5.3 Science, Engineering and Technology Literacy FY10

Brief Summary of Program

Youth participate in educational 4-H activities centered in environmental education, biological and physical sciences, plant and animal sciences, technology and engineering, food and nutrition, and fiber science and apparel design.

Situation and Priorities Statement

In international comparisons, U.S. student performance in mathematics and science is at or below levels attained by students in other countries in the developed world (Science and Engineering Indicators 2004, National Science Board). The longer students stay in the current system the worse they do. According to the 1995 Third International Mathematics and Science Study, U.S. fourth graders ranked second. By twelfth grade, they fell to 16th, behind nearly every other industrialized rival and ahead of only Cyprus and South Africa. (No Child Left Behind, U.S. DOE) A survey of more than 1700 Science Educators found that 68% of those polled cite science literacy as "essential" for adults (Bayer Corporation, 1999). Hands-on learning has been shown to increasing learning and achievement in science content (Mattheis & Nakayama, 1988; Brooks, 1988; Saunders & Shepardson, 1984; Bredderman, 1982). Research indicates that activity-based science can improve students' attitudes toward science (Rowland, 1990; Kyle, et al., 1988; Jaus, 1977; Kyle et al, 1985). Evidence clearly indicates that hands-on activities increase skill proficiency in processes of science, especially laboratory skills and specific science process skills, such as graphing and interpreting data (Mattheis & Nakayama, 1988). In a 1999 study of NYS 4-H club members, 80.9 percent of members surveyed reported that they prefer hands-on projects and 36.9 percent reported that it was the most important component of their club experience. (Mead et al, 1999).

Research links experiential learning with higher student performance in mathematics and science. 4-H has succeeded in providing such learning opportunities to kids. Approximately 500,000 New York state youth participate in educational 4-H activities centered in environmental education, biological and physical sciences, plant and animal sciences, technology and engineering, food and nutrition, and textiles and apparel. In fact, 77% of all 4-H curricula have a science and/or technology focus. The strong connection to science and technology exists, in part, because of the connection to Cornell and other land grant universities.

The Science and Technology Program Work Team is working to strengthen the connections between science and technology initiatives at Cornell University, other land grant universities and the Cornell Cooperative Extension Associations. The Science and Technology PWT is working on the NYS 4-H Resource Directory, making additional outreach connections and promoting staff development focused on outreach and science and technology.

Nationally, the 4-H Science, Engineering and Technology Program is contributing to long-term solutions for improving science literacy and aptitude of America’s youth. 4-H will address our nation’s critical challenge by preparing 1 million new young people to excel in science, engineering, and technology by 2013.

Assumptions

- Many 4-H educators and 4-H volunteers are not aware of the many different resources or opportunities that are available to them to enhance science and technology learning in their 4-H programs.
- Curriculum and program design should incorporate best practices for building life skill competencies and recognize how different delivery methods may impact learning.
- Youth have different interests and needs and therefore respond differently to the same opportunities. They should have choices about which activities they participate in and they should have a chance to help shape those activities.
- The uniqueness of 4-H is its connection to the land grant university system.
- Many opportunities exist to connect youth to the educational resources of Cornell University in the area of science and technology.

Target Audiences

The target audiences for 4-H Science and Technology programming and curricula are youth in grades K-12 and adults who work with youth. These include, but are not exclusive of 4-H Leaders, 4-H Junior Leaders, and 4-H youth members, parents of 4-H members, adult leaders and the youth involved in after school and out-of-school-time programs, summer camp staff and youth campers, classroom teachers and their students in grades K-12, and leaders and youth in other youth serving organizations such as Scouts. Training one adult leader will result in a significant multiplier of youth who will participate in the activity from which their adult leader received training. This audience is reached directly through educational classes and workshops, individual consultations, group consultations and hands-on-curricula. These may be provided to youth or to their adult leaders. Additional contacts are made through newsletter articles highlighting curricula...
and curriculum reviews. The New York State 4-H Curriculum Resource Directory website provides and opportunity for any person to search for approved curricula in any Science and Technology topic, read a description of the curricula and then purchase it.

**Ultimate Goal(s) of the program**

Youth become knowledgeable, contributing participants in science and technology-related issues in their communities and chosen professions.

*Note: Only highlighted outcomes are collected in annual reporting.*

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<tr>
<th>Outputs</th>
<th>Near-Term Outcomes</th>
<th>Mid-Term Outcomes</th>
<th>Long-Term Outcomes</th>
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<tbody>
<tr>
<td>(5.3.1a) # of 4-H members enrolled in Science and Technology project areas (as reported on ES-237). (no target)</td>
<td>(5.3.1d) # participants demonstrating increased awareness of SET, improved SET skills including scientific methods, knowledge of specific sciences, and/or increased awareness of opportunities to contribute to society using SET skills. (20,000)</td>
<td>(5.3.1e) # of participants that report improved success in school science and/or increased interest in science and technology. (15,000)</td>
<td>(5.3.1i) # of youth documented to become contributing participants in sci/tech related issues in their communities and/or choose sci/tech related professions and who attribute same at least in part to involvement with the program. (no target)</td>
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<td>(5.3.1b) # of youth reached through school enrichment and special interest programs, 4-H camp, and after school programs coded as science and technology related (as reported on ES-237). (no target)</td>
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<td>(5.3.1f) # youth applying SET learning to contexts outside 4-H programs, e.g., school classes, science fairs, invention contests, etc. (7500)</td>
<td>(5.3.1j) Increased number and more diverse pool of youth pursuing education and careers in SET related fields (no target)</td>
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<td>(5.3.1c) # of 4-H and other youth program educators and adult volunteers participating in programs on SET for youth (no target)</td>
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<td>(5.3.1g) # youth expressing interest/demonstrating aspirations towards SET careers, e.g., career fairs, job shadowing, volunteer work or internships (2000)</td>
<td>(5.3.1k) Increased and more diverse pool of trained teachers, educators, scientists (no target)</td>
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<td>(5.3.1h) # youth adopting and using new methods or improved technology (2000)</td>
<td>(5.3.1l) Increased science literacy in general population (no target)</td>
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