### Problem Based Enhanced Language Learning

**Title of Experience/Topic:**

Let's Build a Bridge!

**Notes:**

Start with! Soooo I have a book I want to read to you all today..

Day 1: read book about building a bridge (non-fiction book) make charts with facts about bridges
Day 2: view videos and pictures of bridge, label parts of bridge
Day 3: Read a fiction story about a problem with animals and a bridge (21 elephants and Cross a Bridge)
Day 4: engineer comes to speak about how to build bridges
Day 5: basket all about books for research, block model, plan for bridge, writes down plan in notebook for materials they will use for their bridge building (brainstorm day)
Day 6: Build bridge
Day 7: Present bridges to class/Reflect on bridges

**Problem** (framing words + person + action + audience \(^1\)):

The local zoo needs to build a strong bridge for its new animals to be brought into the zoo. They have hired our class to build it! We need to determine what materials will make the strongest bridge to hold the most amount of animals.

How can we design the strongest bridge that holds the largest amount of zoo animals?

**Time Frame:** (number of sessions and length of sessions)

7 Days (sessions), 7 class periods (~1.5 hour sessions)

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STANDARDS:

1st Grade Science Standards (Content):

Concept 1: Properties of Objects and Materials
Classify objects and materials by their observable properties.

PO 1. Classify objects by the following observable properties:
• shape
• texture
• size
• color
• weight

Concept 4: Communication
Communicate results of investigations.

PO 1. Communicate the results of an investigation using pictures, graphs, models, and/or words. (See M01-S2C1-02 and W01-S3C3-02)

PO 2. Communicate with other groups to describe the results of an investigation.

Concept 3: Analysis and Conclusions
Organize and analyze data; compare to predictions.

PO 2. Compare the results of the investigation to predictions made prior to the investigation.

1st Grade Mathematics Standards (Content):

1.MD.C.4: Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.

1.MP.7 Look for and make use of structure.

Mathematically proficient students use structure and patterns to assist in making connections among mathematical ideas or concepts when making sense of mathematics. Students recognize and apply general mathematical rules to complex situations. They are able to compose and decompose mathematical ideas and notations into familiar relationships. Mathematically proficient students manage their own progress, stepping back for an overview and shifting perspective when needed.

1st Grade Reading Standards (Content):

1.RL.1: Ask and answer questions about key details in a text.
1.RL.2: Retell stories, including key details, and demonstrate understanding of their main idea, central message, or lesson.
### 1st Grade Writing Standards (Content):

**1.W.7:** With guidance and support from adults, participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions).

### 1st Grade ELL Standards:

**R.S4.E-9:** identifying the purpose for reading specific books. (e.g., to be entertained, to be informed)

**W.S1.E-3:** summarizing the key events or ideas of informational text by drawing and labeling pictures with instructional support.

**L.S1. E-7:** responding to academic discussions using keywords and phrases with instructional support.

**S.S1.E-6:** following two-to-three step directions for classroom activities that are accompanied by visual cues

### Integrated Language Arts Standard(s):

- Assessed
- Not Assessed

### Content Language Objective (Language Function + Content Stem + Supports):

Students will be able to...

*Students will use the language of justification to identify the ideal characteristics of a bridge using a diagram to label parts of a bridge, small group interaction, and sentence stems to state their findings.*

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**Sub-Objectives:**
- SWBAT: distinguish the differences 6-8 different images of bridges (size, materials use to build, and shape)
- SWBAT: Listen and visualize the stories being read in class by the teacher about bridges.
- SWBAT: Recall facts from the stories and record the facts on a chart.
- SWBAT: Observe a video summarizing what a bridge is, the parts of a bridge and what it can be used for.
- SWBAT: Identify the characteristics of a bridge by using a graphic organizer.
- SWBAT: Work in small groups to discuss the parts of a bridge.
- SWBAT: Observe public speaker.
- SWBAT: Ask questions about the information provided by the public speaker.
- SWBAT: Collaborate in small groups about what a bridge should look like.
- SWBAT: Design a plan for what their personal bridge will look like.
- SWBAT: Write a plan for in their notebooks of how they will create their bridge.
- SWBAT: Compare different materials to use to construct bridge.
- SWBAT: Debate with groups about what material they would like to use.
- SWBAT: Select the material they want to use to build with.
- SWBAT: Summarize by explaining with the class what materials their group use and discuss with the class how they built their bridge and why they choose those specific materials to build with.
- SWBAT: use sentence stems to write what materials they used and why they choose them.
- SWBAT: state what they have written down on their sentence stems by reading them aloud to the class.
- SWBAT: Test bridges by placing different objects (toy animals) on the group's bridges.
- SWBAT: Evaluate what material (Popsicle sticks, straws, pipe cleaners, or toothpicks) worked the best to construct a bridge to withstand the weight of the objects (toy animals).
- SWBAT: Discuss as a class what materials worked better to build with and why.
- SWBAT: Show mastery by writing one sentence about what material worked the best and why. This piece of paper will be collected. (grade is on participation and being creative with their bridge building)
- SWBAT: Show mastery by writing one sentence about what material worked the best and why. This piece of paper will be collected. (grade is on participation and being creative with their bridge building)

