

WOMEN IN STEM

UNIT 1: TOO FEW WOMEN IN STEM

Although efforts to increase the number of women in science have existed for decades, girls and women are still **underrepresented** in science, technology, engineering, and math (STEM). A shortage of qualified scientists is a problem that must be addressed because science advances knowledge and impacts human life in many ways such as healthcare or the environment.

CURRICULUM CONNECTIONS

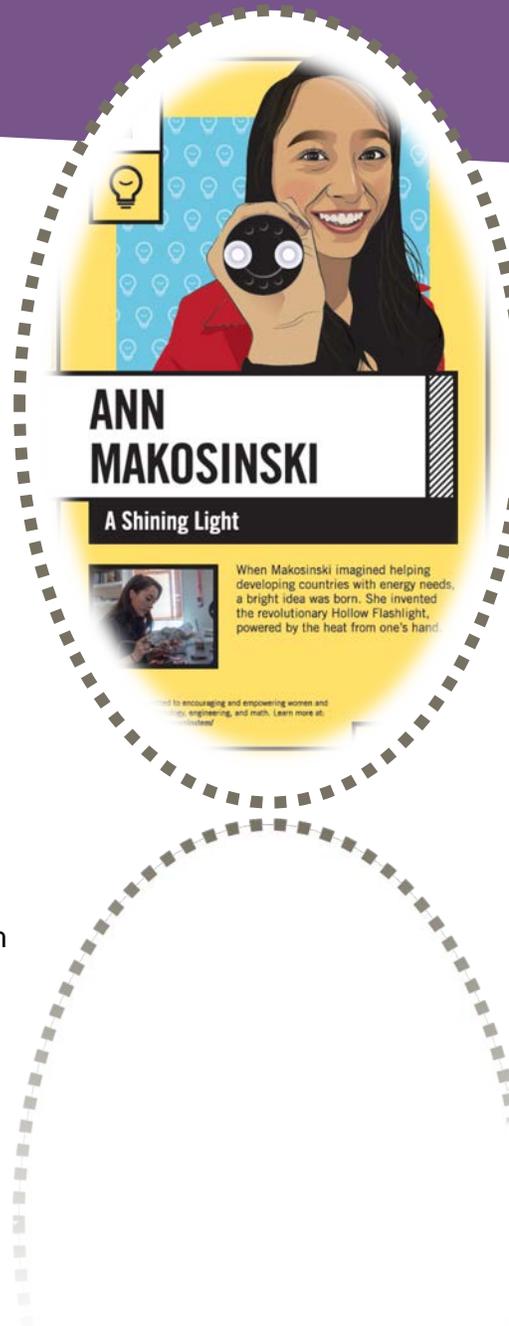
Social Studies; people and groups; stereotypes and societal norms

LEARNING OUTCOMES

- **Describe** the problem and possible explanations for why the problem has not yet been solved.
- **Think critically** about ideas related to the problem.
- **Work collaboratively** to discuss constructive ways to address the problem.
- **Identify evidence** or information from valid sources to comprehend the problem and to support potential solutions.
- **Apply evidence** or information to support points or arguments.
- **Communicate** effectively and respectfully with others when discussing the problem and how it might be solved.

SUGGESTED GROUP SIZE: 10 TO 30

SUGGESTED TIME: 2 HOURS





INTRODUCTION AND BACKGROUND INFORMATION

Despite efforts of North American governments to encourage women into science, technology, engineering and mathematics (STEM) retaining women in these fields remains difficult. In Canada, while women comprise 70% of university graduates, only **30%** of STEM graduates are female¹. Further, the number of university degrees awarded to women in STEM in the U.S. has declined between 2000 and 2013².

Women's under-representation in STEM is likely due to multiple reasons, some of which include negative stereotypes that girls and women are less skilled at math than men or boys, and a culture that does not support women in the classroom³ and at work⁴.

Sexism refers to attitudes, beliefs, and behaviours, as well as the systemic and cultural practices that promote negative evaluations of people based on gender or support unequal status of women and men⁵.

