At a Glance

1.3 Civic Engagement

Essential Question: Why is it important to give back to the community where you live with your time, talents and skills?

Standards

NGSS HS. Engineering Design

Students who demonstrate understanding can:

HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Common Core State Standards Connections:

ELA/Literacy – RST.11-12.9 -Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. (HS-ETS1-1),(HS-ETS1-3)

Materials

- GE Focus Forward- You don't know Jack
- Multimedia presentation
- Student Sheets
- Student notebooks
- Student Exit Slips

Activities

Activity	Name of the Activity	Photocopies	Materials
1	Preparation for Class - 1.3 and 1.8- Teacher Toolbox. Assigning Team rolls- 1.13 Teacher Toolbox- Roles and Responsibilities		Student page Video: You don't know Jack Notebook
2	Standards Statement (Option: Unpacking the standards Teacher toolbox 1.12- Unpacking the standards)	1.3 Student Sheet	PowerPoint Presentation 1.3 Student Sheet
3	Video- You don't know Jack		Video embedded in PowerPoint 1.3 Student Sheet
4	Importance of Civic Engagement		PowerPoint Presentation 1.3 Student Sheet
5	Reflection and Formative Assessment	Exit Slips	PowerPoint Presentation Notebook Formative Assessment Sheet

Overview

Students will use the essential question and reflect on the social implications of service to the community. They will explore this question with the 4 major components of **economic impact, social implications, professional opportunities and personal satisfaction.**

Major Concepts

- Analyze a major global concern such as cancer with quantitative criteria
- Building Self-Efficacy through cooperative learning strategies.
- Application of Engineering to solve a real world problem.
- Use of skills, interests and talents to serve the community.
- Notebook and team building.

Objectives

Students will:

- Explore how service learning can impact their lives economically, socially, professionally and personally
- Work with classmates to build teaming skills.
- Evaluate information to determine the personal characteristics that allowed a high school student to be able to find a low cost test for pancreatic cancer.
- Brainstorm ideas about how service learning can have a personal impact.

Lesson Preparation

Preparation

- **Lesson Preparation**: For specific directions on preparing lesson materials, see 1.3 and 1.8 documents in the Teacher Toolbox.
- **Instructional Resource:** Make sure that you have the ***PowerPoint presentation*** and the ***video***- ***You Don't Know Jack*** ready for class viewing.

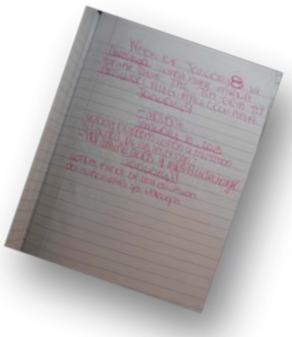
Procedure

Activity 1: Preparation for the Class

Multimedia Presentation: This lesson will have a multimedia presentation that will help to get the students thinking about the lesson and walking them through the information. Download the presentation in the folder to have the videos attached.

Preparing the notebooks- see document 1.3 in the Teacher Toolbox for specific instructions concerning notebooking.

1. For pages 3 and 4, these will be the **Line of Learning**. In this lesson it might not be necessary for the students to write line of learning. Most of the information that will be reflective about how Civic engagement is important to the student will be within the notebook.



Team Roles and Responsibilities- For more detailed information about team roles; use 1.13 Teacher Toolbox Team Roles and Responsibilities.

Activity 2: Unpacking the Standards

Class Explanation: Explain to the class that they are going to be exploring a real world engineering achievement that was accomplished by a high school sophomore named Jack Andraka, who had an idea about how to create a test for pancreatic cancer using nanotechnology. In this lesson we will not only be looking at Jack's accomplishment but also how Service-Learning challenged him academically but also improved the lives of thousands of cancer patients throughout the world.

Note to Teacher: Look above to see the standards that will be addressed through this lesson. The students need to understand the focus of the lesson, so an examination of the standards is a way of addressing this lesson essential.

Here is a possible Standard Statement which incorporates the standards used in this lesson:

Students will create a list of objectives that will guide their learning through this lesson based on the above standards. It is important to see that all students have a voice and have skills, talents and critical thinking skills that can tackle important issues in the community.

Application to the lesson: Students look at the video of how Jack Andraka saw the need for a new form of screening for pancreatic cancer that would be more effective.

Optional Lesson Component: As an additional component for this lesson, you may use Teacher toolbox 1.12- *Unpacking the standards in a Student Centered Classroom*. This gives procedures to help your students create their own standards statement.

Activity 3: *You don't know Jack*

Note to teachers: This video is a short case study of Jack Andraka, who had a passion for nanotechnology and was able to use his talents to improve the lives of thousands of people throughout the world.
Make sure that all of the students have their notebooks open and ready to write notes along with the student sheet 1.3

1. **Review Service-Learning**
   - What are the key elements of Service-Learning
     - Must integrate meaningful Community Service that makes the lives better for its residents.
     - Students must learn and reflect on the learning through the experience
     - Students will develop a sense of Civic responsibility.
   - We are going to discuss how service-learning can not only improve the lives of your community but it can:
     - Have a significant economic impact for people in the community
     - Improve the living standards of people in the community
     - Provide professional opportunities
     - Have significant personal satisfaction.

