The Popcorn Course: An Academic/Industry Partnership Promoting "Real Science" Opportunities for Undergraduates

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Abstract

Many academic institutions have alumni in career positions that afford opportunities to forge unique academic/industry partnerships for the benefit of both institutions. At Michigan State University (MSU), we worked with an MSU alumnus in the Research, Quality & Innovation department at ConAgra Foods to produce a research course for undergraduates at MSU called, "The Science of the Food You Love." The goal of the resulting 3-credit course was to introduce students to how food companies do research to improve their products, and to have students carry out a research project of their own. In our first iterations of this course (see https://www.msu.edu/course/lb/494/s11/), students addressed research questions associated with Orville Redenbacher's popcorn, one of ConAgra Foods' flagship brands. Eight students enrolled in the course in spring 2011, and another seven enrolled in spring 2012, which was conducted in Dr. Smith's research lab on the MSU campus. Student projects ranged from looking at biochemical and physical differences between different popcorn genotypes, to examining parameters associated with the contents of microwave popcorn bags. The capstone experience for the course was a visit to the ConAgra Foods headquarters in Omaha, NE where the students presented the results of their research to ConAgra Foods scientists, and interacted throughout the day with ConAgra Foods staff. Student participants in the course responded very favorably to the experience, with the strongest element being that the research being carried out was authentic and actually mattered to someone. ConAgra Foods scientists played a key role in the success of the course by virtue of making themselves available for consultation and guidance with respect to project feasibility, scope, and relevance. Future offerings of the course will expand beyond popcorn to other products and/or food technologies. We see this research course as a model for other academic/industry partnerships, creating the potential to increase opportunities for research training for undergraduates and to broaden their view of career paths.

Introduction

Inquiry-based lab experiences, where students carry out "real research", provide a tremendous way to train future scientists (Thornton 1972; Sundberg & Moncada 1994). One of the impediments to offering real research experiences for undergraduates is cost, especially at large Research I universities. Meanwhile, US industries seek workers with a strong set of scientific skills and expertise. To address this problem, we established an academic/industry partnership between Michigan State University and ConAgra Foods to provide undergraduate students with strong scientific training and to open their eyes to possible career paths that exist in science outside the traditional avenues of professional school or graduate school. The partnership took the form of a research course in which students worked in an MSU research lab to carry out research on questions associated with a ConAgra Foods product line. We employed a "Teams-and-Streams" model for student research (Wilterding & Luckie 2002). Students worked in teams of two (one team of three) to research a topic and then develop an experimental plan in consultation with ConAgra Foods scientists. Results of the research studies were presented as posters at ConAgra Foods HQ and on the MSU campus as oral presentations at the Lyman Briggs College Research Symposium.

Methods

What the MSU students did:

Literature Survey – Carried out literature research on popcorn to learn what is known and what is not known.

Developed Research Questions – Posed questions that were not yet answered.

Framed Hypotheses – Put their questions in the form of formal hypotheses.

Experimental Design - Devised a plan to test their hypotheses

Proposal Preparation – Wrote up their plan as a formal research proposal. This proposal was reviewed and evaluated by both the course instructor and scientists at ConAgra Foods.

Data Collection – Worked in the lab with their research team members to collect experimental data. This work was carried out pretty much independently.

Data Analysis – Consulted with the course instructor to design the framework and carry out the appropriate statistical test for their experimental data.

Presentation of Results – Traveled to ConAgra Foods World HQ in Omaha, NE to present their results and discuss their research with ConAgra Foods scientists. Presentations were also made on the MSU campus at the Lyman Briggs College Research Symposium.

What ConAgra Foods scientists did:

Research support – In addition to providing funding to carry out experiments, ConAgra Foods provided popcorn, bags and other supplies used in experiments, as well as a specialized popcorn bag sealer.

Access to scientists – The course instructor had several telephone conversations with ConAgra Foods scientists to discuss project ideas and directions for the research.

On campus visit by ConAgra Foods scientists – Two ConAgra Foods scientists traveled from Omaha to East Lansing to spend a day in class with the students teaching popcorn basics and basic popcorn research skills.

