Women in Science 8-Step PBLP (Grades 7-12)

Objective: This interdisciplinary Project-Based Lesson Plan examines the historical, scientific, technological, and social contributions of women and girls in science while exploring barriers to participation and pathways toward equity and innovation. Students analyze how representation, access to research opportunities, policy frameworks, and community support systems influence scientific discovery and workforce participation. Through systems thinking and applied research, learners design real-world initiatives that expand access, visibility, and opportunity for women and girls across STREAMSS-related fields.

Round Table

- **Opening Discussion:**
  - Why has scientific discovery historically excluded many voices?
  - How does representation affect innovation, research outcomes, and public trust in science?
  - What systems support or limit access to scientific education and careers?
- **Materials:** Reflection journal

Reflection Point

- **Discussion Questions:**
  - How does access to education, mentorship, and research opportunities shape who becomes a scientist and whose discoveries are recognized?
- **Purpose:** Learners reflect on the relationship between equity, innovation, and scientific progress. Learners consider how social systems, education policy, and research institutions influence participation in science and technology fields.
- **Materials:** Reflection journal

Knowledge Setting	
Science (S): Scientific Contributions and Discovery	❖ **Objective:** Understand how women have advanced scientific knowledge across disciplines. ❖ **Activity:** Study case examples of scientific breakthroughs led by women in biology, chemistry, physics, medicine, environmental science, and engineering. Analyze how these discoveries influenced society and future research.
Technology (T): Access, Tools, and Innovation	❖ **Objective:** Examine how technology expands or restricts access to scientific participation. ❖ **Activity:** Evaluate digital platforms, laboratories, data systems, and educational technologies that support scientific research and collaboration. Identify gaps in access for women and girls globally.
Research (R): Evidence, Data, and Representation	❖ **Objective:** Develop research literacy by analyzing participation trends and outcomes. ❖ **Activity:** Conduct comparative research using academic articles, workforce data, and historical records to examine women's participation in science fields over time. Identify variables such as education access, funding, mentorship, and policy.

Engineering (E): Systems That Support Scientific Careers	❖ **Objective:** Understand how systems are designed to sustain scientific work. ❖ **Activity:** Analyze mapped systems that highlight what's required to support scientific careers, including education pipelines, research institutions, funding models, and community partnerships. Identify points where inequities emerge.
Arts (A): Science Communication and Representation	❖ **Objective:** Explore how storytelling and design influence public understanding of science. ❖ **Activity:** Analyze media, visual design, and storytelling that highlight women in science. Evaluate how representation affects identity, aspiration, and public engagement.
Mathematics (M): Data Interpretation and Trend Analysis	❖ **Objective:** Analyze participation trends using quantitative reasoning. ❖ **Activity:** Interpret charts and datasets related to education enrollment, research funding, and workforce representation. Identify growth trends, gaps, and long-term impacts.
Social Studies (SS): Policy, Equity, and Global Context	❖ **Objective:** Understand how laws, policies, and social movements shape scientific access. ❖ **Activity:** Study education policy, labor trends, and global initiatives related to gender equity in science. Compare national and international approaches.

Project Examples

Progress Map for Project Delivery	❖ **Step 1: Project Proposal** Students gather foundational knowledge through a collaborative knowledge-setting session to prepare for a project-based learning process. They meet with community partners (if possible) and create a written proposal outlining the project focus and intended community benefit. ❖ **Step 2: Initial Project Proposal and Community Engagement Plan** Students submit proposals and reflect on community input, refining their plans. They outline how the project addresses real-world needs and aligns with learning objectives. ❖ **Step 3: Research Progress Update** Students conduct research and gather data by consulting with community partners to guide their project development and ensure accuracy. ❖ **Step 4: Draft of Final Project** Students compile findings into a working draft of their final project proposal. ❖ **Step 5: Final Project Refinement and Approval for Implementation** Students apply final feedback to strengthen their project and submit it for approval. Approved projects move forward to the community involvement and assessment phases outlined in the SOP.

