

1.3 21st Century Women STEM Innovators

Women, whose work in philosophy, science, and politics has been neglected or marginalized in history textbooks and curriculum framework, made change-producing discoveries and advances during the Enlightenment and in every era since. Still in today's digital age, the most well-known STEM figures are men, such as Steve Jobs, Elon Musk, and Mark Zuckerberg.

Rarely do elementary, middle, or high school students learn about women like [Margaret Hamilton](#) who wrote the software for the 1969 Apollo Landing and invented the term "software engineer," [Annie Easley](#), a Black rocket scientist whose work set the stage for space shuttle launches, [Radia Perlman](#), the "mother of the Internet" who invented an algorithm for organizing and moving data, and many more women technology trailblazers.

Indeed, there is a lack of diversity in STEM fields in general. Just 3% of STEM workers are Native American, Native Hawaiian, Pacific Islander, or people who identify with 2 or more racial groups. Women earn more than half the bachelor's degree in health and life sciences, but far fewer in engineering and computer science ([Pew Research Center](#), April 14, 2021).

DEMOCRACY FOR ALL

TOPIC 1, STANDARD 3

Watch on YouTube <https://edtechbooks.org/-geEZ>

How many of the following women trailblazers and change makers in math, science, and technology fields did you learn about in school?

- [Emmy Noether, Mathematician and Physicist](#)
- [Ada Lovelace, Mathematician and First Computer Programmer](#)
- [Mary Anning, Fossil Finder and Paleontologist](#)
- [Maria Mitchell, Astronomer and Educator](#)
- [Elizabeth and Emily Blackwell, First American Women in Medicine](#)
- [Alice Guy-Blache, Pioneering Woman Filmmaker](#)
- [Rosalind Franklin, Molecular Biologist](#)
- [Rachel Carson, Environmentalist and author of the book *Silent Spring*](#)
- [Margaret E. Knight, Inventor](#)

If the answer is 1 or less, you are not alone.

Take a moment to learn about just one from the list: **Ada Lovelace**

Ada Lovelace was the daughter of poet Lord Byron and Anne Isabelle Milbanke. She is considered the first computer programmer.



Portrait of Ada Lovelace by Alfred Edward Chalon (1838)
["Ada Lovelace Chalon"](#) by [Alfred Edward Chalon](#). [Public Domain](#)

Ada Lovelace did not conform to traditional gender roles and expectations, focusing on mathematics and coding in a time when women were not taught math. She became a correspondent to mathematician Charles Babbage who was in the process of creating the plans for the Difference Machine, the world's first calculator. She

created notes on the machine and its step sequences and those notes became the first computer "code." Learn more at [Ada Lovelace, Mathematician and First Computer Programmer](#).

In the following activities, you will explore how influential women in STEM fields are, and have been, portrayed in the media and think about how to encourage more girls to pursue careers in science, technology, engineering and math (STEM).

Activity 1: Locate Women in STEM in the Media

- Search online and in print media for stories about women STEM innovators, then answer the following questions in a video, [podcast](#), or paper:
 - How easy or difficult is it to find examples of women's accomplishments in STEM fields?
 - How are women STEM innovators portrayed in the media? How does this compare to the way male STEM innovators are portrayed in the media?
 - Why do you think many young girls choose not to pursue careers in science, technology, engineering, or math?
 - What life would be like today without the [13 Famous Women Who Changed Tech History Forever?](#)



Photo by [Christina @ wocintechchat.com](https://www.wocintechchat.com) on [Unsplash](https://unsplash.com), free to use

Activity 2: Increase the Participation of Girls in STEM

- Write a proposal for how your school can increase opportunities for success for girls in STEM.
 - Include changes in curriculum and courses that are needed to support girls in STEM
 - Include changes in school culture and climate that are needed to support girls in STEM.
- **Create a social media campaign** to spread awareness about your proposal.
 - The social media campaign should include at least 2 videos (e.g., YouTube, Snapchat, TikTok), 5 example posts, and 3 images (e.g., memes, graphics, infographics) designed by you.
 - Here is a [social media campaign example](#) created by

Justin Lo, Daniel Mulno, and David Warde and here is a [Twitter campaign example](#) by Sara Shea.

- Consider using the [Made to Stick principles](#) or [TED Talk presentation techniques](#) to increase the appeal of your social media campaign.

