension
length
width
scale
line / line segment
area
perimeter
floorplan / sketch
architecture

Procedure:
Day 3:
Students will be told to imagine their families are moving to a new house where they will be responsible for designing and decorating their own dream bedrooms. Their parents have requested that they think about their “needs” verses their “wants”, as they will be limited to a $1000 budget. Their parents have also requested that everything they purchase be purchased from the Internet in order to avoid taxes.
Using design and architecture magazines/catalogs and a list of websites (both to be provided by the teacher) to help them research ideas and brainstorm items needed/wanted for their dream bedrooms, students will begin to sketch their dream bedrooms to scale.

Day 4:
Students will complete any unfinished sketches. Then, using the ideas generated from the previous day, students will use the Internet to shop for furniture and other items
wanted for their dream bedrooms from the same list of websites provided. Students must then create a room budget describing each item, listing their cost (excluding shipping), and giving a brief explanation about why they need/want it for their new dream bedroom. (*See attached budget handout.) Although students will want to buy many “cool” items for their new bedrooms, remind them that they must have bedroom furniture and stay within their budget of $1000.

**Days 5 and 6:**
Using their sketches and recycled materials*, students will build their dream bedrooms in the confines of a shoebox. Lastly, based on the dimensions of their shoebox, students will calculate the perimeter and area of their new dream bedrooms.

**Teacher Reflection:**
*(To be completed after lesson implementation.)*

**Part 4: Visiting Architect**

**Procedure:**
*Day 7:*
Students present finished work to a visiting architect. Architect gives feedback on their work.

**Assessments for Whole Unit:**
There will be ongoing formative assessments as the students work with and discuss materials. Students will be supported by peers and teachers in using new vocabulary, learning and building skills to help them feel comfortable expressing their ideas during the design challenge.

There will be a rubric for the design challenge and presentation.

**Enrichment Extension Activity:**
Make a Voicethread for each student. Have students take pictures and record audio of themselves explaining their design and process. Have other students give audio feedback.

Website: [www.voicethread.com](http://www.voicethread.com)
### ’s Dream Bedroom Budget

Total budget not to exceed $1000.

List the items purchased, their cost, and a brief explanation of why you need/want that item for your new dream bedroom. Be sure to exclude shipping prices.

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<th>Cost:</th>
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