

What We Do With Ideas

By Christine Anne Royce

Creative thinking is important to scientists and engineers as they frame their work and engage in the practices of their fields. Elementary-age children need opportunities to think about and develop an idea from its inception through to its conclusion to expand their thinking and engage in scientific processes. Generating and expanding on ideas allows children to consider problems or questions they want to find solutions for through experimentation, and it requires perseverance and practice. This month's column focuses on allowing students to expand their thinking around simple objects and ideas while maintaining a science focus.

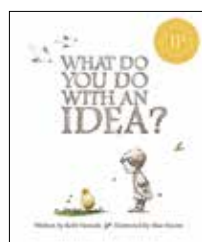
This Month's Trade Books



What to Do With a Box
By Jane Yolen
Illustrated by Chris Sheban
ISBN: 978-1568462899
Creative Editions
32 pages
Grades K–3

Synopsis

Through vivid artwork and simple words, this book shows how a simple item can encourage creative thinking and idea sharing.



What Do You Do With an Idea?
By Kobi Yamada
Illustrated by Mae Besom
ISBN: 978-1938298073
Compendium
32 pages
Grades K–4

Synopsis

The child in this book has an idea and isn't sure what to do with it. Without ever actually naming the idea, the child works through the concept by thinking about it and developing it over time, despite the naysayers in his life. Once the idea has been developed, he asks an important question: What's next? ■

Christine Anne Royce (caroyce@aol.com) is a professor at Shippensburg University in Shippensburg, Pennsylvania.



NSTA Connection

Download a list of additional book suggestions, student brainstorming worksheets, and the picture-frame cutout at www.nsta.org/SC1609.

Grades K–2: SCAMPER

Purpose

Students engage in a creative-thinking strategy called SCAMPER as they consider how to use items in different ways.

Engage

Begin by asking the class to think of different ways they have used a box. Students may respond with the traditional ideas related to packing or mailing objects, or they may describe a creative idea related to building a fort. Record their ideas on poster paper on one side of a T-chart labeled “Our Ideas.” This initial list allows students to begin brainstorming ideas that they will compare to the use of the box in the story. Read *What to Do With a Box*. After reading the story, return to the chart paper and ask students to create a list of ways in which the characters in the story use their box on the side of the T-chart labeled “Ideas from the Story.” Having students examine the illustrations will also help expand their ideas of how the box was used. Engage the class in a discussion that compares and contrasts both lists (Reading Standards for Informational Texts K–5 – Integration of Knowledge and Ideas).

Explore

During this phase, students engage in a brainstorming strategy called SCAMPER, which is an acronym for substitute (S); combine (C); adapt (A); modify, minify, magnify (M); put to another use (P); eliminate (E); and reverse (R). A quick overview of each word is shown in Table 1, as well as an example of each as it appears in the book. For additional information on this strategy, see the Internet Resources (CC ELA: Vocabulary Acquisition and Use).

Choose a common object that students can hold and manipulate (e.g., milk carton, straw, plastic cups). Using the student brainstorming sheet (see NSTA Connection), ask groups of two or three students to either record or illustrate ways in which they can use the object for each of the categories listed. For example, if a straw is used as the object, students would identify ways in which the item could be substituted for something else (the S in SCAMPER) or what could be substituted for the item. This should be done over several days, allowing the teacher to first discuss with the class each word in the SCAMPER acronym. Also ask students to connect the SCAMPER term and idea being discussed to how the characters in the story used the box.

Materials

- *What to Do With a Box*
- chart paper
- ordinary objects (e.g., milk carton, straw, plastic cup, pencils, wrapping paper, baseball hat, plastic test tube or beaker)
- student brainstorming sheet (see NSTA Connection)
- picture-frame cutout (see NSTA Connection)

Explain

Have students select one creative use for the object and describe that use on the back of their brainstorming sheet. Once they have drawn and labeled their use, ask students to write a sentence explaining how the object is now being used. Have students share their ideas with the class by first listing all of the substitute uses and discussing them as a group. Ask questions such as, “Now that we have thought of these uses, what are other things we could substitute for this object?” (Speaking and Listening Standards K–5 – Presentation of Knowledge and Ideas). Then complete the rest of the SCAMPER letters using a similar process. Collect the student pages and create your own classroom book titled “What to Do With a ...” for future classroom sharing.

