

Lesson Plan (Unit) for A Visitor for Bear by Bonny Becker An Engineering Unit for Grade 1

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Introduction: First grade students will create a solution to a design challenge from A Visitor for Bear, an engaging picture book for primary grade students. In a whole group setting, students will listen to the story and brainstorm design challenges and solutions. They will then work in pairs to create/construct a solution to a design challenge that has been chosen by the teacher.

Story Description: A Visitor for Bear is a fiction/animal fantasy picture book written by Bonny Becker and illustrated by Kady MacDonald Denton. It tells the story of a bear who lives alone and does not like visitors, and a mouse that comes to visit and won't go away despite the bear's insistence that he does not want the mouse in his house. Finally, the bear lets the mouse stay and the two become friends. This is an appropriate book for young students who are beginning to learn about the design process because the plot is straightforward and presents simple yet engaging design challenges.

Learning Goals: The students will be able to

Identify the problems in a fiction story.

Brainstorm possible solutions, real and imaginative, to the problems.

State the selected design challenge.

Work cooperatively.

Create a solution to the design challenge using design thinking.

Use content vocabulary appropriately.

Construct a design solution.

Communicate their solution to their peers.

Procedure:

***Lesson One:** (Priming) The teacher reads the story. Using a **graphic organizer**, the students work with the teacher to create a story map that includes the characters, setting, plot, problem(s), and resolution. If time permits, students can draw a picture of their favorite part of the book (this will give them a chance to independently engage with the story).

***Lesson Two:** (Generative) Students will first review the story map, then they will focus on the problem(s) in the story. They will **brainstorm** as many possible problems as they can while the teacher records them on chart paper. The teacher will encourage them to “**think outside the box**” (anything goes) when considering problems (creative thinking/risk taking). Teacher will review the final list and tell the students that the next day they will focus on only one of those problems.

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***Lesson Three:** (Generative; Convergent) The teacher will select one problem (**design challenge**) from the list. (The design challenge will be to find a way for the bear to keep the mouse out of the house so that he can have his privacy.) Students will discuss and brainstorm possible solutions to that problem. The teacher will again encourage **creative thinking and risk taking** as the children use their imagination to think of solutions. The teacher lists the solutions on chart paper. The teacher then asks the students to consider each solution and to sort them into groups based on how difficult or easy it would be to actually build the solutions. The teacher will **recap** what the children have done so far: read and mapped the story, and brainstormed problems and solutions. **Positive feedback** from the teacher that focuses on students' ability to brainstorm and think creatively is very important at this point.

***Lesson Four: Vocabulary** (engineer, design, identify, need, select, construct, test, communicate) At the start of the lesson, the teacher will ask the students to reflect on what they have done so far since the initial reading of the story. As they reflect and recall, the teacher writes their responses on the board. Then the teacher introduces some **engineering vocabulary** and aligns it to what the children have stated. The teacher then posts **index cards** with each word on a card. The children read the words with the teacher. Then volunteers try to use each word in a sentence, with the teacher's help. The teacher explains that from now on, everyone will try to use these words as they work on their projects. At the end of the lesson, the children will do a **Word Search** (fun!) at their desks to help with familiarity of the vocabulary. (The teacher posts the index cards on a wall or bulletin board for children to refer to.)

***Lesson Five:** (Defining) The teacher begins by reviewing what has been done thus far, paying close attention to the list of possible solutions to the design challenge. Working in pairs (teams), students then work cooperatively to choose from the list or create their own design solution to the problem. They **draw/sketch and label their design**. The teacher circulates the room, checking in with each team and providing assistance as needed. At the end of the lesson, the children meet on the rug. The teacher selects a few teams to share their solutions/drawings.

***Lessons Six and Seven (plan a longer time for these lessons):** (Defining) The teacher begins by showing a drawing of a possible design challenge. Then the teacher **models** how one might begin to actually build the solution. The teacher refers to an enlarged copy of the **student checklist/rubric** as he/she models how to use the checklist to help guide the students. (It is important for them to know what the expectations are for success with this project.)

The children will then have a chance to peruse the available materials in small groups. (During this time, students who are waiting for their turn can be finalizing their sketches.) Students begin to use the materials to **build** their solution. They use their checklists (rubric) to help guide them as they work. The teacher circulates the room to check in with teams and help as needed. *The teacher will encourage*

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students, as they work, to consider using what they know about science (force and motion) and/or math (measurement, number sense, patterns) in their designs.

Lessons Eight and Nine: (Defining) Students share their solutions with the class. They will be asked to state the **design challenge**. The presentation will include an explanation of how their design works to keep the mouse out of the house, and how the team worked together to build their design, along with any challenges they encountered along the way and how they worked through those challenges (**self-reflection/assessment**). The teacher should extend the discussion, as appropriate, **to include connections to science and math concepts that students may have used**. The teacher can also ask students how they might have used these concepts in their design. (This will help students think about these connections the next time they are presented with a similar project, especially since the more opportunities they have to work through the design process, the more likely it will be that a math or science connection will be a requirement in the future.)

Prior Knowledge: Skills that students will need in order to meet learning goals are: understanding how to brainstorm, understanding how to cooperate with peers, understanding of story elements.

Teacher's Strategy: The teacher will place special emphasis on teaching the engineering process at a beginning level of understanding for young children. Therefore, although this series of lessons connects to the understanding of story, *its primary focus will be on the steps involved in the design process*. The teacher will use content vocabulary throughout the unit and students will be encouraged to do so as well.

Vocabulary: Students will learn the following vocabulary – engineer, design, identify, need, select, construct, product, test, communicate.

Design Challenges: Possible design challenges that first graders might identify are

- The bear needs to find a way to stop the mouse from getting into his house.
- The mouse finds a way to stay in the house.

Requirements: Because these lessons are an introduction to the design process, there will be no specific requirements (science or math). However, there will be opportunities for extension (see below) for students who are up for the challenge.

Selected Design Challenge: The students will design and construct a way to *help the bear keep the mouse from coming back into his house*.

Extensions: Students can research mice to find out how they are able to get into small places and what size space would be too small for them to get into (Life Sciences and Math connections). Students can be encouraged to use knowledge of

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pushes, pulls, and friction in their design (Physical Science connection). Students may use tools (rulers) to measure materials used in their product (Mathematics connection). Students can rewrite the story to include their solution. (Language Arts connection)

Framework Standards:

Understanding Literature: Identifying story elements

Speaking and Listening: Maintains focus on topic, speaks clearly, slowly, and loudly enough to be heard. Gives full attention to the speaker.

Physical Sciences: Describe the various ways objects can move. Demonstrate that the way to change the motion of an object is to apply a force.

Thinking Skills: questioning, creative and critical thinking, brainstorming, discussion of pros and cons, modeling, building, presenting.

Materials: Book, index cards, vocabulary Word Search, enlarged copy of checklist/rubric, team copies of checklist/rubric, assortment of craft materials (scissors, glue, glue sticks, drawing materials, cardboard, pipe cleaners, Wikki Stix, Styrofoam, small wood pieces, yarn, string, popsicle sticks, empty containers of different sizes and materials, cotton, toothpicks, drinking straws, etc.)

Rubric: The children will be given a checklist to guide them as they work. It will be a simplified rubric based on the teacher rubric that the teacher will use to assess their project. Possible criteria to be assessed are:

- Team Work – how well did the students work together?
- Design Idea – how creative was the solution to the design challenge?
- Product – how effectively did the product solve the problem?
- Presentation – how clearly and thoroughly did the students explain their solution?