

LASER: Leadership And Science Ensures Results – A STEM Partnership Between Industry and Education

Jill Brooks, Sundown Aronsson, Elyse Hogan, and Jodi Roepsch
Raytheon
Chaurcley Cook
McKinney Independent School District

ABSTRACT

As the Baby Boomer generation prepares to retire and our youth continue to fall behind their international peers in Science, Technology, Engineering and Math (STEM), there is a growing crisis regarding the United States' STEM pipeline. This crisis is the catalyst for a partnership between Raytheon and the McKinney Independent School District (MISD). LASER (Leadership And Science Ensures Results) is a STEM outreach program sponsored by Raytheon and jointly developed and supported by resources from both Raytheon and MISD.

LASER combines technical and leadership elements and is embedded into the School 11th grade Physics curriculum. The curriculum is implemented in a series of class room visits and a Capstone activity.

The program has engaged over 1500+ students and received positive feedback from students, teachers, and coordinators. Data shows that the program has caused 42% of the participants to consider pursuing a career involving STEM. In addition, 15% of the participants stated that the program re-affirmed their interest in STEM careers. This data points to a brighter future for the United States STEM pipeline.

Keywords: STEM, K-12 Outreach, Partnering

INTRODUCTION

LASER was developed to address the crisis in the STEM pipeline. Raytheon engineers partnered with the MISD Secondary Science coordinator over a period of nine months to develop and initially deploy the curriculum. In addition to the STEM focus, leadership components were included since this is sometimes a weakness observed in college-hires. The curriculum applies to all Physics students, from Advanced Placement, to pre-Advanced Placement, to Academic, and even in the alternative schools. The intent was to help all students develop leadership skills and encourage students to consider STEM careers through project-based, hands-on learning that promotes creativity and fun!

PROGRAM DESCRIPTION

LASER is actually embedded into the School 11th grade Physics curriculum and mapped against the Texas Essential Knowledge and Skills, which governs all Texas school curriculums. The curriculum was designed to leverage elements of MathMovesU (Raytheon developed and promoted project based learning) as the technical foundation while at the same time highlighting specific leadership skills required for success both in the classroom and in post high school careers.

The curriculum takes an innovative approach by using the premise that the students have been selected for an internship at a leading-edge professional think tank organization called Cogitate. Cogitate provides consulting and research services to a variety of government and

ASQ Advancing the STEM Agenda in Education, the Workplace and Society Session 3-3

commercial customers in various scientific and engineering domains. As part of Cogitate, students work with their fellow interns to address customer needs in an innovative, high-quality, timely, and cost-efficient manner. The curriculum is implemented in a series of four class room visits, each with a certain set of technical and leadership learning points, and a capstone activity which challenges the students to take one of the previous modules and further build upon it, drawing real-life input from industry. The technical and leadership components include:

- ◆ Scientific Methods
- ◆ Characteristics and Behaviors of Waves
- ◆ Teaming
- ◆ Communications
- ◆ Goal Setting
- ◆ Problem Solving
- ◆ Mathematical concepts such as Mean and Standard Deviation
- ◆ Concepts and Laws of Force and Motion
- ◆ Diversity
- ◆ Innovation
- ◆ Decision Making
- ◆ Critical Thinking

The class room visits were supported by Raytheon volunteers, many of whom are engineers. However, the non-engineer volunteers have also made a great impact by showing the wide reaching importance of math in other careers, such as finance, contracts, human resources, information systems, communications and supply chain.

RESULTS

The LASER program has made a great impact. The program has engaged over 1500+ students. Feedback from students, teachers, and administrators is positive:

“...I was completely unaware of any possibilities to explore such a field. After only one visit from Raytheon, I had a completely new perspective on what I could do in the future....” R. Johnson, Student.

“At the beginning of the program this year, my students were typical teenagers taking a general population science course: “Physics is hard, it’s too much math, I want to be a dancer, I want to be a professional baseball player, etc.” After a few of our LASER sessions, and with the positive influence of the engineers from Raytheon, a great number of my students are now expressing a desire to pursue a career in the sciences. Several have decided to try becoming engineers.” F. Wiatroski, Physics Teacher.

“...(LASER) is reaching scores of students with engaging, exciting content with real-world connections.” S. Biles, Physics Teacher.

“The fact that teachers and students alike are already discussing ways in which the program could be expanded for future years speaks volumes about the impact it has had.” K. York, Science Department Chair and Instructional Specialist.

Equally exciting as the above feedback is the interest that we are hearing from younger students. Several 10th graders have heard about the LASER program from 11th graders and are now anxiously looking forward to participating next year. This “pull” from the student community shows the success of the program will continue in the future.

Post-module survey metrics re-enforce stakeholder comments. When asked if they would recommend the module activity to others, 88% stated that they would recommend the activities. When posed the statement “I had fun participating in this module,” 91% responded positively. The program caused 42% of the participants to consider pursuing a career involving science, technology, engineering, or math. In addition, 15% of the participants stated that the program re-affirmed their interest in STEM careers. That means 57% of the

**ASQ Advancing the STEM Agenda in Education, the Workplace and Society
Session 3-3**

participants have been positively impacted in terms of pursuing STEM careers, which points to a brighter future for the United States STEM capability pipeline.

ACKNOWLEDGMENTS

Special thanks to Ruth Hargis and Jill Mitchell, Community Relations at Raytheon, for their generous support of the LASER Program.

LASER was made possible through the dedicated and creative efforts of the entire development team:

- Sundown Aronsson, Engineering Integrated Product Team Lead, Raytheon
- Jill Brooks, Raytheon Six Sigma Lead, Raytheon
- Chaucley Cook, Coordinator of Secondary Science, McKinney Independent School District
- Elyse Hogan, Software Manager, Raytheon
- Jodi Roepsch, Product Data Management Risk & Opportunity Manager, Raytheon

AUTHOR'S INFORMATION

Jill Brooks, a Six Sigma Lead for Raytheon, contributed to the development of LASER, serves as the STEM liaison for a local middle school, and supports numerous STEM outreach activities. Jill is a Certified Software Quality Engineer, American Society for Quality, and a Certified Raytheon Six Sigma Expert. She earned a BS in Computer Engineering from the University of California at Santa Cruz and an M.B.A. from Southern Methodist University.
972.344.3022
jill_a_brooks@raytheon.com