**Your Name:** Shelley Belgard  
**School:** Harold Keller Elementary School  
**City:** Metairie, LA  
**Title:** The Pencil Caddy Problem  
**Grade Level:** K-2  
**Subject Area:** Language Arts  
**Lesson Time:** 45-60 minutes (lesson time can be easily adjusted as per individual class needs)  

**Introduction:**  
In this design lesson, we address problems that arise daily in our class with our pencil caddies. Although they are cute and color coordinated to our tables, our pencil caddies don’t adequately meet our needs. This lesson will allow students to analyze the problems with the existing caddies, design a new pencil caddy, and call on higher order thinking skills as well as speaking and listening skills to describe their designs and prototypes.
| Objectives: | 1. Students will be able to explain problems with an existing classroom object.  
2. Students will be able to generate ideas for an alternate version of an existing classroom object.  
3. Students will be able to collectively discuss and implement their ideas through the design process.  
4. Students will be able to verbally articulate their thoughts about their new design.  
5. Students will be able to listen attentively and ask appropriate questions about their classmates’ designs. |
| National Standards: | CCSS.ELA-Literacy.SL.1.1.b Build on others’ talk in conversations by responding to the comments of others through multiple exchanges.  
CCSS.ELA-Literacy.SL.1.1.c Ask questions to clear up any confusion about the topics and texts under discussion.  
CCSS.ELA-Literacy.SL.1.5 Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings. |
| Resources: | N/A |
| Materials: | *Pencil caddy, **pipe cleaners/chenille stems, small cardboard squares, unused coffee filters, small squares of aluminum foil, small squares of cellophane, straws, small squares of construction paper, paper plates, tape (optional)  
*Although this lesson uses a pencil caddy, it can easily be adapted to suit your needs, whether you use a cup or a plastic basket.  
**Design materials should be sorted and grouped together in a bag or container prior to the lesson. Each group of students will get one bag/container of materials. |
### Vocabulary:
List and define new words or terms that you will be introducing in this lesson.

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<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tr>
<td>Design</td>
<td>to make something for someone who needs to solve a problem</td>
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<td>Form</td>
<td>the shape and structure of an object</td>
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<tr>
<td>Function</td>
<td>the way something works</td>
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<tr>
<td>Prototype</td>
<td>an original model on which something is patterned</td>
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### Background:
Include background information the teacher should introduce as part of the lesson. Find some real-world examples as a reference, including photographs or videos.

This lesson should be preceded by at least 2 to 3 lessons in which the design process is introduced and discussed. The vocabulary *form* and *function* should be discussed as well as *prototype*. Teachers can use any common item: a toothbrush, a child’s coat, backpack, a chair, etc. to introduce the concept of design to students. When discussing an object, for example a toothbrush, point out to students that someone (a designer) somewhere thought about making a toothbrush, including what color it should be, the shape of the bristles, how the handle should be shaped, etc. Ask students if they think the toothbrush designer came up with the perfect design the first time. Students will likely respond no; at this point teachers can introduce the term *prototype*. Teachers can continue the discussion by asking students what considerations the designer needs to think about when designing a toothbrush (who is going to be using the toothbrush—child or adult, the color, how soft the bristles should be, should it be an electric/rechargeable type). By the time teachers are ready to teach “The Pencil Caddy Problem” students should be able to easily define *design, form, function, and prototype.*
Procedures:
Give step-by-step directions for the implementation of this lesson. Things to remember: educators from across the country will be downloading your lesson. Remember to be detailed and precise. Do not refer to anything that may be specific to your classroom or school; address and articulate each step of the design process; articulate how you are addressing each standard listed above; procedures should be a minimum of 650 words.

1. Begin the lesson by examining the pencil caddy. Point out that there are some problems with it and that doesn't work well most of the time. Ask students to name some problems they’ve experienced with the caddy (possible answers: it tips over easily, it’s hard to get the erasers out of the small compartments, and so on). Please note if you have a rug in your classroom, it works well to begin the lesson here with you seated and the students seated surrounding you. At step 6, you can have them return to their tables or desks to begin the design work.

2. Tell students that they’re going to have the opportunity to fix all the problems with the pencil caddy by making a prototype of a new version of one. (Students should be familiar with the term prototype from previous design lessons.)

3. Ask students to recall what the terms form and function mean and how this relates to the new pencil caddy they will be designing. Discuss with students the function of the caddy, including design elements that should be included (possible ideas might be larger compartments so our hands can easily get the erasers out, it should have two compartments instead of three, keep the handle like the current one has so we can easily move it, and so on).

