

Lesson Plan: Beyond the Classroom: Encouraging Girls to Continue in Physics and Science

Class level	Class Time	Materials
High School or Middle School	<ul style="list-style-type: none"> • 3 min video • 15-20 min discussion • 10-15 min in-class web work & discussion 	<ul style="list-style-type: none"> • Computer & Projector • Internet access • Photocopy of Worksheet • Computer for every 2-3 students

Objectives:

- Educate girls on their options in physics and/or other scientific fields.
- Show students positive role models who are women working or teaching in Physics.
- Encourage girls to continue in their science classes and give them things to hold their interest in Physics and other sciences.

Overview:

In the life sciences, the number of women in the field is quickly catching up to or exceeding the number of men. In physics, although the number of women is increasing, it is not increasing at the same rate. The aim of this lesson is to have students think about careers in science, both in academia and beyond, including unexpected places, particularly for women.

Place in Course?

Beginning Motivation and introduction
 Middle For a substitute teacher; Between course units or after a test
 End Include an extension where students find connections between the material they studied in class and what the women discuss in the video

Background:

HERStories is a series of videos recorded at the 5th International Conference on Women in Physics at Waterloo, Canada, August, 2014. All interviewees were delegates to the conference. The project was supported by the National Science Foundation Grant #1419453 and presented by the American Physical Society, the American Association of Physics Teachers and the Society of Physics Students. The videos share experiences and wisdom from women in physics in order to encourage young girls to explore a career in physics.

Common Core Standards:

CCS.ELA-LITERACY.SL6.1 (or 7.1 or 8.1)	Engage effectively in a range of collaborative discussions with diverse partners on grade 6 (7, 8, 9, 10, 11 or 12) topics, texts, and issues, building on others' ideas and expressing their own clearly.
CCS.ELA-LITERACY.SL9.1(or 10.1)	
CCS.ELA-LITERACY.SL11.1(or 12.1)	
CCSS.ELA-LITERACY.RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
CCSS.ELA-LITERACY.RST.9-10.2	
CCSS.ELA-LITERACY.RST.11-12.1	

Teacher Guide

1. Video: https://www.youtube.com/watch?v=KRH_7Cc1VVs
2. Hidden Physicists: <http://www.spsnational.org/cup/profiles/hidden.html>
Suggested profiles to consider:
Spring '08: Robert L. Greeson and Robert E. Maltby
Fall '11: 1LT Joshua D Frey
Fall '10: Frances D. Carter
Spring '10: Mary Anna Evans
3. Have students complete worksheet and then discuss answers.
4. Additional discussion questions:
 - a. Do you have a teacher from your past that inspired you or a particular in-class activity that you remember? What was so memorable or inspiring about it?
 - b. What sorts of things inspire students about science? Conversely, what parts of science or the science classroom do students find discouraging and why?
5. Extensions:
 - a. Possible discussion question or a short in-class research activity: Ask students to think about possible careers for physicists beyond the lab or the classroom: Why might physicists be hired as engineers or for a space program? What might physicists do in the medical field? In computer engineering? Why would a physicist be hired by Wall Street or by the National Hurricane Center?
 - b. Research magazine articles and identify topics and/or careers with physics components. How are they connected to physics?

Additional Resources:

- “Escape from the Pipeline: Women Using Physics Outside Academia” by Jill A. Marshall, *The Physics Teacher*, **56**, 20 (2008).
- Society of Physics: <http://www.spsnational.org/>
- American Association of Physics Teachers (Beth Cunningham): <http://www.aapt.org/>
- American Physical Society: <http://www.aps.org/>
- Bernoulli Principle (referenced in Uma Das’ interview):
http://www.nasa.gov/pdf/543568main_PS1_Bernoulli_More_Bernoulli_C6.pdf
- Renee Horton’s Profile from NASA (interviewed in video):
<http://scitation.aip.org/content/aip/magazine/physicstoday/news/10.1063/PT.4.0313>
- SNOLAB (Taylor Shantz’ lab): <https://www.snolab.ca/>

Worksheet: Beyond the Classroom

Name _____

Date _____

Answer while watching the Video:

1. What did the women in the video say inspired them to study physics? (At least 2 examples) At what age/grade?
2. What advice did they have for students who are interested in pursuing Physics?
3. Pick one woman from the video and explain what she does as a physicist.

Hidden Physicist Website: <http://www.spsnational.org/cup/profiles/hidden.html>

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4. Pick one "Hidden Physicist" and describe how she or he uses physics outside of traditional physics fields.
5. If you are interested in science where would you go from here? Who would you talk with to begin your path?