Elaborate

Share with students the following example of how a scientist had an idea before creating the famous invention. Have the students discuss how this “first attempt” helped in the brainstorming process.



When the Wright Brothers were designing their airplane, they at first tried to make “wings” that a human could strap onto the arms to fly like a bird.

Ask students to select another item of their choosing that is easily obtainable (e.g., pencils, wrapping paper, baseball hat). Older students can use a common piece of science equipment such as a test tube or beaker. Ask students to go through the SCAMPER process with this new object, using either words or illustrations on a new brainstorming sheet. This time, however, ask students to confer with their original group of two or three peers and have them answer the question, “How can the ideas be improved?” This question allows students to begin to engage in constructive critique, a scientific practice (Writing Standards K–5 – Text Types and Purposes). Share the final results by posting the student responses on a bulletin board or in the hallway, using the picture frame template to create a science gallery (see NSTA Connection).

Evaluate

Although students can be evaluated based on their answers to questions and the worksheet, it is important that they *not* be evaluated on their creativity or the number of answers they develop during the SCAMPER process. Similar to brainstorming, no answer is wrong at the onset of the process. Delving into reasons why students selected a particular category or part of SCAMPER for their idea will also demonstrate whether they understand the ideas of the process.

Internet Resources

A Guide to the SCAMPER Technique for Creative Thinking

www.designorate.com/a-guide-to-the-scamper-technique-for-creative-thinking

Applying the SCAMPER Technique

www.youtube.com/watch?v=e4jMend3u1U

TABLE 1.

The SCAMPER strategy.

Substitute	What can this item be substituted for? What can I substitute for this item? <i>Book example: Painting pictures on the box is substituting it for poster board or drawing paper.</i>
Combine	Can this item be combined with another object to create something else? What materials can be combined to create this item or replace this item? <i>Book example: Pretending there is a dirt track to use the box as a race car.</i>
Adapt	How can we adapt this item to make it better? <i>Book example: A box could be made of sturdier cardboard so it doesn't collapse.</i>
Modify, Minify, Magnify	Can this object be modified or altered to make it better? What happens if we change the size, shape, or color of the object? What happens if we increase or decrease the size of the object? Can it be used for something else if this is done? <i>Book example: Locking the door with a magical key.</i>
Put to Another Use	Where else can this item be used? What are those uses? How would other people use this item? <i>Book example: Using the box for a library, palace, or nook.</i>
Eliminate and Elaborate	What happens if we remove this item from the entire process/product? Can something be taken away from this item to make it better? What could be added to make this object better? <i>Book example: If we removed boxes, we would need to find some other way to hold materials to be shipped.</i>
Reverse or Rearrange	If we rearranged the item, what could we do with it? What would happen if the order were reversed? What would happen if we turn the object upside-down or backward? <i>Book example: Turning the box on its side allows you to open it differently.</i>

Grades 3–5: Incubating Your Idea

Purpose

Students brainstorm different ideas when presented with a problem.

Engage

Read *What Do You Do With an Idea?* to the class one time through so that students hear the entire story first. Once they have heard the story, ask them to outline the steps the boy took when considering what to do with his idea. Questions that are posed throughout the book or feelings that the young boy had are solid building blocks for discussion (Reading Standards for Informational Texts K–5 – Key Ideas and Details).

