Cube It! for “Bigger Onions on Better Land”

Created by Emily Holden of Oregon State University

Description
“Bigger Onions on Better Land” tells the success story of farmers and scientists working together to improve the environment and their product. By using sophisticated irrigation systems, farmers have increased the size of the crops and limited nitrogen run-off. “Bigger Onions on Better Land” provides an example for students about how sustainability can be achieved through scientific research.

Cube It! is a game-like method that will increase student literacy and comprehension. The activity allows students to review and analyze material that they have already read, while playing a game. Cube It! encourages students to reach a higher level of Bloom’s Taxonomy of Cognitive Thinking.

Time Estimate
One 45- to 50-minute class period

Student Outcomes
- Students will examine the effects of herbicides and pesticides.
- Students will investigate new technology used in onion production.
- Students will discover the benefits of drip irrigation systems.

Standards
Science
H.2E.4: Evaluate human impacts on environmental quality and sustainability.
H.4D.5: Describe how new technologies lead to scientific inquiry and are responsible for changes in the ways people live and work.
H.4D.6: Evaluate how ethics, public opinion and government policy influence engineers and scientists and how their results impact human society and environment.

Language Arts
EL.HS.RE.01: Read at an independent and instructional reading level appropriate to grade level.
EL.HS.RE.02: Read and understand a wide variety of informational text.
EL.HS.RE.03: Make connections to text, within text and among texts.
EL.HS.RE.05: Match reading to purpose.
EL.HS.RE.06: Understand and use a variety of comprehension strategies as needed such as summarizing, class and group discussions and responding to questions.
EL.HS.RE.08: Understand, learn and use new vocabulary that is taught through informational text.
EL.HS.RE.15: Read magazines and news stories.
EL.HS.RE.19: Identify and summarize sequence of events, main ideas, facts, supporting details and opinions.
EL.HS.RE.20: Clarify understanding of informational texts by creating graphic organizers.
Career-Related Learning Standards
CS.PM.02: Plan, organize, and complete assigned tasks on time, meeting standards of quality.
CS.PM.05: Maintain appropriate interactions with colleagues.
CS.HS.01: Locate, process and convey information using traditional tools.

Materials
- Copies of “Bigger Onions on Better Land” from the 2009 issue of Oregon’s Agricultural Progress magazine, a special issue on Food in Oregon
- Copies of the “Bigger Onions on Better Land” Cube.
- Scissors
- Glue or tape

Vocabulary
DCPA: herbicide that was found to have significant negative impacts on water quality.

Drip irrigation system: system that slowly applies water directly to the root system of the plant.

Ground water: water that is stored below ground. It is often water that has seeped down through the soil after precipitation. It is the source of springs and wells.

Herbicides: substances used to kill plants, most commonly weeds.

Pesticides: substances used to eliminate organisms that are parasitic.

Runoff: water and other substances that are leached from the soil as rain, or other water, runs over it.
Cube It! Procedure

1) Divide students in teams of 6 or less.
2) Hand out prepared dice, or have students cut out and assemble them.
   a. Printing the dice on cardstock will result in a stiffer die.
3) Have students number a sheet of notebook paper 1 through 6 leaving 6-8 lines between each number.
4) Students should read the article as a team.
5) Each student should roll the die once until every student has answered a different question, and all 6 questions have been answered.
6) Each student should write his or her answer on the sheet of paper. The answers should be written in each student’s own words and handwriting.
Questions to Answer

1) Describe it
   What is the article about? What is the importance, color, size, shape, etc?
   EX: changes in farming practices have led to larger onions and less environmental impacts.

2) Compare it
   What is it similar to or different from?
   EX: Similar to cars and fuel usage. We have completed research that allows us to travel farther, faster on a gallon of fuel.

3) Associate it
   What does it make you think of?
   EX: It reminds me of all aspects of today's sustainability debate. Is it possible to reach a solution that allows farmers to continue to be profitable and sustain or improve our environment?

4) Analyze it
   Tell how it is made or what it is composed of.
   EX: Better seed breeding programs, drip irrigation and careful nitrogen application have led to less runoff and lower use of water, pesticides, herbicides and fertilizers.

5) Apply it
   What can you do with it? How is it used?
   EX: Can these same procedures and technologies be applied to other industries? Are there other crops that this technology can be directly applied to? Is there a way to adapt these concepts and increase feed efficiencies in livestock production?

6) Argue for or against it
   Take a stand and list reasons supporting its importance.
   EX: It has been a win-win situation for all involved: bigger profits and healthier environment.
   Farmers should have been left alone and not required to adhere to additional regulations: how much was spent on all this research?
Cube It! Pattern  
*Adapted from Dr. Travis Park of Cornell University*

- Describe It
- Analyze It
- Compare It
- Associate It
- Apply It
- Argue For or Against It