The BSD-UW Partnership for Enhancing Elementary Science Teaching and Learning

The LIFE Center, University of Washington
Bellevue School District
Partners

- John Bransford
- Bob Abbott
- Philip Bell
- Hank Clark
- Angie DiLoreto
- Dan Gallagher
- Laura Gaylord
- Leslie Herrenkohl
- Susan Kaminoff
- Erin King
- Andrew Morozov
- Pol Thummaphan
- Andrew Shouse
- Giovanna Scalone
- Kari Shutt
- Allison Snow
- Carrie Tzou
- Nancy Vye
- Amy Winstanley
- BSD Collaborating Teachers & Students
Context

- Design-based implementation research (DBIR) (Penuel, Fishman, Cheng & Sabelli, 2011) initiative
- Effort to redesign hands on science teaching and learning to afford elementary students greater *agency*
- Initiative synthesizes previously separate, SLC-LIFE Center work by Bell and Bransford
- NSF (DRK12#1019503 & LIFE SLC#0835854)
Why Agency?

- Mismatch between NGSS and today’s school science
- In many schools,
  - Science inquiry practices ≈
    - Write procedures for teacher-provided investigative questions
    - Identify variables (controlled, measured, manipulated)
    - Record data and draw conclusions
  - Science inquiry is largely without broader purpose or application and inquiry experiences are disconnected (e.g., don’t use concepts or evidence from an investigation to make a decision or to inform next steps)
Initial Work of BSD-UW Partnership

• BSD/UW team focused on elementary science
• One 5th grade unit selected for redesign and became the *Isopod Habitat Challenge*.
• Initial results showed students were better prepared to:
  – ask scientific questions
  – make predictions
  – determine questions for follow up study
• That initial unit redesign provided the blueprint for redesigning further units.
Current Work of the Partnership

• Iteratively design, implement and test science inquiry learning environments that offer diverse groups of elementary students agency to inquire about relevant, socially-consequential science problems.

• Over 3 years, develop, implement & study three 5th grade and two 2nd grade trimester-long science units that:
  – incorporate students’ out-of-school experiences into formal science instruction, and;
  – involve sustained, student-directed, collaborative inquiry on complex problems
In *My Skokomish River Challenge*, students determine if and where to build a proposed low-income house development in the Skokomish River Valley, the most frequently flooded area in Washington. To inform their decision-making, students document erosion and deposition in their neighborhoods, conduct stream table investigations, examine maps of the proposed building sites, and learn the perspectives of Skokomish stakeholders.

*Erosion, Deposition, Maps, Models*
The Skokomish River area is:

- in Mason County on the Olympic Peninsula
- in western Washington State
The Evergreen Development Company wants to build an apartment building in the Skokomish River area.
The Evergreen Development Company has found 3 sites in the area where they could build the apartments.

When completed, 25 families could live there.

Affordable apartments are desperately needed in the area because so many people are out of work at this time. The apartments would allow people to stay in the valley even though times are tough.
A major problem in the Skokomish River area is flooding.

The Skokomish River is the most frequently flooded river in Washington State.
People’s use of the land has caused erosion of gravel, soil and sand. The gravel, soil and sand have washed into the Skokomish river and been deposited on the bottom of the river, making the flooding much, much worse.

The flooding of the Skokomish River is partly due to ways that people have used the land in the past. People have clear-cut the trees and built a dam on one part of the Skokomish River.
Mason County does not want the apartments to make the flooding problems worse in the Skokomish River area.

So, before Evergreen Development Company can build in the Skokomish area, their plan must be looked at and approved by Mason County government.
Your Challenge

Prepare a presentation on the following questions for the Mason County government:

1. Based on your research and investigations, what do you think is causing the flooding in the Skokomish River area?

2. Would you advise the Mason County government to approve the company’s plan to build apartments on any of the 3 sites? If so, which of the 3 sites would you recommend, and why? Provide evidence to support your thinking. In making your recommendation, think about the impact on the land and people in the area. Who might be affected by the decision to build and how might they be affected?

3. What recommendations do you have for how Evergreen Development Company could cause as little erosion as possible during and after construction?
Small Group Activity

Brainstorm initial thoughts (Challenge phase)
• What do you know (and how)?
• What do you still want to find out?

What question(s) would you want to investigate before making your recommendation?
**Question:**
What effect does soil type have on the amount of erosion?

**Prediction:**
I predict that compact granite, gravel and stone will cause less erosion.

because stronger soil stays together

Use the space below for a labeled diagram to support your procedure.
Embedded Inquiry Assessment – Landforms/Skokomish

If you could do another investigation in the stream table, what would you do? You will need to think of your own idea for an investigation.

- Generate investigative question
- Make a prediction & explain
- Identify variables
- Draw conclusions based on data
- Generate new/related investigation
- Identify confounds
Embedded Inquiry Assessment – Landforms/Skokomish

- Significantly higher scores for Agency students than FOSS students
- Higher scores hold for Cluster 1 and Cluster 2 Agency students
Take Aways

• Elementary students can formulate and plan investigations inside a larger challenge
• Existing science kits can be redesigned using this Challenge Cycle to provide opportunities for students to engage in scientific practices
Learn More at NARST!

Tuesday April 14th 1:00-2:30

A Research-Practice Partnership Towards Agentive Science Learning: Advancing Elementary Students’ Science Learning and Practice-Linked Identities