



EVALUATING THE 4-H SCIENCE INITIATIVE:

*Youth, Engagement, Attitudes, and
Knowledge Survey Results — Year 2*

INTRODUCTION/OVERVIEW

A RESPONSE TO THE NEED FOR FUTURE SCIENTISTS ...

The 4-H Youth Development program offers a solution to address the need for future scientists, engineers, mathematicians, and technicians. According to the most recent 4-H Science Enrollment Report, more than 1.3 million young people are engaged in 4-H Science Ready programs.

Today, 4-H out-of-school opportunities focus on plant science, animal science, environmental sciences, electricity, mechanics, natural sciences, rocketry, biofuels, renewable energy, computer sciences, and more. The combination of rich science content and a meaningful youth development context inherent in 4-H clubs, camps, and 4-H afterschool programs is proven to have a positive effect on youth, resulting in young adults who are prepared to contribute, excel, and lead in their communities and in the global workplace.

4-H IS AMERICA'S LARGEST YOUTH ORGANIZATION

Annually, nearly six million youth participate in 4-H, which is implemented by 109 land-grant universities and Colleges in more than 3,000 counties as a part of the Cooperative Extension System. National leadership is provided by National 4-H Headquarters, National Institute of Food and Agriculture, USDA, and National 4-H Council. National 4-H Council, the national nonprofit partner of 4-H and the Cooperative Extension System, focuses on fundraising, branding, communications, and legal and fiduciary support to 4-H programs.

The goals of the 4-H Science initiative are to increase the number and quality of science, engineering, technology and applied math programs that 4-H offers around the country, and to increase the number of youth involved in these programs. Objectives for the 4-H Science initiative are to increase science interest and literacy among youth, to increase the number of youth pursuing post-secondary education in science, and to increase the number of youth pursuing science careers. With the support of the Noyce Foundation, National 4-H Council contracted with Policy Studies Associates (PSA) to evaluate the implementation of the 4-H Science Initiative using the 4-H Science Youth Engagement, Attitudes, and Knowledge (YEAK) survey, a program evaluation tool developed in conjunction with the 4-H Science Instrument Design Team.

METHODS

An initial survey was given to a sample of 4-H Science program educators (n=19) to verify that their 4-H program was science focused, and to collect information about its goals, its daily activities, and the content areas it addressed. The Youth Engagement, Attitudes, and Knowledge (YEAK) survey, a self-report questionnaire used to understand the attitudes youth in 4-H Science programs hold towards science, was then given to the youth participants.

THE SAMPLE

4-H Science programs (n=19) from 7 LGU's were randomly selected to participate in the YEAK survey. In total, 486 youth ranging from 9 to 18 years of age participated (69% were between 9 and 12 years of age and 31% between ages 13 and 18). Females comprised a majority of the sample (59%). Sixty-one percent of youth reported their race or ethnicity as white, 25% as African American, 12% as other, 8% as Hispanic or Latino, 4% as Native American, 3% as Asian-American, and 1% as Native Hawaiian/Other Pacific Islander.

SUMMARY OF 4-H SCIENCE YEAK STUDY FINDINGS¹

EXPOSURE

To measure intensity and dosage, 4-H youth were asked to report their length of involvement in 4-H Science programs and how many hours per week they spend in this program/project.

- 39% of youth were classified as high exposure and reported participating in their program for the greatest number of hours and months (at least 1 hour or more per week for 5 or more months)
- 26% of youth were classified as moderate exposure and participated in their program for fewer hours per week and for fewer months (1 hour or less over 5 or more months, or 1 or more hours over 2-4 months)
- 36% of youth were classified as low exposure and reported participating in their program the least (less than 3 hours over 4 or fewer months)²

PARTICIPATION IN COMMUNITY SCIENCE ACTIVITIES

- 70% have participated in a science-related community service project in the past year
- 56% have taught others about science

LIFE SKILLS

- 46% always think before making a choice
- 40% process all the information they have about different choices before coming to a decision
- 35% always keep their mind open to different ideas when planning to make a decision
- 49% always first figure out what the problem is before solving a problem
- 32% always think about how their solution worked after they solved the problem

NOYCE ENTHUSIASM FOR SCIENCE SURVEY

In order to begin building a broad set of data on interest in science among youth enrolled in nonformal science education programs, the Noyce Foundation partnered with evaluation specialists and Foundation grantees to develop a set of youth survey items that measure youths' enthusiasm for science.