Science (S): Expanding Scientific Access	❖ **Project Example:** Collaborate with local scientists, science educators, universities, museums, or public-health organizations to design and implement a community-based science education initiative that highlights women's contributions to a specific scientific field. Learners work with partner to identify barriers to participation and propose evidence-based strategies.
Technology (T): Expanding Access Through Innovation	❖ **Project Example:** Work in partnership with a community technology organization, nonprofit, school district, or innovation hub to design a digital or technology-supported solution that increases access to science education and research opportunities for women and girls. Learners use local data (e.g., school enrollment, program access, broadband availability) to inform tools such as resource hubs, virtual labs, or mentorship platforms that reduce participation gaps and increase visibility.
Research (R): Mapping Participation and Opportunity Variables	❖ **Project Example:** Partner with a university research center, education department, or data-analytics lab to conduct comparative research on participation trends for women and girls in science. Learners identify key variables such as access to coursework, funding, mentorship, and institutional support, and analyze how interventions affect outcomes over time. Research findings are compiled into a report or brief shared with community leaders, schools, or workforce partners.

Engineering (E): Designing Supportive Systems for Scientific Pathways	❖ **Project Example:** Collaborate with engineering professionals, research institutions, or nonprofit organizations to design a systems-level blueprint that supports sustained participation of women and girls in scientific pathways. Students map educational pipelines, support structures, and institutional processes, identifying points of exclusion and proposing design improvements that increase retention, accessibility, and continuity across education and career stages.
Arts (A): Communicating Representation and Impact	❖ **Project Example**: Partner with local artists, media organizations, museums, or design studios to create a public-facing awareness campaign that communicates the impact of women in science. Learners develop visual, narrative, or multimedia works that elevate representation, challenge stereotypes, and make scientific contributions accessible to the broader community.
Mathematics (M): Measuring Access and Representation	❖ **Project Example**: Collaborate with a civic-data group, school district, or research organization to develop a data visualization or index that measures participation, access, or progression of women and girls in science-related fields. Students analyze trends over time, interpret disparities, and present quantitative findings that inform decision-making for educators, policymakers, or community organizations.

Social Justice (SS): Policy and Equity in Science Education	❖ **Project Example**: Partner with local education agencies, advocacy organizations, or civic leaders to develop a policy or program proposal that addresses equity and access in science education. Learners examine existing policies, funding structures, and historical contexts, then draft and present a brief outlining actionable recommendations to improve participation and representation for women and girls in science.

Community Involvement

- ❖ **Objective:** Learners implement approved projects in collaboration with community partners, translating research and interdisciplinary learning into actionable, real-world initiatives.
- ❖ **Activity:** Following project approval, student teams coordinate with partner organizations to pilot programs, share findings, or present recommendations to relevant stakeholders.

Assessment

- ❖ **Objective:** Evaluate student learning through interdisciplinary understanding, applied research, and community impact.
- ❖ **Methods:** Rubrics assess depth of knowledge, research quality, interdisciplinary integration, clarity of communication, implementation effectiveness, and partner engagement. Assessment includes self-reflection, peer review, and community partner feedback.

Feedback Loop

- **Activity**: Facilitate structured reflection on how systems, representation, and access influence scientific participation and innovation.
- **Journal Prompt**:
  - How do community systems shape who participates in science?
  - What barriers were most significant, and which solutions felt most impactful?
  - How can research and policy create lasting change?

Resume Integration

- Students develop resume bullets and action statements highlighting experience in research, data analysis, collaboration, and community-engaged problem-solving aligned with science and STREAMSS-related pathways.

For more STREAMSS 8-Step Project-Based Lesson Plans, go to our website at www.steamsinitiative.org.

For all inquiries, please email **info@steamsinitiative.org**

A STEAMS Central, Inc. Program
STEAMS Central, Inc. | STEAMS Initiative
8605 Santa Monica Blvd
#123617
West Hollywood, CA
90069-4109
info@steamsinitiative.org
833-379-6892