OCTE 2011 – Elementary Conference Workshops

Grade 3 Biomimicry – "Gimme Shelter"

Curriculum Expectations

Science and Technology
Understanding Structures and Mechanisms – Strong and Stable Structures

Overall Expectations

2. investigate strong and stable structures to determine how their design and materials enable them to perform their load-bearing function
3. demonstrate an understanding of the concepts of *structure*, *strength*, and *stability* and the factors that affect them

Learning Goals

- I can use natural structures for ideas when I plan a strong and stable structure
- I can build a structure that can't be pushed over easily
- I can build a structure that can't be broken easily

Success Criteria

Knowledge and Understanding
- I will build a structure that uses something from a structure made by an animal
- I will build a structure that cannot be pushed over by a single hand push
- I will build a structure that can support several books (big books for life size model, and smaller books for prototype)

Thinking and Investigation
- I will look for the things that make a natural structure strong and/or stable
- I will use what I learned about natural structures to plan my structure
- I will use my plan to help me build my structure
- I will test my structure, and make changes to make it stronger and/or more stable

Communication
- I will use science and technology words to explain my plan, and how I built my structure

Application
- I will think of other human-made structures that are like mine
- I will think of other ways to use this kind of structure

Curriculum Connections

Language – Oral Communication (Speaking to Communicate)
The Arts – Visual Arts (Creating and Presenting)

Materials and Tools List

Materials:

- Newsprint
- Cardboard tubes
- Cardboard
- Construction paper
- Paper straws
- Re-used and/or recycled paper
- Playdough or clay
- Tape (e.g., masking, clear)
- Glue (e.g., white, low temperature glue gun)

Tools:

- Scissors
- Pencils
- Rulers

Print Resources:

- *And So They Build* by Bert Kitchen (ISBN: 1-56402-217-X)
- *Wild Technology* by Phil Gates (ISBN: 0-7534-5261-8)

Electronic Resources:

- "Fooled by Nature – Beaver Dams" (http://www.youtube.com/watch?v=Na2HYq11yuM)
- "Swallow Nest" (http://www.dailymotion.com/video/xejsmi_swallow-nest-swallow-bird-nest-barn_animals)
- "Paper Wasp" (http://www.youtube.com/watch?v=mHaKqTfZ8cQ)
- "Wasp Nest Museum" (http://www.youtube.com/watch?v=XudBD8hzHTo)
- "Attenborough – Giant Waterlilies" (http://www.strimoo.com/video/16440131/Attenborough-Giant-Waterlillies-MegaVideo.html)

Activity Description

Design Challenge:
Design and build a strong (can't be easily broken) and stable (can't be pushed over easily) temporary shelter* (based on natural structures) using the materials and tools provided.

Minds On/Hands On

- View natural structures (e.g., bird and squirrel nests, bee hives, wasp nests, ant hill, beaver dam) on hikes to natural areas, in their neighbourhood (including school or home), and at natural museums (could have a guest presenter bring in a variety of items); students observe items and talk about what makes them strong and stable.
- Read Aloud: teacher shows pictures and reads text from *Wild Technology* that show strong and stable structures from nature.
- Show video of strong and stable natural structures

Action

- Teacher introduces and provides design challenge to partners or small groups
- Teachers and students co-construct learning goals and success criteria based on those learning goals and prior learning
- Display tools and materials available for the design challenge
- Review Learning Skills related to this type of task (e.g., collaboration, responsibility)
- Design and build shelter using provided materials and based on ideas they learned about from natural structures
- Test shelter stability by trying to push it over with a single hand push
- Test shelter strength by placing a weight upon the shelter (e.g., a stack of big books on life size model; a stack of guided reading/smaller books)
- Make design changes based observations, and peer and teacher feedback
- Test again

Consolidation

- In their groups, talk about the ideas they used in their structure that were based on natural structures
- In their groups, talk about what went well with their design, what design changes were made and why, and what would they do differently; share these ideas with whole group (could be recorded by teacher on chart paper)
- In their groups, talk about other kinds of shelters that need to be strong and stable, and how they are similar and/or different to what they designed and built

Assessment and Evaluation

Teachers and students should co-construct learning goals and success criteria based on achievement of the learning goals at Level 3/4. Base descriptive feedback on the success criteria.

Teacher Notes

* Teacher decides whether the students will make a life-size model (provide shelter for one student) or a smaller prototype (30 cm X 30 cm).

For additional information on strong and stable natural structures see Biomimicry Taxonomy from Ask Nature (a project of the Biomimicry Institute [http://www.asknature.org/aof/browse]).

Consider connections to environmental impact and durability:

Overall Expectation:

1. assess the importance of form, function, strength, and stability in structures through time

Specific Expectation:

1.2 assess the environmental impact of structures built by various animals and those built by humans