

TEACHER QUEST TAMPA BAY PROGRAM

ACTION PLAN

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Lesson Title: Is There An Engineer In You?

Grade Level: Middle School

Subject Area(s): Engineering

Date: July 9, 2010

Summer Work Experience

Network Centric Systems – Raytheon

My Teacher Quest experience was in the Network Centric Systems business group, in the Joint Sensor Networking department. The program I was involved with was the Cooperative Engagement Capability, a system that combines the information that it gathers from radars and sensors from multiple different locations (ships, airplanes, hum-vees, etc.) to create one set of very accurate data that can be used to locate and destroy fast flying air threats such as cruise missiles. This system is comprised of many different electronic systems, which are designed, built, tested, and assembled in Raytheon's Tampa Bay facilities.

Almost every day, I worked with a Six Sigma expert (someone whose job is to improve manufacturing and business processes to reduce waste and improve quality) on different improvement projects. One project I worked on was to understand and improve the way the team collects and records information about the finished products they keep in their storage facilities. We did this by working with the team to find out what information they needed, how they found it, and what they did with it. Then we designed a computer program for them to use to make that task easier and more enjoyable to perform. We wrote instructions for them so that they could find answers to questions they may have, and so they could easily train other people to do the job the same way.

Another project I was involved with focused on employee engagement by improving the environment in which the Raytheon employees work. We did this by asking the employees for suggestions about things that could be done to make them happier at work – some of the ideas included softer toilet paper in the bathrooms, tablecloths for the cafeteria, and a room where they could take naps during their breaks. The employees will vote for their top ten from the most

popular suggestions and from the winning ten, two will be implemented each month, and the employees who suggested the winning ideas will be interviewed and recognized.

All of the projects that I was involved in included working with employees with different educations and skills, such as Six Sigma experts, program managers, and many different types of engineers. My experience allowed me to see how all of these people work together, and how vital their different education, skills and talents are to the success of the projects that we were involved in. I will use this knowledge to share with my students about the many different engineering degrees that are available to them, and some of the different types of jobs that people do who have those degrees.

Unit of Study

Objective

Through the semester, students will learn about many different engineering fields and will be able to investigate the idea of a career in engineering for themselves.

Sunshine State Standards

SC.8.N.2.2 Discuss what characterizes science and its methods.

SC.8.N.4.1 Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.

SC.8.N.4.2 Explain how political, social, and economic concerns can affect science, and vice versa.

LA.8.5.2.1 The student will demonstrate effective listening skills and behaviors for a variety of purposes, and demonstrate understanding by paraphrasing and/or summarizing; LA.8.5.2.2 The student will use effective listening and speaking strategies for informal and formal discussions, connecting to and building on the ideas of a previous speaker and respecting the viewpoints of others when identifying bias or faulty logic;

LA.8.5.2.4 The student will research, organize, and effectively deliver speeches to entertain, inform, and persuade

LA.8.5.2.5 The student will demonstrate language choices, body language, eye contact, gestures, and appropriate use of graphics and available technology.

Materials

Handouts, Internet, books, videos, guest speakers.

Instructional Procedures

Roughly once a week, students will learn about a new engineering field by either reading a handout or, if funding is provided to purchase DVDs, watching a short video available to them via their Moodle website to prepare them for their classroom discussion the following day. Guest engineers from Raytheon and other companies will be invited to join our classroom discussions through the semester.

Student teams will be formed and throughout the semester, the teams will further research engineering fields using online resources, books, and engineer interviews. They will then create posters highlighting engineering careers and companies who hire those types of engineers. The research for the student-made posters will encourage the students to learn more by researching engineering fields and interviewing engineers via phone or web-conference. The students will present their posters at the engineering open house, and will be put on display at the end of the semester.