Designing for Learning: Student-Created Activity Example

[Increasing Participation of Women In STEM](#)

Activity 3: Revise a Science or Math Textbook to be More Gender Inclusive

- Find an open educational resource (OER) math or science textbook from [OpenStax](#), [OASIS](#), [OER Commons](#), or another resource.
- Select a chapter or section that you would like to revise to be more gender inclusive.
- Copy the text and media from that chapter into word document.
- Revise the text and/or media to be more gender inclusive (e.g., to help girls see themselves in the text!).
 - Find [open source images, video clips, and audio files to add to the text here](#).
- Publish the new section or chapter with an [OER license](#).

Activity 4: Analyze the Portrayals of Women in Science and Politics, Then and Now

- Conduct Internet research to examine how women thinkers from the Enlightenment era are currently presented on websites and in various media (e.g., YouTube videos, TikToks).
 - How easy or difficult is it to find examples of women Enlightenment thinkers? What does this say about how women Enlightenment thinkers were perceived at the time?
- Next, explore how influential women in science and politics are presented in the media and online today. What are the similarities and differences between the portrayals of women Enlightenment thinkers and women in science and politics today?
- To wrap up, **create a TikTok dance** about a women Enlightenment thinker and their impact on present day society.

Additional Resources

- [When Women Stopped Coding](#)
- [Code Acts in Education](#) - Prof. Ben Williams' blog about the influence of software on education
- [Sisters in Innovation: 20 Women Inventors You Should Know](#)
- [The 10 Most Influential Women in Tech Right Now](#)
- [15 unsung women in tech you should know about](#)
- [What Early French Female Press Can Tell Us About a Key Period for Women in Public Life](#)
- [6 Facts of America's STEM Workforce and Those Training for It](#), Pew Research Center (April 14, 2021)
- [Ignite Her Curiosity: 60 Children's Books to Inspire Science-Loving Girls](#)

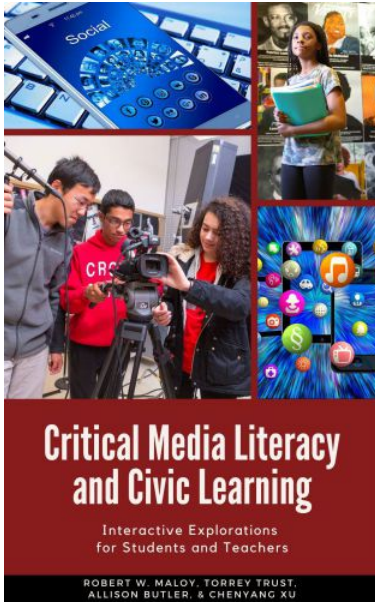
Connecting to the eBook

[Building Democracy for All: Who Were History's Important Women Change-Makers in Math, Science, and Politics?](#)

Connecting to the Standards

- [Massachusetts Civics & Government Standards](#)
 - *Explain the influence of Enlightenment thinkers on the American Revolution and the framework of American government* (Massachusetts Curriculum Framework for History and Social Studies) [8.T1.3]
- [ISTE Standards](#)
 - Knowledge Constructor
 - 3a: Students plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.
 - 3b: Students evaluate the accuracy, perspective, credibility and relevance of information, media, data, or other resources.
 - 3d: Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.
 - Creative Communicator
 - 6b: Students create original works or responsibly repurpose or remix digital resources into new creations.
 - 6d: Students publish or present content that customizes the message and medium for the intended audiences.
- [DLCS Standards](#)
 - Interpersonal and Societal Impact (CAS.c)

- Digital Tools (DTC.a)
- Collaboration and Communication (DTC.b)
- Research (DTC.c)
- [English Language Arts > History/Social Studies Common Core Standards](#)
 - CCSS.ELA-LITERACY.RH.6-8.6
 - CCSS.ELA-LITERACY.RH.6-8.7
 - CCSS.ELA-LITERACY.RH.9-10.6
 - CCSS.ELA-LITERACY.RH.9-10.9
 - CCSS.ELA-LITERACY.RH.11-12.6
 - CCSS.ELA-LITERACY.RH.11-12.7
 - CCSS.ELA-LITERACY.RH.11-12.8
- [English/Language Arts Common Core Standards](#)



Maloy, R. W., Trust, T., , & Xu, C. (2021). *Critical Media Literacy and Civic Learning*. Equity Press.
<https://equitypress.org/mediaandciviclearning>