

Lesson Plan: Pitfalls, Potholes, and Hurdles: Finding Success as (Physics) Students

| Class level | Class Time | Materials |
|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none">• High School- Junior or Senior• Intro College• Pre-Service Teachers | <ul style="list-style-type: none">• 3 min video• 10 min read article• 20-30 min for discussion | <ul style="list-style-type: none">• Computer & Projector• Copy of McCullough article• Copies of questions during video• A list of resources at the school to help students overcome academic obstacles, e.g. guidance counselors or other science faculty who would be willing to help students pursue physics |

Objectives:

- Teach students about pursuing goals and overcoming obstacles by giving them positive examples of women who did so in the field of physics.
- Engage students in discussion about the importance of science and physics and about the adversity that women and people of different backgrounds face in physics.
- Encourage students to identify and seek ways around obstacles and supply them with information that might help them.

Overview:

The lesson introduces students to physics as a field of study and gives them examples of what physicists are doing in the world. The lesson also introduces students to the disparity between women and men in physics. The lesson plan includes a short video, an article, a worksheet (based on both video and article) and a series of follow-up discussion questions. Finally, the teacher should provide the students with information about the resources at their school to help them overcome similar obstacles in any field.

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.

Additional Resources:

- Society of Physics: <http://www.spsnational.org/>; American Association of Physics Teachers: <http://www.aapt.org/>; American Physical Society: <http://www.aps.org/>
- Statistics on Women in Physics: <https://www.aip.org/statistics/women>

Common Core Standards:

CCS.ELA-LITERACY.SL11.1
CCS.ELA-LITERACY.SL12.1

Engage effectively in a range of collaborative discussions with diverse partners on grade 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly.

Teacher Guide:

1. Question for class: what is a physicist?

Answer from: <http://www.physics.org/article-questions.asp?id=18>

A physicist is a scientist who studies matter, energy, and the interaction between them. Physicists work as engineers, astronomers and all kinds of other scientific fields. Some physicists work for NASA and others help develop video games and sports equipment. Some physicists work on how to treat cancer and predicting earthquakes. Physics relates to almost every field. Physics has strong connections to math and computers as well, which many physicists work with.

2. Show the video: <https://www.youtube.com/watch?v=-XS4YQH3aAk>
3. Students read article: “Women in Physics: A Review” by Laura McCullough, *The Physics Teacher*, **40**, 86, 2002. <http://dx.doi.org/10.1119/1.1457312>.
Further statistical information: <http://www.aip.org/statistics/trends/gendertrends.html>
4. Students complete worksheet questions (suggestion: in small groups)
5. Questions for Large Group Discussion
 - a. What do you think can be done in science or physics classrooms to create a better learning environment for both women and men?
 - b. What did students think was the most interesting story in the video? Can they see any connections with their own lives?
6. Give students a list of resources and contacts that can help them overcome academic obstacles, discuss these resources so the students understand them, and encourage students to reach out.

Worksheet: Pitfalls, Potholes, and Hurdles

Name: _____

Date: _____

1. What is the “leaky pipeline” phenomenon and why is it so serious in physics?
2. According to the McCullough article, what is the reason that so few women continue to pursue physics as they continue their education?
3. Name three of the mentoring or support organizations in the sciences and describe briefly what each one does.
4. What sort of classroom practices does McCullough cite as problematic according to research on why women are not pursuing physics?
5. In the video what kind of obstacles did the women say they encountered as physics students? What kind of obstacles have you encountered as a student?
6. What resources did the women in the video say helped them most in overcoming these obstacles? What are some resources you have to help you achieve your educational goals?