Follow-up teleconference – These same two ConAgra Foods scientists delivered a webinar-type presentation to the class on aspects of ConAgra Foods popcorn research.

Consultation and feedback on Research Proposals – ConAgra Foods scientists read over and commented on the students' research proposals. Grades, however, were entirely under the control of the course instructor.

Consultations during data collection – ConAgra Foods scientists were available for help during the data collection aspects of the research.

Hosting the group – ConAgra Foods graciously hosted the entire group for a one-day visit to World Headquarters in Omaha. Students presented posters describing their results, interacted with ConAgra Foods scientists, and toured the facilities.

Fig. 1. Popcorn Kids. MSU student-scientists enrolled in the Popcorn Course in spring 2012 with their course instructor (JS) at the Chef Boyardee statue in the entrance plaza at ConAgra Foods World Headquarters in Omaha, NE.

Outcomes

What were some of the benefits of the course?

Students were engaged. Research teams were all very strong, with high levels of motivation, good communication, and excellent shared responsibility. Over the course of two semesters there were no interpersonal problems brought to my (JS) attention.

Students worked on projects that mattered. One of the main things that I heard from students in both semester the course was taught was how cool it was that they were working on something in class that mattered to someone else besides the course instructor.

Students bonded. Working on a related set of four projects for the entire semester, culminating with a class field trip to Omaha served to create the strongest, most cohesive sets of students I've ever taught.

We had 15 minutes of fame. The press picked up on our course and thought it was interesting that students were studying microwave popcorn. We had articles about our course in the *Detroit News* and *Detroit Free Press* (Figure 2), which were distributed to the wire services nationwide.

Course Evaluation: Was the course worth it?

In both spring semester 2011 and 2012, we evaluated the popcorn course using a variety of instruments. Based on the Student Assessment of Learning Gains (SALG) Instrument, the students valued most highly their informal interactions in the lab with the course instructor (JS), the course assistant (Mr. Fazaldin Moghul in spring 2012), and their peers, as well as the Omaha trip and poster presentation.

Here's a sampling of students comments:

1. "I really enjoyed the class and learned a lot about scientific research. I like the way the class was loosely structured so we could make the research our own. Personally, this class makes me want to do more research."
2. "The research proposal really forced us to think and plan ahead, which really helped me and made me feel more prepared and organized."
3. "The Briggs presentation was helpful because it was a good exercise in describing concepts (i.e., popcorn research) to an audience that wasn't already extremely knowledgeable in the subject (as it was on the ConAgra trip)."
4. "Great structure and application to the "real" world."
5. "Created a different learning experience from our other science classes. Forced us to kind of look outside of the box."

MSU GETS POPPIN'

Students seek perfect popcorn

By DAVID JESSE
FREE PRESS STAFF WRITER

Fluffier. Bigger. Flavorful. And no unpopped or burnt kernels.

That's the goal of scientists at ConAgra Foods as they seek perfect Orville Redenbacher popcorn.

For a semester, it was also the goal of eight Michigan State University students enrolled in what quickly became known as the "popcorn course."

You might one day taste the results of their research. The class finale was a visit to ConAgra headquarters in Omaha, Neb., to present the findings for possible use in improving the product.

The students won't say exactly what conclusions they reached — they signed corporate nondisclosure agreements.

The experience opened students' eyes to high-level research and nontraditional career options in food science.

"When you take other classes, it's very structured. You know where the (experiments) are headed," said student Fazaldin Moghul. "It really was a different way to look at research."

Officially, the class was the Science of the Foods We Love, but student lab time was spent reaching toward popcorn nirvana.

8 NOT A KERNEL LEFT UNPOPPED. 4A

E. L. KOHLTIN/Michigan State University
Student Meghan Miotte measures popcorn during class this month.

Fig. 2. Fifteen Minutes of Fame. The Popcorn Course drew interest from news services in the spring of 2011 and we were on the front page of the *Detroit Free Press* the day after we arrived home from Omaha (April 18, 2011).

References

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