4. Next, introduce the design materials students will be using to build their prototypes. Spend at least 2 to 4 minutes introducing each material and how it can be used. For example, when introducing the pipe cleaners (or chenille stems), demonstrate how one can be bent, twisted, or folded in various ways. Point out to students the ways it shouldn’t be used, for example, even though it's soft, you shouldn’t rub it on your face, you shouldn’t put it in your ear or nose, and you shouldn’t try to hit anyone with it. Note: this can also be done through a series of questions. “Are you going to rub the pipe cleaner on your face? [teacher rubs it on his/her face to demonstrate] Students will likely respond, “No!” “Are you going to put it in your ear?” [teacher acts as if he/she is about to put it in his/her ear]. Again, students will likely respond “No!” “Are you going to try to hit someone with your pipe cleaner?” [teacher will likely tap a student sitting next...
<table>
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<th>Procedures (cont’d)</th>
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<td>likely respond with a lively “No!”</td>
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<td>5. Review with students the class rules for conversation and for getting help if they have a problem. (We use kind, respectful words to speak to one another and we raise our hand if we have a problem or need something from the teacher.)</td>
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<td>6. Dismiss students back to their tables in their groups you have pre-assigned them. Distribute one bag/container of materials to each group or alternatively, have the bags/containers on the tables or desks prior to the start of the lesson.</td>
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<td>7. Allow students time to sort their materials, examining each one, and talking amongst themselves.</td>
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<td>8. Circulate through the class observing how students are using each material and the conversations they are having related to their design.</td>
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<td>9. Allow 20 to 30 minutes (depending on your needs) for students to build their prototypes. Be sure to make students aware of the time they have remaining to complete their work.</td>
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<td>10. At the end of this time, tell students their work time has ended and it’s time to present their prototypes to the class.</td>
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<td>11. Call each group up to the front of the class (or other designated area) to share their prototype. Ask them what materials they used and why they used them the way they did. Encourage each group member to share something about the design process or the group’s prototype.</td>
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<td>12. Invite the remainder of the class to ask questions or provide constructive feedback.</td>
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<td>13. Repeat the previous two steps with each group.</td>
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**Discussion Questions:**

List open-ended discussion questions to help students investigate the design challenge, frame/reframe the problem, generate possible solutions, develop ideas, and reflect on their process.

While examining the current pencil caddy:

1. What are the problems we have with this pencil caddy?
2. What are the things that work or the things you like about this pencil caddy?

While discussing the design process/building of the prototype:

1. So, if one of our problems is that the caddy tips over a lot (or any other problem named by the students), what might we do when designing a new one that would keep this from happening?

After the presentation of design and prototypes:

1. Let’s look at the prototypes. (Prototypes can be set up on a large common table or on each individual table.) Which ones are alike? Which ones are very different from each other?
2. Ask each group about their own design process, specifically how they came up with their design and how they decided on which materials to use.

**Assessment:**

How would you determine if the student has successfully learned the objectives of the lesson? How would you differentiate instruction?

Students can be assessed as a group or individually using the attached rubrics. There is one rubric for the design process and one rubric for the presentation. This lesson can be differentiated a few ways. First, the teacher can heterogeneously group students according to ability level. This can allow higher level students to act as peer buddies for lower level students. Similarly, you can differentiate with the materials given to each group. For example, one group can be given pipe cleaners/chenille sticks, square of aluminum foil, and rubber bands while another group can be given square of cellophane, straws, and unused coffee filters. The teacher might also set certain parameters for selected groups. For example, Group A has to design a pencil caddy with two compartments. Group B must design one with three compartments.
**Enrichment/Extension Activities:**
How might you expand the objectives of the lesson to trigger higher order thinking skills (HOTS), and make connections across the curriculum, with other disciplines, into the home or into the community?

One cross curricular connection can be with Math. One of the problems with the current pencil caddy that students might mention is that their hands cannot fit into the small compartments. This can be easily adapted into a measurement lesson. Students can measure their hands using classroom objects such as paper clips or glue sticks and use those measurements in their designs. A school-to-home activity can be for students to go home and choose an object in their home (or in a specific room of their home, for example, the kitchen) that they would like to re-design to make it better. This can be a multi-day at-home task where students sketch or build a prototype and write about it.

**Teacher Reflection:**
Note how this lesson could be adjusted after its initial implementation. How successful were the students? What did the assessment demonstrate about the students’ learning? What skills do the students need to revisit? What instructional strategies worked and what made them successful? What will you change the next time you use this lesson? Why?

When I taught this lesson in my first grade classroom, I realized soon into it that I needed to have given the students more background information on the design process, specifically how everything in our lives has in some way been designed. I also needed to have talked to them more about making prototypes. Thanks to our grade level teaching artist, students were already very familiar with the terms form and function. Introducing each design material (as described in step 4 under Procedures) was an important part of the lesson, especially given my large number of students with behavior issues and on lower academic levels. If I were to teach this lesson again, I would have more class discussion about the design process and prototyping and more smaller-level design tasks.

**Attachments:**
Please remember to include any necessary handouts, rubrics, worksheets, PowerPoint presentations or any other additional resources specific to your lesson.

Attached are Rubric #1 for group participation and Rubric #2 for group presentation. Also attached are photos of the pencil caddy used in this lesson.
For example: smith_design challenge.doc