The SUNRISE project is to become institutionalized as a university-wide program that is sustained through internal and external support. As a continuing project beyond NSF support years the goal of the project will be to reach out to more schools and continue to provide the transformative experience to all its participants.

**Fellow Disciplines**

- **Christopher Ruck** – Environmental Science and Policy
  - Alexander Kozera – Computational Sciences and Informatics

- **Praval Saxena** – Physics/Math
  - Daniel Vetti – Bioinformatics and Computational Biology
  - Saira Ahmad – Bioscience (Microbiology and Infectious Diseases)
  - Elizabeth Nohotti Romano – Environmental Science and Policy

- **Kumnit Nong** – Computational Science and Informatics

**Curriculum Enrichment and Integration of Fellow’s Research**

**Microbial Growth and Treatment**

**Research Topic** – Identification of Molecular Targets for Francisella Biofilm Formation

- **Saira Ahmad**
  
My research focuses on targeting the mechanisms involved in biofilm formation of Francisella bacteria. Proteins are used to identify molecular targets of the bacteria involved in biofilm growth. Identifying these genes will then be used to determine ways to treat biofilm formation.

**Science Question Box:**

- **Christopher Ruck**
  
Cathelicidin peptides are a family of antimicrobial peptides found in the innate immune system of mammals. In searching amino acid sequences for functional patterns, there is the potential to better engineer peptides for medical applications.

In addition to our regular lessons, students have been submitting excellent science-related questions to our class “science question box” to go over each week.

- **Kumnit Nong**
  
My fourth graders have been interested in what it inside blood? We have looked at 3D models of hemoglobin using the Visual Molecular Dynamics (VMD) program; a common tool used by protein researchers. We talked about why hemoglobin is so important to us and why our blood turns red in air.

**Computers in Science**

**Research Topic** – Electronic Structure Calculations of Heavy Elements: Radium (Z=88) and Francium (Z=87)

- **Alexander Kozera**

Electronic structure calculations allow scientists to predict the properties of solid materials. This consists of two heavy elements, Radium and Francium, the last elements from the noble gas and alkali metal groups, respectively. The mechanical and electrical properties of these elements were calculated.

**Computational Biosensor Development**

The school lesson consisted of computational biology video and animated computer based simulations of car crashes. These simulations were preformed using finite element methods to model and compute the deformation of the vehicle.

This lesson showcased the ability computational scientists have to model and visualize complex systems. I modeled quantum mechanical systems of bulk materials.

**Environmental Effects of the BP Oil Spill and the Public**

**Research Topic** – Hydrodynamic Model of Atmospheric Capture by Charon with applications to EGP’s

- **Praval Saxena**

The research is centered around the potential capture of an atmosphere by Charon from the loosely bound atmosphere of Charon's parent planet Pluto. Analogous situations with Extratropical Giant Planets (EGP) and the changing views on potentially habitable bodies outside our solar system and then comparing them to what they had created as criteria for habitability. They then compared each and chose the most suitable body to explore.

- **Prabal Saxena**

Computational simulation models of car crashes. These simulations were preformed using finite element methods to model and compute the deformation of the vehicle.

This lesson showcased the ability computational scientists have to model and visualize complex systems. I modeled quantum mechanical systems of bulk materials.

- **Kumnit Nong**

This lesson is to demonstrate my research on bacterial cells which is based on the foundation unit that students are currently studying. I thought it would be valuable for students to see the science in action.

- **Prabal Saxena**

Cancer is the second leading cause of death in the United States, and breast cancer is the most common invasive cancer and the leading cause of death for women over 50. My research is strongly tied to this problem. My research is strongly tied to this problem. My research is strongly tied to this problem.