- 85% like to see how things are made
- 82% like to participate in science projects
- 74% want to understand science
- 81% like to work on science activities
- 75% like to take things apart to learn more about them

ASSOCIATIONS BETWEEN PROGRAM AND YOUTH CHARACTERISTICS AND YOUTH RESPONSES

- Youth who fell in the high-exposure group gave higher ratings to their own decision making, critical thinking, and problem solving skills. They also reported experiencing greater benefits from their science program than youth with less exposure.
- Boys were more enthusiastic about science than girls. However, girls gave more positive evaluations of their own decision making and critical thinking skills than boys.
- Youth from underrepresented racial or ethnic groups rated their decision making, critical thinking, problem-solving skills, enthusiasm for science, and their science process skills lower than well-represented groups.³

PROGRAM PERSPECTIVE

Educators leading these programs report:

- 89% of youth learn about careers that use science
- 81% meet with adults who work in science-related fields
- 80% learn about educational choices that youth must make to pursue a science-related career
- 68% take field trips to see how science is used in real life

EDUCATIONAL AND CAREER ASPIRATIONS

- 52% want to finish college
- 37% want to get more education after completing a college degree
- 54% want to pursue a science-related career after graduating from high school

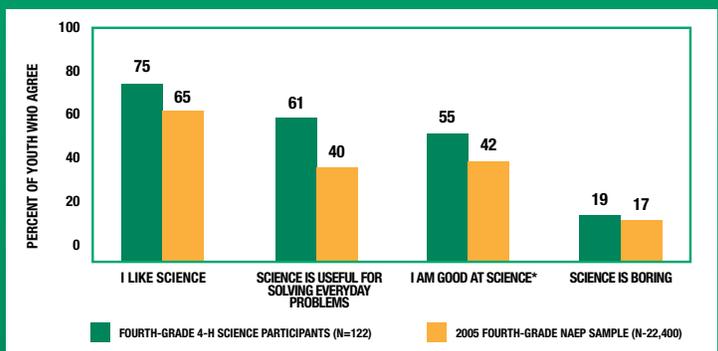
SCIENCE PROCESS SKILLS

- 87% of youth ages 9–12 can make a chart or picture to show information
- 86% can do an experiment to answer a question
- 83% of youth ages 13–18 always or usually use the results of their investigation to answer the questions they asked
- 80% ask questions that can be answered by collecting data
- 77% can record data accurately

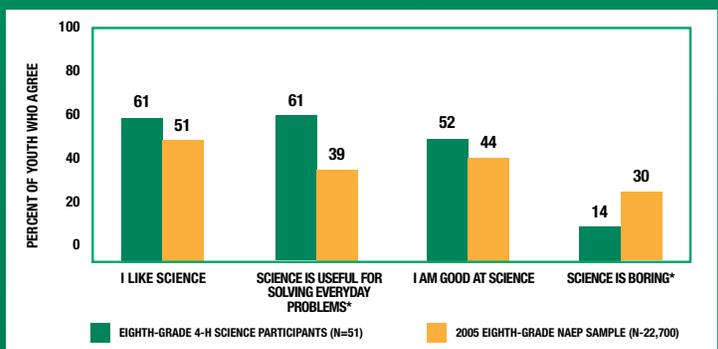
SCIENCE PROGRAM ENVIRONMENT AND BENEFITS

- 65% said spending time with their friends was their favorite part of their program
- 35% said that caring and kind adults was their favorite aspect of their program
- 52% said doing hands-on science activities and projects is one of their favorite things about their program

