

Ohio's Science Education Standards Grade 8: Science and Technology

- Examine how science and technology have advanced through the contributions of many different people, cultures and times in history.
- Examine how choices regarding the use of technology are influenced by constraints caused by various unavoidable factors (e.g. geographic location, limited resources, social, political and economic considerations).
- Design and build a product or create a solution to a problem given more than two constraints (e.g. limits of cost and time for design and production supply of materials and environmental effects).
- Evaluate the overall effectiveness of a product design or solution.

Innovative ideas in science and technology are being used in pork production including: solar walls for supplemental heat, barn environmental controls, bio-filters and nutrient management systems. The technologies mentioned in the video are real-world applications of how science, engineering and technology are applied to solve problems and meet human needs and wants.

TECHNOLOGY CREATES A BETTER BARN TO CARE FOR THE ANIMALS...

Slatted floors in the “dunging area” allow farmers to efficiently use the nutrients found in pig manure. These organic compounds, containing nitrogen and phosphorus, build the soil and fertilize the crops. Using swine manure as fertilizer saves natural gas used to manufacture chemical fertilizers. In the “food court,” feed distribution systems allow for a prescribed diet, controlling nutrients and proteins in a corn-soy feed. Temperatures are controlled by variable-speed fans, water misters, and controlled air inlets. Sophisticated computerized water meters track consumption and water-to-feed ratios. Farmers receive cell phone messages when systems break down. Some computerized systems permit troubleshooting from remote locations with a password. US farmers have been working with farmers in Denmark and the Netherlands to study new systems they have developed¹. Collaboration leads to innovation and improvements.

ENGINEERING AND TECHNOLOGICAL LITERACY ARE NECESSARY FOR THE 21ST CENTURY...

Engineering design activities foster problem solving skills and increase awareness of scientific and technical careers. Use this simple model as a framework for designing an engineering lesson.

The Goal: A Better Animal Barn

Ask: What is the problem? What are the constraints?

Imagine: What are some solutions? Brainstorm ideas. Choose the best one.

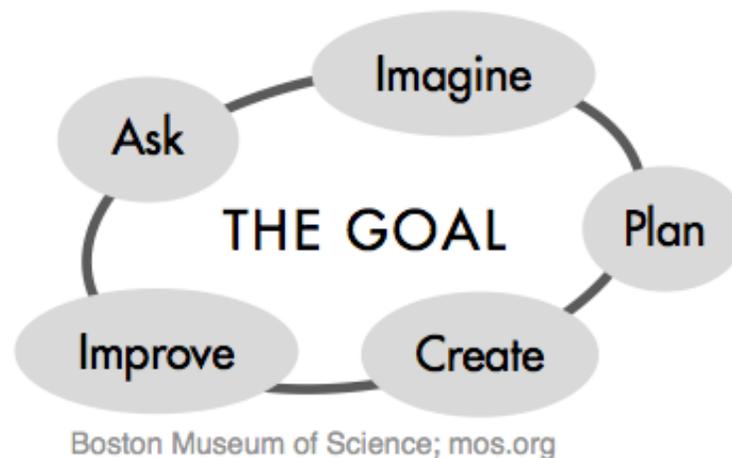
Plan: Draw a diagram. Make lists of materials you will need.

Create: Follow your plan and create a model. Test it out.

Improve: Talk about what works, what doesn't and what could work better. Modify your design and make it better. Re-test.

ENGINEERING DESIGN CHALLENGES

- Design a hog barn (or any animal barn). Assign different design constraints: number of pigs, cost of building materials (hoop vs. barn), terrain/geography, weather limitations, environmental regulations, energy efficiency. See pork.org, nationalhogfarmer.com, ohiopork.org.
- Design a Pooper-Scooper or Egg Rover; check out a civil engineering/agriculture challenge from ancient Mesopotamia. See thetech.org/learning/challenge/design.
- Try these online interactive explorations to engage students in the engineering process, online at quest.nasa.gov.



RESEARCH TOPICS

List ways technology has had an impact on industry: transportation, food production, nutrition, and animal care. Create a power point presentation to share with others.

- The Pork Industry. For photos and information go to: pork.org/newsandinformation/quickfacts/porkstory1.aspx
- Growing a Nation: American Agriculture. Download video/audio presentation at: agclassroom.org/gan/multimedia.htm
- History of Inventions. For timelines, trivia, and the birth of technology go to: inventors.about.com