INNOVATIVE PROJECTS FUND GRANT
FOR DIVISIONAL ENHANCEMENT
SPONSORED BY THE COUNCIL COMMITTEE ON DIVISIONAL ACTIVITIES (DAC)

REPORT

Divisions that are recipients of these funds are required to submit a short report on the use of the funds and the effectiveness of the project receiving funds. This is required 30 days at the end of the project's completion, or the completion of part of the project for which these funds were used, whichever comes first. In any case, a status or final report on any previous year's funding shall be submitted by July 1 before any new funding for a subsequent year can be considered.

Please fill shaded areas to complete the form. Email, fax or mail the completed form to:

American Chemical Society
Member Communities, Volunteer Support O-1021
1155 Sixteenth St. NW
Washington, DC 20036
Fax: (202) (202) 872-4353
Email: division@acs.org

Date: Aug. 8, 2012 ☐ Status ☒ Final

Division Name: Cellulose and Renewable Materials (CELL)

Project Title: Enhancing Public Awareness of Egg Food Safety and Potential Practical Solutions

Start Date: 15/01/12 Completion Date: 28/07/12
Division Chair: Dr. Alfred French
Division Project Contact: Dr. Lucian Lucia, Phone: 919 515 7707

Funding Received from DAC: $ 7,500.00
Other Funding Received: $6,000 (Private company & Girl Scouts National Council)

Project Assessment:

Background – CELL embarked on a unique partnership with the Girl Scouts of America (GSA) to provide a unique educational experience for GSA Troop 1295, the nominal "Eggsperts." The experience was offered in conjunction with the troop's success in winning their regional and state competitions in the area of "Food Factor: Keeping Food Safe," as sponsored by the First LEGO League (FLL). The specifics of the competition that led the Troop 1295 to excel at the regional and state levels are detailed at: http://firstlegoleague.org/challenge/2011foodfactor. The GSA were extremely supportive of the overall objectives and were quick to commit to the project as evidenced by the cost share. In general, their work had several elements of chemical experimentation that was a very compatible fit with the ACS. Their task was to choose a simple, single or few ingredient food item and learn as much about it as humanly possible to find the harm it has on anyone who eats it. Eggs were the first thing that came to mind, because they are so popular and there are many steps in learning about them. The last part of this project was to employ teamwork, cooperativity, leadership, and perseverance in getting a robot to navigate an "food obstacle course" in the performance of certain tasks or missions.

Strategy for scientific learning on food safety – First, they made simple observations such as, where do they come from? What harm can they cause? How can we prevent the harm? What is there main use? The question that brought them to the North American competition was "How can we prevent the harm?" Firstly, the harm was that eggs may contain salmonella bacteria that are the main microorganisms in eggs to cause a very bad health response. Salmonella are tiny germs born with the egg that can make people very sick. They learned how eggs can transfer the salmonella in the process of being handled, such as someone not washing their hands, or having salmonella infested eggs crack. To better learn this information as part of this funding, they went to Sunderburg farms, inquired of the manager at a local Harris Teeter, James Johnson, and talked and worked a lot with the CELL division of the ACS. After learning about the harm salmonella can do, they had to follow up on this information by providing a practical solution that was economic, informative, and could be implemented safely and efficiently.

Practical solutions to improve food safety – This was probably the most interesting part of their investigation. They, amazingly, received inspiration from a vacuum cleaner product; UV rays kill any microorganisms in the carpet. The troop decided that we could do the same for eggs. Putting the eggs in their newly designed "egginator," the UV rays employed would irradiate the eggs, killing any salmonella germs in the process. If one wanted to kill the germs at home, one would purchase an "eggcelent wand," a handheld product that also scans with UV germs. They made prototypes of these products using glow sticks as the UV rays, and they put them in shoe boxes. The girls felt very proud of their accomplishments at this point and were enthusiastic about showing them at the national level.

If an egg vendor chose not to employ these latter processes, they developed another practical solution to indicate if a cracked egg was in a container. They installed pH paper in the egg carton. pH paper detects the acidity or alkalinity of liquids at different concentration ranges and the girls found out that the pH range for eggs is about 7.2 – 8.6. If an egg cracked, the carton would change colors due to the pH indicator paper in it, and therefore the consumer would be aware that that carton isn't the best one to buy. This is important to the consumers because a cracked egg is the most vulnerable for salmonella poisoning.

Presentation of Results – After gathering all the information, skills, pictures, and everything else, they made a poster to present to demonstrate everything that they did. It included brochures, pictures of them in action, the troop visiting people, eggs, and the chickens they saw. They presented this poster along with a skit, which represented what they learned about eggs. It started with the farmer, to the egg, all the way to germs. This was the project, and the other part of their story was the robot.

Application of Higher Thinking by Employing a Robot – They were given a basic robot that they had to transform using only Legos into a big machine that could complete missions. Their strategy was "KISS," or Keep It Simple Science. A coke machine is very easy to use on the outside, but on the inside millions of things are happening to dispense a beverage, so they decided to do the same thing. The outside of their robot had very few arms and actuators which lowered their chance of something going awry. During the competition, they noticed that many teams had many build-ons that they had to take on and off, which damaged the outcomes of their missions significantly. They did our best to have their robot do as many missions in as little time as possible. If many missions could be done in one particular quadrant of the board, they tried to accomplish most of them to save time. If a mission took too much time or needed too many parts, they did not attempt that mission (KISS).

Conclusion – This whole experience took an enormous amount of their time, lots of planning, and a lot of thinking. They had to use strategy, work together, and try to stay calm. Their overall experience was much like what researchers today go through. The ups and downs of the scientific process require that researchers work together, communicate effectively, and build strong teams to tackle a problem. The girls had a taste of the scientific process of discovery. The ACS's support of their effort allowed them to be "winners" in every sense.

Describe the impact of these funds on the Division (if applicable): CELL is embarking on a number of outreach activities that are not only designed to support worthwhile community endeavors, but to motivate the younger generation to pursue careers in science. CELL takes its role as a community leader very seriously and has been strongly encouraging the younger generation to appreciate science in everyday life. The overall collaboration was VERY productive and allowed all of the participants, judges, and media to appreciate the support of the CELL Division of the ACS in this endeavor. It allowed the troop to experience science in all of its glory and wonder and inspired them to continue their sense of exploration and inquiry. CELL was able to build bridges in the community particularly with the GSA with this fund and continues to explore ways to show society how it can bring value through the indelible power of chemistry.