2. **Watch the video about Jack Andraka's quest to find an alternative testing procedure for pancreatic cancer.**

3. **Group Discussion of the Video:**

   - How would this project differ from the Bicycle Helmet project in the service-learning realm?
   - What skills did Jack have to master to be able to accomplish his goal?
   - How does this testing procedure serve a global need?
   - What skills in what subjects would you use to be able to design and test this product?

4. Discussion in small groups: Using the Standard ETS1.b as a basis for small group discussions.

ETS1.b- When evaluating solutions, it is important to take into account the range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural and environmental impacts.

Essential Question: Look back at the Essential Question:

Why is it important to give back to the community where you live with your time, talents and skills?

- Discuss the implications of a high school student following his passion when others discouraged him.
- Can students have good ideas that can change the world?

- Evaluate Jack's testing procedure to determine the constraints of the design. Does it meet and or exceed baseline goals? Explain.

- Each group will discuss the question and make inferences with some of the constraints given by the standards which include cost, safety, reliability, and aesthetic appeal, social, cultural and environmental impacts.
- Students will record the inferences in their notebook.

5. **Academic Standards-** What academic disciplines were used to complete this project?

    - **Note to teacher:** This is an extreme example of how a high school student can follow his passion and think through a problem that previously was unconceivable. The students may express that this is way above high school knowledge and standards, however it demonstrates how a student can serve their community and the world by pursuing their interests and using their own talents and skills.

In groups, brainstorm the application to Academic Skills and Standards:

- Students will discuss the skills and the disciplines that would apply to this project.
- Students will create a list of at least 3 skills and disciplines that they would need to have mastery to be able to complete the testing and production of this project.

Share small group academic applications with the class- One member on the team will share out each group's application of academic standards and skills.

Activity 4: *Civic Engagement*

Essential Question: What benefits do we see in this example of a student being engaged in Service-Learning?

Discussion:

- Students will look at this example and give evidence where this student who used his time, talents, skills and passion to serve the community and was also able to grow personally and professionally.
- How can using my time talents and skills help me professionally, socially, personally as it serves the community?

Persuasive writing: Why Civic Engagement?

1) Explain the creative writing assignment. – Students will use the discussion as a starting point to write a persuasive essay about Civic responsibility and how it can be of benefit to students personally. The students can use Jack Andraka as an example but then reflect personally how working through a community problem that uses science and engineering can be beneficial to the student.

2) Independent work: The students will prepare a persuasive writing essay explaining the importance of Civic engagement and students using their time, talents, skills and passions to serve the community.

- Go over the rubric
- Remind students that this is also a reflective piece where they are exploring their own talents, skills and passions. Service-Learning can be of huge personal benefit by expanding knowledge, make possible professional connections, and develop a sense of satisfaction by helping the community.
- Discuss how they have good ideas in their notes and from discussions
- For further information about Jack Andraka click the two web sites.
    - http://jackandraka.net/
    - http://www.cbsnews.com/videos/boy-wonder-jack-andraka/
    - http://www.youtube.com/watch?v=3KKYkpMXqro

Note to teacher: Students may not be accustomed to writing persuasively in the engineering or science classroom. However, it is an essential part of engineering and science to be able to explain and defend their research and findings. It may be necessary to discuss persuasive writing and walk through some of the key features that made this story so unique.

This assignment will take more than one class period and would be best to be an outside activity.

Activity 5: Wrap-Up: *Reflection and Formative Assessment*

1) Back to the Standards:

Go back to the original class document about the standards.

Ask the students did they:

- Evaluate a real example of a student involved in service-learning and how it was beneficial academically, professionally, socially and was personally satisfying.
- Explore how Service-Learning improves the lives of the community and has personal benefits.
- Make the connection that service-learning involves both local and global issues.
- Examine the criteria of an engineering project to determine cost, safety, reliability, aesthetic appeal and additional questions that they still had.

2) Formative Assessment and student reflection: Last 5 minutes of class

- Pass out the ***Exit slips***. This will give you an idea of what they have learned in the lesson.
- Make sure that they students have their ***notebooks open*** with their two sheets taped in their books.

Notebook check:

As the students are filling out the slips, walk around the room and check to make sure that the student have the following information in their notebook:

- ✓ Completed the 1.3 student sheet.
- ✓ Have the students turn in the exit slips.

3) Teacher Reflection: Look at the student's exit slips and the student notebook. The teacher reflection sheet is helpful to reflect on the day's learning. It is also helpful as an artifact for the class and how they are progressing through the learning experience.

Questions:

- ✓ Have the students expressed an understanding of the correlation between Serving the community, Engineering Practices and Academic standards?
- ✓ How are the students reflecting in their notebook?
- ✓ Are the students showing self-efficacy when reflecting on their own learning in the class?

Resources:

- GE Focus Forward- *Short Films, Big Ideas, a partnership between GE and cinelan.*
- NGSS Lead States. (2013). Next Generation Science Standards: For States, By States. Washington, DC: The National Academies Press. For more information see http://www.nap.edu/NGSS/
- National Governors Association Center for Best Practices & Council of Chief State School Officers. (2010). *Common Core State Standards for English language arts and literacy in history/social studies, science, and technical subjects*. Washington, DC: Authors.
- **http://rubistar.4teachers.org**
- http://jackandraka.net/
- http://www.cbsnews.com/videos/boy-wonder-jack-andraka/
- http://www.youtube.com/watch?v=3KKYkpMXqro