

Encouraging Students to Question: Inquiry-based Learning in the Agriculture Classroom

Introduction:

- Inquiry-based learning is not new; in fact, reference to current use of inquiry as a teaching strategy can be traced to Comenius, Dewey, among others.
- Minner, Levy, and Century (2009) synthesized 138 different studies using inquiry-based learning and found that inquiry-based learning had a positive effect on learning of content, retention of content, and the conceptual understanding of students.
- Since agriculture classrooms teach many scientific principles, it makes sense to implement a teaching strategy requiring students to inquire about the topic and create their own opportunities to learn through inquiry-based learning activities.

Results to date:

- In the beginning, students wanted the teacher to give them the answers
- Throughout the year, students began to create their own scientifically-oriented questions and were excited to learn the answers to them on their own.
- By allowing students the opportunity to present their data in a manner of their choosing, students began to realize the importance of reporting data in an easy to understand format.

Advice:

In the beginning, adjust one part of each lesson to encourage the learner to be self-directed. The key to success is to be creative and follow the inquiry process.

How it works:

Step 1: Engage students in a scientifically-oriented question.

(Can be teacher given or student created.)

EXAMPLE

Can I grow a garden from the ingredients purchased to make salsa?

Step 2: Students either analyze teacher given data or collect own data to analyze.

EXAMPLE

Students take the ingredients from salsa then they create and conduct an experiment to collect data.

Step 3: Students formulate explanations based on evidence.

EXAMPLE

Some students planted the whole jalapeño; none of the jalapeños grew. Students would then explain why they believed this happened based on their collected evidence.

Step 4: Students connect their explanations to scientific knowledge.

EXAMPLE

The students who took the seeds out of the tomato and then planted just the seeds (spaced evenly) had great germination rates. Students made the connection that results were because the plants were not fighting for nutrients.

Step 5: Students communicate and justify their results.

EXAMPLE

Once students had finished the experiment, they presented their results to the class. They presented their own ideas for what went wrong or right.



The Question



Experimenting



Results

INQUIRY



Key Points:
Creativity & Process

1. Scientifically Oriented Question
2. Analyze Data
3. Formulate Explanation
4. Connect to Science
5. Communicate Results

Cost/Resources Needed:

The only direct costs related to inquiry-based learning activities are the supplies for the activities. The most critical resource is the time invested in the learning process in both preparation and implementation. Professional development in inquiry-based learning activities is helpful.

References:

Blythe, J. M., DiBenedetto, C. A., & Myers, B. E. (2015). Inquiry-based instruction: Perceptions of national agriscience teacher ambassadors. *Journal of Agricultural Education*, 56(2), 110-121. doi: 10.5032/jae.2015.02110
Edelson, D. C., Gordon, D. N., & Pea, R. D. (1999). Addressing the challenges of inquiry-based learning through technology and curriculum design. *Journal of the learning sciences*, 8(3-4), 391-450.
Maaß, K., & Artigue, M. (2013). Implementation of inquiry-based learning in day-to-day teaching: a synthesis. *ZDM Mathematics Education*, 45(6), 779-795. doi: 10.1007/s11858-13-0528-0

Minner, D. D., Levy, A. J., & Century, J. (2009). Inquiry-based science instruction- What is it and does it matter? Results from a research synthesis years 1984 to 2002. *Journal of Research in Science Teaching*.
National Research Council. (2000). *Inquiry and the national science education standards: A guide for teaching and learning*. Washington, DC: National Academy Press.
National Committee on Science Education Standards and Assessment. (1996). *National science education standards*. Washington, DC: National Academy Press.