**Materials:**
- Mentor books about building bridge (non-fiction)
- Chart paper (to write facts on)
- Markers
- Computer (YouTube) to watch bridge videos
  [https://www.youtube.com/watch?v=oVOnRPeJcno](https://www.youtube.com/watch?v=oVOnRPeJcno)
  or
  [https://www.youtube.com/watch?v=ulNPjtR22rl](https://www.youtube.com/watch?v=ulNPjtR22rl)
- Graphic Organizer handouts (label parts of bridge)

- Mentor book about elephants crossing a bridge (fiction)

- Contact an engineer to come in and speak to the class
- Basket of other fictional and nonfiction books for students to read as research when brainstorming their bridge ideas
- Basket of other books for students to use for research
- Notebooks to brainstorm/draw bridge ideas out on
- Popsicle sticks
- Straws
- Pipe cleaner
- Toothpicks
- Glue
- Masking tape
- Scissors
- Yarn
- Two ends of a table to suspend the bridges in the air in order to test how much weight they hold
- Toy animals (this also tests the weight, the more animals it holds the more weight it holds so we don’t need a scale)
- Handout on reflection of best bridge that will be collected

*Academic Tool Kit*

<table>
<thead>
<tr>
<th>Vocabulary taught prior to the experience (Background):</th>
<th>Vocabulary developed during lesson:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge</td>
<td>Span</td>
</tr>
<tr>
<td>Weight</td>
<td>Beam</td>
</tr>
<tr>
<td></td>
<td>Column</td>
</tr>
<tr>
<td>Strong</td>
<td>Think</td>
</tr>
<tr>
<td>--------</td>
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</tr>
</tbody>
</table>

**Academic Conversation:**
What language function will students have the opportunity to practice? How will this language be explicitly taught? How will this language be applied and practiced?

**SWBAT:** Use the language of justification to give reasons for their actions and decisions by providing their evidence using their sentence stems during their think-pair-share puzzle solving activity.

Prior to our PBELL lesson, we will teach a mini lesson to the class about justification. To start this mini lesson the teacher will model on the smartboard how to complete a puzzle using a virtual puzzle website (website listed below). The teacher will complete this puzzle in front of the class, purposefully choosing a corner piece to start the puzzle but won’t explicitly say why she is choosing that piece (that is something for the students to solve and pull out that information on their own). Also, the teacher will purposefully model putting the wrong pieces together to show students that certain pieces just don’t fit together. Once the teacher has completed her puzzle, she is going to tell the class that they are going to learn the language of justification and why someone would want to use this type of language. She will tell them that we use this language when we are explaining why we are doing something or why we did do something. Next, she will model the language of justification using certain vocabulary terms (believe, think, feel, and reason—this language will be hung up on butcher paper on the board so students can see it) by using the sentence stems provided below to explain why she chose to complete the puzzle the way she did. The teacher will model a correct way and incorrect way to justify reasoning, again using the provided sentence stems to model the correct way to justify a reason and by not using a sentence stem to model the incorrect way to justify a reason. The importance of this modeling piece is that the students need to know what we want them to say, and that is why we have to explicitly teach and model justification with the sentence stems. The teacher will set the classroom expectations and tell her class the reason why they are learning this language of justification is because when the step into science time they are expected to put their thinking caps on and use their problem solving skills and evidence to justify or back up their findings.

Once the teacher has modeled everything for her students, she will tell them it is now their turn to practice the language of justification. So, after the teacher has modeled the mini lesson, it will be time for the students to do it in small groups of 4 students. The teacher will provide the small groups with a simple puzzle to have them complete on their own. They will have about 20-25 minutes to try and complete their puzzle by only relying on help from their group members. (Students will have actual thinking caps to put on while working to enhance their thinking skills, and it’s also fun for them, it makes the activity feel like a real life problem). As the students are working on their puzzles and finishing up, the teacher will walk around and ask the students to use their language of justification (sentence stems) to tell her how they decided to solve their puzzle (each small group will have a sentence strip
with the sentence stems on it to use as reference and to read off of when they are speaking. Once each group has completed their puzzle, the class will come back as a whole to discuss how each group solved their puzzle. The teacher will call on at least one student from each group to say their sentence stem and evidence it loud for the class to hear. This will allow more speaking, listening, and content practice for all students. Once the class has all collaborated, this will complete the mini lesson on the language of justification.

**Resources:**

Virtual Puzzle Link:
http://www.jigzone.com/gallery/Butterflies

**Sentence Stems: (Provided on sentence strips for them to use in their small groups)**

I believe this because...
I think this way because...
I feel that doing it this way is best because...
The reason that I picked this ______ is because.....