- Wk 1** Pre-course career survey
Introduction to Engineering

- Wk 2** Chemical Engineer Guest Speaker
Paragraph on speaker due next class
Form Project teams, assign engineering careers, introduce project

- Wk 3** Assign basic research on careers
One paragraph on each due Wk 5

- Wk 4** Mechanical Engineer Guest Speaker
Paragraph on speaker due next class

- Wk 6** Assign Q&A
Questionnaire due Wk 8

- Wk 7** Civil Engineer Guest Speaker
Paragraph on speaker due next class

- Wk 9** Assign Interview Questions
Due Wk 11

- Wk 10** Biomedical Engineer Guest Speaker
Paragraph on speaker due next class

Wk 11 Assign Interview

Due Wk 13

Wk 12 Electrical Engineer Guest Speaker

Paragraph on speaker due next class

Wk 13 Assign Poster / Presentation

Draft due Wk 15

Final due Wk 17

Wk 15-16 Green Engineer Guest Speaker

Paragraph on speaker due next class

Wk 17 Engineering Open House

Wk 18 Post-course career survey

Out-of-area guest speakers could be met via video conference.

Additional in-person guest speakers could include:

- Environmental Engineering
- Computer Science
- Computer Engineering
- Industrial Engineering
- Management Systems Engineering
- Materials Science

Integration of Summer Work Experience/Follow-up Activities

My integration goal is to introduce students to different fields of engineering, and allow them to explore careers in engineering by bringing in guest engineers from Raytheon and other local companies, and having them interview engineers about their careers. I will also discuss with them my experiences over the summer and show them a short video describing the project that I was involved with.

Assessment Instrument

Students will create a notebook of the different engineering careers they learn about, adding information about the engineering field that is explored weekly, and notebooks will be checked

throughout the semester and given a final grade at the end of the semester. At the end of the semester, presentations and posters will be graded.

In addition, pre- and post-course survey focusing on knowledge of and interest in engineering careers will be administered.

Resources

Career and soft skills books including:

104 Activities That Build: Self-Esteem, Teamwork, Communication, Anger Management, Self-Discovery, Coping Skills, Allana Jones – amazon.com (\$24)

101 Life Skills Games for Children: Learning, Growing, Getting Along (Ages 6-12), Bernie Badegruber – Barnes & Noble (\$20)

101 More Life Skills Games for Children: Learning, Growing, Getting Along (Ages 9-15), Bernie Badegruber – Barnes & Noble (\$20)

Young Person's Career Skills Handbook – Grades 4-9, Editors at Jist – amazon.com (\$20)

Engineering books and activities including:

High Tech Hot Shots, Celeste Baine – engineeringedu.com (\$20)

The Musical Engineer, Celeste Bain – engineeringedu.com (\$18)

The Fantastical Engineer, Celeste Baine – engineeringedu.com (\$20)

The Exploratorium Guide to Scale and Structure, Barry Kluger-Bell – exploratorium.edu (\$35)

The Math Explorer, Pat Murphy – exploratorium.edu (\$28)

Prof. Noggin's Famous Inventions – amazon.com (\$12)

Engineering Career Bingo – engineeringedu.com (\$30)

Electronic Library – engineeringedu.com (\$250 set)

Engineering PowerPack – 24 CD set that includes an introduction to 24 engineering careers, each with student presentations, teacher presentations, and handouts

Women In Engineering – a DVD that offers girls encouragement to pursue engineering

Engineers Can Do Anything – a DVD that delivers the facts about engineering careers in a fun, motivating and engaging way

The Road Ahead – a DVD that answers the questions that help every student figure out what they want and what they need from a college

Why did you choose this answer?

8. Science is an interesting subject...

Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
0 1	2 3 4 5	6 7 8	9 10

Why did you choose this answer?

9. Please describe/list some of the job responsibilities that an Engineer, Scientist and a Mathematician may have.

10. I have a parent, guardian, and/or sibling at home who can easily help me with my math homework.

Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
0 1	2 3 4 5	6 7 8	9 10