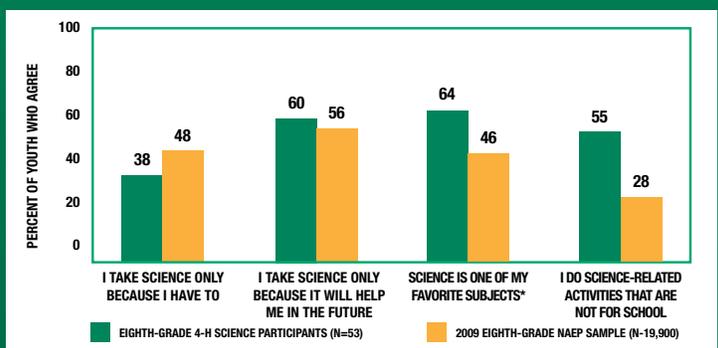
Fourth-Grade 4-H Science and NAEP Respondent Attitudes Toward Science, in Percents



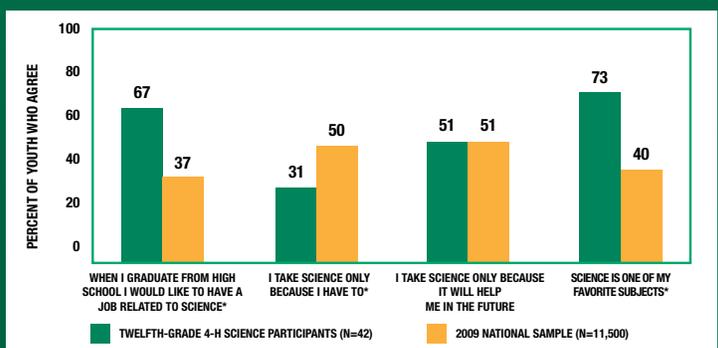
Eighth-Grade 4-H Science and 2005 NAEP Respondent Attitudes Toward Science, in Percents



Eighth-Grade 4-H Science and 2009 NAEP Respondent Attitudes Toward Science, in Percents



Twelfth-Grade 4-H Science and 2009 NAEP Respondent Attitudes Toward Science, in Percents



Exhibits read: Seventy-five percent of fourth-grade 4-H Science participants agreed that they like science, compared to 65 percent of 2005 fourth-grade NAEP respondents.

Comparison against a national sample. While the differences between the 4-H Science participants and NAEP respondents were statistically significant and are encouraging, these differences should be interpreted with caution because the effect sizes were not strong enough to meet this evaluation's threshold.

*Indicates a statistically significant comparison ($p < 0.05$)

RECOMMENDATIONS/OPPORTUNITIES FOR LEARNING

- Giving youth more frequent opportunities to practice science skills improved youths' estimations of their own science skills and revealed greater youth enthusiasm for science.
- Planning and intentionality are important parts of delivering high quality youth programming.
- In order to support and develop greater participation of girls and youth from racial and ethnic groups that are underrepresented in science fields, 4-H should continue to seek out best practices for recruiting, engaging, and supporting these youth.

CONCLUSIONS

A deeper look into the content and context of the participating 4-H programs allowed for a richer and deeper understanding of the various learning opportunities available for 4-H youth. Taken altogether, the evaluation findings reported indicate that 4-H is indeed implementing an abundant variety of science, engineering, and technology programs to 4-H youth successfully. By providing engaging out-of-school programming, 4-H Science programs have the potential to bolster participants' interest in pursuing education and careers in the STEM fields.

¹ For information on the survey scales used in this study, please reference the full report found at 4-H.org - About/Research/Science

² The percentage exceeds 100% due to rounding.

³ Youth reported as being white and/or Asian American were categorized as well-represented in science fields; youth from other racial/ethnic backgrounds (Hispanic/Latino, African American, Native American, Native Hawaiian/Other Pacific Islander, and youth who specified "other") were categorized as underrepresented.



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