Week 3
Building Straw Towers

Reading: Transformative Communication as a Cultural Tool for Guiding Inquiry Science

(Polman & Pea, 2001)

School Science Reform Research: A Brief Historic

- There has been three decades of educational debate around scientific and technological literacy
- It started in the 80's when we realized that high school students:
  - Opted to take few science courses
  - Held major misconceptions
  - Scored low on international science tests
- And this was happening all over the world

- To date there are over 500 studies that have addressed the school science reform movement.
- But still there are problems with:
  - Low enrollment levels
  - Few females choosing science careers
  - Lack decision-making skills
- Recent surveys say that science jobs are increasing but the general level of public knowledge is not keeping pace.

Major Obstacles to Success

1. Teacher's understanding of how students learn

- An incomplete list of what learning should be:
  - Purposeful
  - Situated or contextualized
  - Anchored in real-world experience
  - Actively constructed
- This occurs through:
  - Problem-solving and inquiry
  - Debating, arguing and discussing
  - Applying what they've learned
  - Motivation

2. Teacher’s comfort levels with pedagogical content knowledge

   • This is related to skills, strategies, and theoretical understanding of how to teach in a specific content area.

   • Three-quarters of North American elementary teachers feel inadequately prepared to teach science

   • They often rely on textbooks, worksheets and teacher-centered instruction.

Building Straw Towers

- A couple of notes:

  - You will be taking the role of the learner in this activity.

  - We will be performing an experiment to observe the effects of collaboration vs. competition.

- When I say tower, what are some images that come to mind?
- What are some purposes of towers in the real world?
- What are some design challenges you would need to consider when building a tower?

Design Challenge

You have been brought together as a group of civil engineers to construct the tallest, most stable tower. Your design team will be competing for a contract awarded by the city. Before you can be awarded the contract, however, you must develop a prototype of the tower you intend to build.

Parameters

1. You must work in a group of three.
2. You must first develop a drawing on paper.
3. Once the drawing is completed you can collect your materials.
4. You can only use 40 straws and a meter of tape and you must use all of them.
5. Let’s generate evaluation criteria? (height maybe should be one)
6. The competition will close in 45 minutes.

Experiment

- Half of the design teams will be working in the part of the room closest to the windows.
  - Each person will have a role
    - Time Keeper, Material's Manager, Scout
  - Your group can share ideas with other groups in that half of the room.
- The other half of the design teams will be working in the part of the room closest to the door and in the hallway.
  - You do not have to assign roles
  - Your team cannot talk to other teams and you must try to hide your design from others.

Evaluation

- Differences and similarities between the structures?
- Which ones hold up best under the prescribed conditions?
- What are some variables that make the most successful towers?
- How did the collaborative teams feel during the activity?
- How did the competitive teams feel during the activity?
- How is this method different than some of the methods you seen or used in other science classes?

Reflection

Read the Polman & Pea (2001) article and consider the following questions:

1. What is the meaning of transformative communication as compared to ritualistic and transmissive communication?
2. What might be possible next steps you would take as a classroom teacher in a follow up lesson to the straw towers activity.

Discuss your answers in teams of two or three and post them in the forum on Moodle.

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