- “Where did it come from? Why was it here?” Discuss with students what happens when they get ideas and why they might have thought of a new idea. Connect this process to the way in which inventors, scientists, or engineers get ideas.
- “What would people say about my idea?” and “I showed it to other people even though I was afraid of what they would say.” Sharing a new idea in the scientific field often requires courage.
- “I actually thought about giving up on my idea.” Scientists need to put a lot of effort into pursuing their ideas over time.
- “I decided to protect it, to take care of it. ... I gave it my attention.” To pursue an idea and accomplish a goal you set, you need to pay attention to the process as well as the idea.
- “Because it is good to have the ability to see things differently.” Sharing your idea with others will allow them to consider different ways of using the idea.
- “And then I realized what you do with an idea ... You change the world.” Ideas often help make the world a better place.

Explore

During this phase, students are given a particular problem for which they must generate an idea for a solution:

You have been told that you are no longer allowed to bring traditional backpacks to school because students carry too many heavy books on their backs, which can harm students’ health and safety. However, you still need to carry your books and supplies between home and school. Your team has been asked to develop a recommendation for a device that

Materials

- *What Do You Do With an Idea?*
- student brainstorming sheet (see NSTA Connection)
- craft materials or actual construction materials



will allow you to meet this need. You will present your idea to the principal, who will make a final decision. After brainstorming, develop one idea that you will try to convince the principal to use.

In teams of two or three, ask students to brainstorm ideas that will solve this problem and record these on their brainstorming sheet (see NSTA Connection). Once they have listed several ideas, ask them to discuss the characteristics of each: reasons why it is an improvement over backpacks, shape and size, where it might be located in the classroom, and its ease of use. As a team, students should select one idea to develop in greater depth. Using the brainstorming sheet, students should draw the new book-carrying device in as much detail as possible and label the different parts. Students should name the idea and write three or four sentences to describe it.

Explain

After each team has had time to develop its idea, have the teams present their ideas to the class (and if possible, ask the principal to attend the presentations). Have students answer the following questions in their presentation so they can share their ideas and thought processes:

- Give your device a name and describe it.
- Where did it come from? Why is it here?
- What would people say about your idea?
- Which ideas did you give up on and why? How is this device different from a traditional backpack?

Elaborate

Using craft materials or, if possible, real materials, have students then construct their devices and ask them to consider how they might change their ideas now that they are developing models of them. Share the models in the classroom by setting up a display table. After teams have shared their ideas, their peers should provide constructive critique by asking questions that start with, “Have you considered ...?” Using the brainstorming sheet, have students write down two different adaptations they would make to their models based on peer feedback (Writing Standards K–5 – Text Types and Purposes).

Evaluate

There are opportunities for evaluation throughout each stage of this activity, from students’ drawing on their previous understandings to their questioning of the process the young boy takes, developing their own idea about how

to solve a problem, and presenting it to the class. Evaluate only the requirements of the activity rather than the level of creativity that students demonstrate.



Connecting to the *Common Core State Standards* (NGAC and CCSSO 2010)

This section provides the *Common Core for English Language Arts and/or Mathematics* standards addressed in this column to allow for cross-curricular planning and integration. The Standards state that students should be able to do the following at grade level.

English/Language Arts

Reading Standards for Informational Texts K–5 – Integration of Knowledge and Ideas

- Grade 1: “use the illustrations and details in a text to describe its key ideas.”
- Grade 3: “use information gained from illustrations and the words in a text to demonstrate understanding of the text.”

Reading Standards for Informational Texts K–5 – Key Ideas and Details

- Grade 4: “refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.”

Writing Standards K–5 – Text Types and Purposes

- Grade K: “use a combination of drawing, dictating, and writing to compose informative/explanatory

texts in which they name what they are writing about and supply some information about the topic.”

- Grade 2: “write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.”
- Grade 4: “write informative/explanatory texts to examine a topic and convey ideas and information clearly.”

Speaking and Listening Standards K–5 – Presentation of Knowledge and Ideas

- Kindergarten: “add drawings or other visual displays to descriptions as desired to provide additional details.”
- Grade 1: “add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.”

Reference

National Governors Association Center for Best Practices and Council of Chief State School Officers (NGAC and CCSSO). 2010. *Common core state standards*. Washington, DC: NGAC and CCSSO.