

2016 South Carolina Navy Grant Impact Report

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This past summer the youth from Japan and Spain were in the Biotechnology, Health, and Society Camp at Clemson University where they learned and applied many of the modern techniques used to solve the medical, forensic, and environmental problems facing today's society, including: pipetting, PCR, running gels, analyzing gels, ELISA assays, microscopy, blood typing, bioinformatics, forensic techniques, how to culture and transform bacteria, enzyme testing, and engineering strategies. In the evenings the youth were involved in team building and leisure activities. We took a break from the classroom one day to experience the Chattooga river while white water rafting.

Impact of the South Carolina STEAM Camp

Basic Knowledge	Average Based on a 5 point scale
Gained a basic knowledge in laboratory procedures	3.40
Learned how to determine DNA	3.92
Learned how DNA is used to genetically modify crops	3.88
Learned how science is relevant to everyone's lives	4.04
Did you gain a new interest in science?	4.00
Did you gain a new understanding of yourself?	3.76
Did you learn about new careers in the area of science	4.25
The rooms were well maintained and clean	3.00
This campus setting enhanced the camp	4.12

Conceptually, the students learned:

- The relationship between DNA, traits, and genetic diseases. They saw the relationship between their own DNA and their ability to taste a bitter flavor. In the context of realistic simulations they considered and discussed the ethical and moral issues these techniques raise. E.g., would they want to know if they had a pre-disposition to Alzheimer's Disease? Should a boy who might have cancer gene get tested?
- How forensic scientists solve crimes using molecular and traditional techniques, e.g., blood typing, DNA analysis, fiber and hair analysis, bone measurements, and more. They also learned the limits of some techniques such as eyewitness reports and fiber analysis.
- How scientists sequence and analyze genomes and the new insights the genome projects have given us. E.g., we learned that thousands of different microbes live in and on us and keep us healthy and, when out of balance, cause disease.
- How microscopes are used to analyze items ranging from dirt, to computer chips, to cells, to coatings.
- How genetic engineering works to produce crops and medicines. They learned and debated the pros and cons of GMO crops versus organically grown crops. In conjunction with this unit, we took a trip to the Clemson organic farm.

- How our brains work and how scientists look at brains to deduce how our brain works (e.g., PET scans, correlating localizing damage with symptoms). The students learned about concussions, the differences between diseased and normal brains, and how drug/food addiction influences brain activity.

Comments from Youth about what they liked best:

- White Water rafting, it was exciting and we were out of our comfort zones.
- Was during class when groups could interact with each other. This allowed me to get closer to others more than I normally would.
- I liked spending time with new people and friends because I feel as though we have gotten closer.
- Being involved with people I've never met and creating a closer group.
- Being able to have two classes a day and learning a lot while being able to have fun. The games and how everyone got along. It was quite refreshing meeting everybody.
- The labs. They kept me busy and had a good amount of complexity.
- Being able to meet new people from Japan. Being able to see how certain things in our bodies worked.
- Just being around other navy kids and being surrounded by instructors who really cared.

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