

College of Agricultural Sciences Strategic Initiatives and 4-H Youth Development Programming

4-H Youth Development programs reach over 170,000 youth across the Commonwealth. In addition, the program prepares and works with over 8,500 adult mentors/volunteers. In order to support this program, approximately 70 FTEs are employed through Penn State Cooperative Extension and county offices. In Pennsylvania, the program is built on Extension's founding principles of technology transfer, community leadership, and improving quality of life.

4-H Youth Development and Science Education

One of three mission mandates in the 4-H Youth Development program focuses on science, engineering, and technology (SET). Objectives of the SET mandate include increasing knowledge, skills, competencies and comfort levels of 4-H staff and volunteers to deliver 4-H SET programming to youth and to increase public and private funding for this mission area.

The 4-H Youth Development Program builds youth of strong character who will be future students and workers within the Commonwealth of Pennsylvania. Extension Educators supporting this program want to feel an alliance with the strategic initiatives of the College of Agricultural Sciences at Penn State. Unfortunately, the goals are often narrowly defined and based upon technology and knowledge beyond the scope of youth abilities and interest. At the same time, youth programs are needed to ensure the development of a knowledge and technology base for future generations. Cooperative Extension's 4-H Youth Development program is about developing well-rounded young adults who will then fit into many of the strategic initiatives currently being developed by the College through careers and community involvement. The groundwork must be laid if we do not want to be repeating our efforts in education every 10-20 years.

Science Education for Youth

America presently faces a significant challenge - young people are not prepared with the necessary SET workforce skills to compete in the 21st century (Rising Above the Gathering Storm, 2006). 4-H is the only youth program with direct access to technological advances in agriculture and life sciences, which result from land-grant university research. This access and application to quality, research-based science, engineering, and technology curricula makes the program unparalleled to any other youth organization in the country, making 4-H the largest provider of informal science experiences. 4-H provides youth with hands-on learning experiences that foster exploration, discovery, and passion for the sciences.

A recent report of the National Academy of Sciences (2006), *Rising Above the Gathering Storm*, speaks to the urgent need to enhance academic and vocational experiences in science, engineering, and technology. American inventiveness and competitiveness in the global marketplace are at risk as student interest and performance in SET disciplines decline at the same time that SET literacy and mastery expectations rise (Business Roundtable, 2005). The increasing pace and complexity of life in a technological age demands engaged, innovative, and cooperating citizens.

Science, engineering, and technology (SET) skills are necessary for productive work in the 21st century economy (Kane, Berryman, Goslen, & Meltzer, 1993) and for everyday survival in

mainstream youth culture. SET represents a broad range of disciplines and careers built upon communication and mathematical literacy and applied to multi-disciplinary pathways (e.g., biomedical engineering, environmental GIS). In many of these fields, American youth are losing ground to peers in other nations (Business Roundtable, 2005). Growth in science disciplines (content knowledge) and science abilities (process skills) is synergistic, increasing exponentially with experience and maturation. Optimal outcomes result from early and continuous learning keyed to developmental capacities. Moreover, creative and critical thinking activities prepare youth as innovators and adaptive problem-solvers—roles in high demand in the New Economy (Kane et al., 1993). Upper elementary and middle school years are critical times for strengthening interests and abilities, especially for young women and ethnic minority youth (National Academy of Sciences, 2006). At all stages, factual knowledge is not as important as critical thinking skills, including: 1) knowing and applying scientific explanations to the natural world; 2) generating and evaluating scientific evidence and explanations; 3) understanding the nature and development of scientific knowledge; and 4) participating in scientific practices and discourse (National Research Council, 2007).

4-H Youth Development and the College's Strategic Initiatives

Engaging 4-H youth in the strategic initiatives of the College of Agricultural Sciences provides opportunities for increasing developmentally appropriate science knowledge and process skills. For example, National 4-H Headquarters and USDA worked with the US Department of Energy on the development of energy curriculum (heat, motion, light, and chemical) for middle school youth. Currently, 4-H educators are being trained on use of the curriculum. In addition, a College faculty member and a graduate student are developing educational materials that will inform youth on the Pennsylvania applications of this energy curriculum. Enhanced materials for volunteer mentors working with youth on the curriculum assist in increasing the science knowledge and science comfort level of adults. Materials are also being developed to inform these middle school students about careers and further educational opportunities. Research projects can be built around curriculum impact, knowledge use and implementation, clientele needs, and a variety of other opportunities.

These opportunities exist for all the strategic initiatives. For further information on the 4-H Youth Development program, contact Christy Bartley, Program Leader at cbartley@psu.edu or 814-863-3828.