Making the Best 4-H Clubs Better –Version 2.0

Science Inquiry

Science begins with the search for knowledge---science is asking questions. Many scientists use a process that has been labeled "The Scientific Method" where a hypothesis is part of the process. However, "Science Inquiry" at its essence, is asking a question. Did Darwin climb aboard the Beagle with the hypothesis of natural selection in mind? Did Galileo experiment with falling objects with the hypotheses that they would have the same acceleration? No—in both of these cases, they were exploring the unknown. They were just asking questions.

Steps Involved in Science Inquiry

1. ***Observation.*** You find a puzzling situation (discrepant event) or recognize the existence of something different, a problem, or an interesting thing to study.

2. ***Inquire/ Ask a Question.*** Develop a question to address what you want to find out. It must be something that is testable.

3. ***Research.*** Study the problem and gather information in order to analyze the situation/event/problem.

4. ***Design the Method/Find the Materials.*** Finding solutions to answer your question requires exploring and testing; this is the experimentation part. Some factors are kept stable (controls) and some factors are allowed to change (variables). Students design their experiment, taking variables and controls into account, and decide what equipment they will use.

5. ***Collect and Record Data***. This involves performing the experiment, gathering data and recording it in a meaningful way.

6. ***Analyze the Data.*** Analyze what the data means, interpret the results and draw conclusions.

7. ***Communicate the Results.*** Document and share the results and conclusions. Other people may want to try the same experiment to check if they get similar results.

   This step also includes sharing your results and information in the community. If for example your project is trying to determine what direction the hole in a tree swallow bird box should face for the best results for the birds, your students will most likely have the most knowledge about topic than just about anyone in your community. Your students spent valuable time in the field collecting information. If this knowledge stays in the school or the 4-H club, the true value of their work is not maximized.

8. ***Ask a New Question.*** Ask a new question which may have developed during the investigation.

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4-H Science Checklist

A "Science Ready" 4-H experience is a program that is framed in Science concepts, based on Science standards and intentionally targets the development of science abilities and the outcome articulated by the 4-H Science Logic Model. Additionally, it integrates the Essential Elements and engages participants in experiential and inquiry based learning. In addition to the following criteria below, it's also recommended that science programs offer a sustained learning experience which offers youth the opportunity to be engaged in programs with relevant frequency and duration.

Utilize the following checklist to self-assess the program you deliver. To meet the needs of children, youth and the nation with high-quality science, engineering and technology programs…

- ✓ **Are you providing science, engineering and technology programs based on National Science Education Standards?** Science education standards are criteria to judge quality: the quality of what young people know and are able to do; the quality of the science programs that provide the opportunity for children and youth to learn science; the quality of science teaching; the quality of the system that supports science leaders and programs; and the quality of assessment practices and policies. **http://www.nap.edu/readingroom/books/nses/**

- ✓ **Are you providing children and youth opportunities to improve their Science Abilities?**
- ✓ Predict, Hypothesize, Evaluate, State a Problem, Research Problem, Test, Problem Solve Design Solutions, Measure, Collect Data, Draw/Design, Build/Construct, Use Tools, Observe, Communicate, Organize, Infer, Question, Plan Investigation, Summarize/Relate, Invent/Implement Solutions, Interpret/Analyze/Reason, Categorize/Order/Classify, Model/Graph/Use Numbers, Troubleshoot, Redesign, Optimize, Collaborate, Compare

- ✓ **Are you providing opportunities for youth to experience and improve in the Essential Elements of Positive Youth Development?** Do youth get a chance at **mastery** – addressing and overcoming life challenges in your programs? Do youth cultivate **independence** and have an opportunity to see oneself as an active participant in the future? Do youth develop a sense of **belonging** within a positive group? Do youth learn to share a spirit of **generosity** toward others?

- ✓ **Are learning experiences led by trained, caring adult staff and volunteers acting as mentors, coaches, facilitators and co-learners who operate from a perspective that youth are partners and resources in their own development?**

- ✓ **Are activities led with an experiential approach to learning?**

- ✓ **Are activities using inquiry to foster the natural creativity and curiosity of youth?**

- ✓ **Does your program target one or more of the outcomes on the 4-H Science Logic Model and have you considered the frequency and duration necessary for youth to accomplish those outcomes?**

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