RISE

Intentional Planning Sheet – Building a Bridge over "Water"

This is a sample of the RISE Intentional Planning sheet that was co-constructed by RISE teachers with the goal of challenging children to engineer a stable bridge that will span a predetermined "river" (made of blue felt/paper). The Intentional Planning sheet provides guidance in planning an experience and considers key details to assure the experience is rich in STE and HSC.

What is the problem/challenge? What is the learning goal?

Can you build a bridge over the "river" that is wider than the longest block in the set?
Children will begin to understand the structure and function of bridges.
Alternative learning goal: Motion and stability: can this bridge withstand weight, and if so, how much?

HSC Information - What do the children know or what relevant experiences have they had? What links can we make from this information to the challenge activity?

Using the QOTD, we asked children to think of a bridge they had seen and if it went over water, train tracks, road or something else. This allowed us to begin a discussion on bridges and for children to share experiences.

What prior knowledge or skills are needed?

- *A bridge connects 2 places*
- *There are different types of bridges*
- *Bridges do not fall down*
- *Children will need to be beyond the "stacking" stage of blocks*

Variables:	Materials: (e.g. visuals, charts, book, song, manipulatives)
Width of the river, height of the bridge, which sized blocks are being used	*"river" made out of felt, blocks, pictures of various types of blocks, people figures, toy car; bridge photos; neighborhood walk; songs (HS has a "Bridge/Tunnel/Road" song)*

How would you introduce the lesson (whole group)? Be sure not to give away the answer!

☐ open ended *X* guided ☐ structured

1. *Begin with a discussion allowing children to share what they know about bridges and/or the one they noted on the QOTD.*
2. *Given that the bridges over water was checked off the most on the QOTD, focus discussion more about what children know about this type of bridge and their experiences with water.*
3. *Share pictures of various sized bridges.*
4. *Using a narrow "river" (made out of felt or paper), have children determine how to create a bridge over the water (this will simply be a block on each side and one on top). Then provide a wider "river" and repeat activity. (This is a structured mini lesson or guided discovery)*
5. *Using a toy car, test the bridge. The car cannot get on the bridge. Introduce the use of ramps on both sides of the bridge.*

What type of investigation would you set up in a learning center after the introduction (small group)?

☐ open ended *X* guided ☐ structured

Provide children with an even wider "river". Can you build a bridge over this river? Offer only the long size block initially and then offer the shortest blocks only.

What questions would you pose to the children? Attention-focusing, Action, Problem-posing, Comparison, Math:

- *How does the length of the block impact our design?*
- *How many blocks do we need to _____?*
- *How can you change your design so that the boat will fit under?*
- *I noticed you made a path around the water. Can you tell me about what you are designing?*

How would you assess understanding?
Potential extensions? (**connect – deepen – extend**) • *Continue the challenge on other days, continuing to widen the "river"* • *Provide some materials that will not allow help in making a functional bridge* • *Provide various size boats. Is the bridge tall enough to allow the boat through?* • *Provide various sized objects to test the amount of weight the bridge can hold.* • *Play big by offering children large cardboard pieces/boxes and chairs to design large bridges* • *Read Three Billy Goats Gruff.* • *Take a neighborhood walk to notice bridges in our community.*

Circle the frameworks that will be addressed:

Scientific & Engineering Practices

1. Asking questions (science) defining problems (engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing & interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating and communicating information

Crosscutting Concepts

1. Patterns
2. Cause and effect: Mechanism and explanation
3. Scale, proportion, and quantity
4. Systems and system models
5. Energy and matter
6. Structure and function
7. Stability and change

Disciplinary Core Ideas

1. Physical sciences:
2. Life sciences:
3. Earth and space sciences
4. Engineering, Technology and the Applications of Science