4-H Rutgerscience Saturdays

A Science Technology Engineering and Mathematics (STEM) program designed to connect middle school age young people to Rutgers University faculty and inspire them to become scientists and engineers.

The 4-H Rutgerscience Saturday program is designed to enrich young people’s interest and competency in science, technology, engineering and mathematics by having direct interaction with Rutgers University faculty, graduate, and undergraduate students. The program offers middle school aged young people the opportunity to engage in hands on activities and demonstrations that highlight a wide variety of STEM disciplines offered at Rutgers University.

Program Outline

4-H Rutgerscience Saturdays are offered in the fall and spring semesters, predominantly on the Cook Campus of the School of Environmental and Biological Sciences. The program is a combination of demonstrations, tours, field experiences, and hands on activities focused on a different STEM theme. The objective is to create opportunities for young people to experience skills used in a specific STEM discipline, with the assistance and guidance of a practicing Rutgers scientist. Since 2009, the program has offered programs in topics such as geology, entomology, oceanography, food sciences, and environmental sciences. A typical 4-H Rutgerscience Saturday involved 3-6 scientists interacting with approximately 40 young people.

10:00 am Youth participants are welcomed and divided into three groups (15/group) and rotated through three programs over the course of the morning and afternoon.

Lunch: Participants are invited to attend a catered lunch with university scientists where they can informally talk and get answers to their science questions.

2:00 pm Young people reflect and provide feedback on the day’s experience. Participants receive a Rutgers souvenir for participating in the program.

The 4-H Rutgerscience Saturday program is designed to increase knowledge and skills while stimulating interest in STEM career paths among participants. In 2012, we welcomed 162 young people on campus (45% male and 55% female participants grades 5-9).

Table 1: Summary of 2012 Participation Statistics for 4-H Rutgerscience Saturdays

<table>
<thead>
<tr>
<th>Theme</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Astronomy</td>
<td>38</td>
</tr>
<tr>
<td>Ocean Science</td>
<td>28</td>
</tr>
<tr>
<td>Natural Disasters (Meteorology/Geology)</td>
<td>67</td>
</tr>
</tbody>
</table>
Youth Perception of Science and Scientists

4-H Rutgersscience Saturdays are focused on providing young people with the opportunity to interact with scientists and engineers. Our assumption in designing and implementing the 4-H Rutgersscience Saturday program is that we can promote career interest in STEM fields through exposure to and interaction with the information, tools, and people in science. By interacting with scientist role models we are trying to motivate young people to feel like they can perform the skills necessary to be a scientist. Figure 1 (below) indicates young people participating in 4-H Rutgersscience Saturdays value their interactions with Rutgers scientists.

Youth participants engaged in a wide variety of science topics and consistently favorable ranked their experiences in laboratory and field experiences. Likewise scientists involved in 4-H Rutgersscience Saturdays report that they enjoy working with young people and engaging them in science learning.

Table 2: How would you rate these 4-H Rutgersscience Saturday activities?
1= poor, 2= fair, 3= good, 4= very good, and 5= excellent.

<table>
<thead>
<tr>
<th>Astronomy</th>
<th>Ocean Science</th>
<th>Natural Disasters Meteorology/Geology</th>
<th>Wild-Life Biology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploring Gravity 4.03</td>
<td>Deep Sea Vents 4.18</td>
<td>Tropical Storms 3.30</td>
<td>Diversity of Small Mammals 4.34</td>
</tr>
<tr>
<td>Making a Comet 4.51</td>
<td>Antarctica and Gliders 4.50</td>
<td>Predicting Bad Weather 3.70</td>
<td>Diversity of Reptiles and Amphibians 4.76</td>
</tr>
<tr>
<td>Observing the Sun 3.97</td>
<td>Fish Aging 4.50</td>
<td>Earthquakes and Tsunamis 4.37</td>
<td>Biology of Pollinators 4.39</td>
</tr>
<tr>
<td>Fish Adaptations 4.57</td>
<td></td>
<td></td>
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</tbody>
</table>

Youth participants (both boys and girls) also consistently ranked the pacing of the day, time to interact with scientists, amount of fun, and level of the science content in the program as just right. Figure 2 shows a ranking of science covered by grade level of the youth participants. Rutgers scientists collaboratively work with a team of Cooperative Extension informal science educators to prepare their lesson activity to ensure the grade level appropriateness and pacing. This process is essential to effective planning and presentation of 4-H Rutgersscience Saturday programs.

Why focus on STEM?

STEM jobs are growing at three times the rate of non-STEM jobs yet too few students are pursuing a STEM education. Research estimates only 17% of 12th graders are prepared for and interested in pursuing STEM degrees. The ability of the U.S. to remain competitive in the global economy depends largely on increasing the number of qualified STEM graduates (NAS 2007).
Youth Interest in Science
Since 2009, we have been conducting formative evaluation on 4-H RutgersScience Saturday programs to improve the program quality and interactions with Rutgers scientists. We know from these evaluations that young people are motivated to attend 4-H RutgersScience Saturdays because they are interested in fun and engaging hands-on activities taught by interesting scientists. Figure 3 below illustrates the motivating reasons why they attend 4-H RutgersScience Saturday programs. Currently we have approximately 52% of youth have attended more than one 4-H RutgersScience Saturday program annually. We have been fortunate to partner with non-profits youth groups to bring large numbers of underserved youth to 4-H RutgersScience Saturday programs and hope to expand our programming opportunities for these groups to improve young people’s identity as someone who can become a scientist and participate productively in the science community.

What is 4-H Youth Development and why use it as a STEM platform for learning?
The 4-H program provides quality in- and out-of-school programs that incorporate sustained, positive youth-adult relationships and youth participation and leadership that afford young people the “social nutrients” they need for positive development.

“There is mounting evidence that structured, non-school science programs can feed or stimulate the science specific interests of children, may positively influence academic achievement for students, and may expand participants’ sense of future science career options” (NRC 2009).

4-H’s national mission is to engage one million new young people in the process of discovery and exploration in STEM fields preparing them to meet the challenges of the 21st century.
Looking Ahead

The New Jersey 4-H program seeks to expand the 4-H Rutgerscience Saturday program by adding events and field experiences for middle school youth. We are currently seeking additional funding to be able to bring more young people on campus to benefit from this experience. We especially want to reach out to youth who are underserved and underrepresented in STEM.

We look forward to our 4-H Rutgerscience Saturday alumni pursuing STEM careers and being among “the one million new scientists and one million new ideas” envisioned by the national 4-H program.

What our Participants Say about the Program...

“Thank you for letting me interact with real scientists and do hands on activities. The activities were so cool and the scientists really listened to the kids”.

“The best part about the 4-H Rutgerscience Day was...
	hat we had the chance to interact with simulations of tsunamis, earthquakes, and tropical storms

examining actual specimens and talking to a scientist in Antarctica.

touching a live snake and turtle and learning about them”.

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