In day-to-day life, cultural stereotypes suggest that being a girl or woman is not a good fit with being a scientist. Examples of these beliefs can be found in media and society: a recent "Barbie" storybook entitled, "I Can Be a Computer Engineer"⁶, portrayed Barbie as unable to code without help from her male friends, or girls' fashion featuring statements like "I'm too pretty to do math."

Negative stereotypes are powerful and can impact how girls and women see themselves in science, and how they perform, a phenomenon known as stereotype threat⁷. If girls and women are not supported to enter and stay in STEM, we risk losing important scientific brainpower that is essential for future innovation.

This discussion will get students thinking and talking about the problem of women's underrepresentation in STEM.

¹ Hango, 2013

² National Science Board, 2016

³ De Welde & Laursen, 2011; Knobloch-Westerwick, Glynn, & Huges, 2013

⁴ Blickenstaff, 2005; Hewlett et al., 2008; Rosser, 2006

⁵ Swim & Hyers, 2009

⁶ Romano, 2014

⁷ Spencer, Steele, & Quinn, 1999



PROBLEM STATEMENT

The problem we face is that girls and women are underrepresented in science, technology, engineering, and math (STEM) and these fields need the best minds to solve future challenges, regardless of gender or sex.

GUIDING QUESTIONS

1. How have women been historically underrecognized in science? Is that changing?
2. How have women contributed to science in a Canadian context?
3. What possible barriers stand in the way of solving this problem? How might different women experience barriers in similar or dissimilar ways?
4. Are women underrepresented equally across different STEM subjects?
5. How have scientific contributions by women changed society? The world?
6. What are possible solutions to women's underrepresentation in STEM? What has worked? What has not?

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RECOMMENDED PROCESS

1. Arrange the physical space and materials prior to beginning the discussion.
2. Provide all students with the necessary background information about the problem or topic.
3. Provide all students with an overview of the discussion and activity.
4. Assign students to small groups of 3-4 and provide guiding questions.
5. Groups should designate roles including, but not limited to: researcher, recorder, or presenter. Students can also collaborate on these tasks. Roles are described below:
 - **Researcher** - can utilize online or other resources to gather information about the guiding question.
 - **Recorder** - will compile the gathered information into a list of written points or statements to summarize ideas.
 - **Presenter** - will share the summarized information and ideas with the remainder of the class.
6. As a class, students and educators should debrief about the process of gathering and communicating information to others.

Remember to...

- ✓ Establish expectations about taking turns to speak so that all students have their voices heard.
- ✓ Encourage students to listen and speak throughout the discussion.
- ✓ Promote an environment of respectful conduct, even when students disagree.
- ✓ Remember that topics related to equity, diversity, and inclusion may bring up strong attitudes or opinions.
- ✓ Reinforce the idea that all people may have a different understanding about an issue, so showing compassion for each other throughout learning is critical.



ADAPTING TO DIFFERENT GRADE LEVELS

Grades 4-6: Group discussions in fourth to sixth grades should be focused on the questions:

- How have women been historically under recognized in STEM? Is that changing?
- Why does under representation matter?
- How have women contributed to science in a Canadian context?

Social Studies for this grade range involves topics like society over time, therefore focusing on women's historical absence from science and the current Canadian context is appropriate.

Grades 6-8: Groups discussions in sixth to eighth grades should be focused on the questions:

- What possible barriers stand in the way of solving this problem? How might different women experience barriers to STEM participation in similar or dissimilar ways?
- Are women underrepresented equally across different STEM subjects?

Social Studies for this grade range involves topics like equity, identity, and power, therefore focusing on women's different identities (e.g., race, ethnicity, religion, sexual orientation) and how they intersect in the scientific context is appropriate.

Grade 9+: Group discussion and presentation in ninth and greater grade should focus on the questions:

- How have scientific contributions by women changed society? The world?
- What are possible solutions to women's underrepresentation in STEM? What has worked? What does not?
- Do you think you have a role to play in helping women be represented in STEM? If so, what is that role?

Social Studies for this grade range involves topics like civic or political engagement and the individual's ability to impact society, therefore focusing on how women's scientific work has contributed to advancing society and generating solutions is appropriate.



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