Program Focus Team Action Plan:

Preparing Kansas' School-Aged Youth to Engage in Science Discovery and Exploration for their Workplaces and Careers

2013-2014

Strategic Opportunities Addressed:

- Prepare People in Kansas to Thrive in a Global Society and All Aspects of Life

Situation:

America faces a future of intense global competition with a startling shortage of scientists. In fact, only 33 percent of 8th graders and 18 percent of U.S. high school seniors are proficient in science (*National Assessment of Educational Progress (NAEP), 2012.*) and a mere 5 percent of current U.S. college graduates earn science, engineering, or technology degrees compared to 66 percent in Japan and 59 percent in China. Only 40% of US STEM freshman majors complete their programs.

Student science test scores in Kansas have decreased by 3.1 percentage points since 2011. The percentage of students who are proficient in science by grade 11 is half of that in grade 4, and the rate of those who do not meet the standards more than doubles in that time. Students who are highly skilled in science are even more rare, with only 10 percent of high school students receiving an exemplary score. Science test scores for Kansas minority students are dismal, nearly 1 ½ times lower than the state average. (Kansas State Department of Education School Report Card. 2011-12.).

When these statistics are coupled with the record number of retirements for current scientists and engineers, it is clear that America is facing a crisis in its ability to keep up with the increasing demand for trained professionals in these fields. The *American Association for the Advancement of Science* document Science for All Americans describes a scientifically literate person as "one who is aware that science, engineering, and technology are human enterprises and who applies scientific content and abilities in meaningful ways."

Clearly, 4-H is at a turning point in its history with an extraordinary opportunity to reaffirm its legacy as a leader in hands-on, non-formal science education. Understanding and appreciating the role of science is even more critical as the needs of our society and its workforce change. Now, more than ever, we must ensure that our nation's youth develop the necessary competencies and abilities for the United States to remain competitive in the 21st century.

Public Value:

Youth participants in Kansas State University Research and Extension science programs acquire positive attitudes towards science, gain science skills and abilities, and become better prepared to support science in a globally sustainable world. They participate and excel in science, technology and math courses at school at a higher rate than the general population, and are more likely to continue their post-secondary education or training in science-related fields.

Outcomes:

Short-Term:

Youth increase interest and engagement in 4-H science (i.e. become aware; adopt new or different attitudes; develop opinions, new aspirations and/or new motivation; or learn new knowledge)

Evaluation Questions:

Or Target Indicators:

- Participation in 4-H science programs across subject areas
- Interest and mastery of science process skills (observation, comparison, hypothesis)

- Volunteers interested in science, engineering, and technology
- Use of the scientific method and/or systematic problem-solving
- Participation in 4-H presentations, demonstrations, skill-a-thons and rubric judging

Evaluation Questions/Measurement Instrument Sources:

- *4-H Common Measures - Science (2013)*
- Number of youth enrolled in 4-H projects using science-ready resources
- Number of adult volunteers mentoring in 4-H science-ready projects

Medium-Term:

Youth use and act on their skills attributed to 4-H science (i.e. acquire new skills, practice new behaviors, or demonstrate new abilities)

Evaluation Questions:

Or Target Indicators:

- 4-H science learning environments and approaches are effective
- The number of youth seeking out opportunities to participate in 4-H science
- The number of youth seeking out leadership roles in 4-H science
- The comfort of 4-H adult volunteer mentors facilitating youth in 4-H science opportunities

Evaluation Questions / Measurement Instrument Sources:

- Implementation of Dimensions of Success (DoS) *(PEARS Institute, Harvard, 2013)* evaluation strategy to measure quality of 4-H science learning environments and delivery methods
- Aggregate the resources invested in 4-H Science programs
- Compare performance of youth on *4-H Common Measures – Science (2013)* over time
- Student performance on *"Next Generation Science Standards" (NGSS*).

Long-Term:

Youth will appreciate science as a discovery process and many will choose occupations in science subject matters for careers.

Evaluation Questions:

Target Indicators:

- 4-H science participants who choose science-related post-secondary training
- 4-H science participants who choose science-related careers

Evaluation Questions:

- Number of youth who choose science-related post-secondary training or careers
- Number of youth who participate in science extra-curricular activities
- Number of 4-H alumni who sustain their involvement in 4-H science as volunteers
- Number of youth who attribute 4-H science experiences to their choice of post-secondary education and/or careers

Outputs:

Output/Participants:

- Kansas school-aged youth

Outputs/Activities to achieve Science Abilities:

(e.g. delivery modes…; ways…; strategies)

- Train staff and volunteers to utilize inquiry as they work with science in a variety of settings.
- Support best implementation practices for all 4-H science and other resources in a variety of educational settings.
- Increase the number of settings across-the-state that offer 4-H science educational opportunities.
- Train staff to utilize evaluation strategies.

*Also known as: SET (Science, Engineering, & Technology); STEM (Science, Technology, Engineering and Mathematics); and STEAM (Science, Technology, Engineering, Agriculture or Art, and Mathematics)

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