**Establish the Problem:**

*How will prior knowledge be accessed? How will the problem be introduced to students? How will students inquire about the problem (optional planning tool attached) How are students using language (reading, writing, listening, and/or speaking) and how are they being supported?*

**SWBAT:** distinguish the differences 6-8 different images of bridges (size, materials used to build, and shape)

**SWBAT:** Listen and visualize the stories being read in class by the teacher about bridges.

**SWBAT:** Listen and observe the stories being read in class by the teacher about bridges.

**SWBAT:** Observe a video summarizing what a bridge is, the parts of a bridge and what it can be used for.

**SWBAT:** Identify the characteristics of a bridge by using a graphic organizer.

**SWBAT:** Work in small groups to discuss the parts of a bridge.

**SWBAT:** Observe public speaker.

**SWBAT:** Ask questions about the information provided by the public speaker.

To introduce the lesson we will first assess the students prior knowledge about bridges by having a class discussion about bridges by asking questions like “Has anyone ever seen a bridge before?”. By asking the students questions about bridges will prompt them to think about what they think a bridge may look like, and also if they have seen a bridge before what did it look like. Before starting the lesson we will show the students 6-8 different pictures of bridges on chart paper and have the students come up and dictate what they observe in the different pictures of the bridges (like the shape, color, size, materials that are used) and the teacher will label the next to the images what the the students thought were. After observing the images as a class we will talk about the different shapes bridges can take on, the different sizes they can have, what materials were used to build the bridge, identify the location of the bridge in the pictures(is it over water?) what is purpose of the bridge?
Next we will present the book “Cross a Bridge” to the class and have a read aloud. While observing the reading students should be able to identify the illustrations in the book and be able to listen to the vocabulary used when describing a bridge. After reading aloud we will come together as a class and write down facts on a chart about what the class has learned about bridges while listening and observing the book. (What vocabulary is being used to describe the bridge? What are characteristics bridges have?)

Students will also will watch a video that summarizes what a bridge is and what it can be used for. After the students watch the video they will get into small groups and list the characteristics of a bridge by using a graphic organizer. After students have labeled their graphic organizers the teacher will have a whole class discussion with the class inquiring about what are some reasons why a bridge may be need? What materials do you think would be best to build with to make a strong bridge?

Know that the students have some background knowledge about bridges the teacher will invite a engineer to the class to publicly speak about more of what it takes to build a bridge and answer any questions the students may have wondering about.

After the class read aloud, the video, class discussions, and public speaker the students will be able to have a better idea of different situations where a bridge may be needed. Now the teacher will introduce the problem. “The local zoo needs to build a strong bridge for its new animals to be brought into the zoo. They have hired our class to build it! We need to determine what materials will make the strongest bridge to hold the most amount of animals”

As a class we are going to get into small groups and make a model of a bridge for the local zoo and decide what materials would be best to use to make the strongest, most reliable bridge to withhold the most animals.

Images that will be used:
Creating the Experience:
How will students work together to develop and present solutions? How are students using language (reading, writing, listening, and/or speaking) and how are they being supported?

Students will be working in small groups and selecting various materials to use that will help them cultivate the strongest bridge. After the bridges are built, each group will individually come up to the front of the class with their bridge. The teacher will then place toy animals on each bridge one by one as the students count along and record the amount of animals each bridge was able to hold before breaking.

Students will be given a graphic organizer and labeling the elements of a bridge. This will give them the key features and vocabulary of a bridge that they will be using to describe what material they used for each part. Throughout the lesson plan, students will be read to from “21 Elephants” and “Cross a Bridge” where they will learn the different functions of a bridge in the real world. When explaining their rationale for the way they built their bridge, students will be using the language of justification by implementing these sentence stems:

I believe this because...
I think this way because...
I feel that doing it this way is best because...
The reason that I picked this ______ is because....

Evaluate:
When and how will you use formative and summative assessments to measure student progress and learning (content and language)?
**Formative**
We will use monitoring and observation to properly formative assess the students. As we monitor and listen to the students, we will be sure to clarify any questions through whole group instruction.  
*Formative assessment objectives in PBELL lesson:*
SWBAT: Recall facts from the stories and record the facts on a chart.  
SWBAT: Identify the characteristics of a bridge by using a graphic organizer.  
SWBAT: Work in small groups to discuss the parts of a bridge.  
SWBAT: Design a plan for what their personal bridge will look like.  
SWBAT: Write a plan for in their notebooks of how they will create their bridge.  
*Teachers will monitor this entire time and be sure students understand procedures to be done to develop their bridge.*

**Summative**
The student’s final outcome is reflected by the grade they receive based on participation and being creative with their bridge building.  
*Summative assessment objective in PBELL lesson:*
SWBAT: Show mastery by writing one sentence, using language of justification, about what material worked the best and why. This piece of paper will be collected. (grade is on participation and being creative with their bridge building)
Problem:

How will students inquire about the problem?

What skills do students need to present the solution?