iSTEM Girls



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Goals and Objectives – Florida Standards

Science Standards

SC.5.N.1.5 – Recognize and explain that authentic scientific investigation frequently does not parallel the steps of the "scientific method."

SC.5.N.1.6 – Recognize and explain the difference between personal opinion/interpretation and verified observation.

SC.5.N.2.1 – Recognize and explain that science is grounded in empirical observations that are testable; explanation must always be linked with evidence.

SC.5.N.2.2 – Recognize and explain that when scientific investigations are carried out, the evidence produced by those investigations should be replicable by others.

Technology Standards (Computer Science)

SC.35.CS-CS.2.2 – Describe how computational thinking can be used to solve real life issues in science and engineering.

SC.35.CS-CS.2.4 – Solve real-world problems in science and engineering using computational skills.

CTE-TECED.68.ENTECH.09.04 - Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.

CTE-TECED.68.ENTECH.01 – Identify and explore careers in Engineering and Technology Education.

Engineering Standards

(3-5-ETS1-1) – People's needs and wants change over time, as do their demands for new and improved technologies.

(3-5-ETS1-2) – Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.

(3-5-ETS1-2) – At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.

(3-5-ETS1-3) – Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.

8 Practices in the Next Generation Science and Engineering Standards

1. Asking questions (science) and defining problems (for engineering)
2. Developing and use models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (science) and designing solutions (engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Math Standards

MAFS.5.OA.2 – Analyze Patterns and Relationships

MAFS.5.MD.2 – Represent and interpret data

MAFS.5.G.1 – Graph points on a coordinate plane to solve real-world and mathematical problems

MAFS.5.G.2 – Classify two-dimensional figures into categories based on their properties.

Course Outline/Overview

Though we live in the 21st Century and there has been much progress made in encouraging our young girls to apply their talents in various fields of study that include STEM, more needs to be done to encourage our young girls in considering entering a field that many still consider male directed. The objective of this project is to encourage our female students in realizing their dreams and aspirations of becoming our future Scientists, Computer and Technology experts, Engineers and Mathematicians.

Female students in grades 4 (Gifted Class) and 5th grade will participate in an "iSTEM Girls" initiative to promote the learning of careers in STEM areas. Using the Sally Ride Science Career books, in addition to other related books that tell about women pioneers in the area of STEM, the girls will learn about women who took on, what many consider, "male roles" in the field of Science, Technology, Engineering and Math. In addition, the girls will participate in various activities in and outside the classroom. Some of these activities will include the CARTHE Bay Drift program through the University of Miami Rosenstiel School of Marine and Atmospheric Science, a field trip to the Biscayne Nature Center to learn more about the ocean ecosystem and sea life, beach erosion and the effects of hurricanes.

Students will also use the Sally Ride Career Books "About Me" interest inventory to learn more about themselves, their strengths and areas of interest. By filling out the interest inventory, the girls will have a better understanding of what they are interested in doing for their future, what "they are good at" and what careers they can explore based on their results.

Using the inventory, they will also create a "middle school" plan to guide them throughout their middle and high school years in a career choice.

By implementing this project in your classroom, teachers will be empowering and building their female student's confidence by helping them learn about other women, young and old, that were "trailblazers" in the field of STEM and change their perception on what they can accomplish and be when they grow up.

Sample Lesson Plans

Lesson Overview: Students will research women in the field of STEM and create a project using various digital media. The option to use videotaping, PowerPoint, a science board presentation, a "first-person" account classroom discussion or a written/typed report will be given to allow for creativity. Provide students with different books on famous women in STEM or allow them the opportunity to research on their own or with a partner.

Lesson Structure: As an introduction to having students research women in STEM, read Ada Lovelace: Poet of Science to promote their curiosity. Explain that Ada was a pioneer of her time. Though she was born over 200 years ago, she was already a "forward-thinking" woman in the area of STEM. Provide a background for them by also introducing her "famous" father (who was also a famous poet) Lord Byron and mother, who was a Mathematician. Emphasize that Ada loved Science and Math and had an amazing imagination which ultimately led her in becoming the "First Computer Programmer", though it would take many years in her receiving the acknowledgement and recognition.

After the introduction, provide students with an outline on collecting important information, recording their findings (in chronological order), and putting all the collected artifacts and information in a digital format for their presentation. (adapted from Education City)

Materials: (Optional) Sally Ride Careers in STEM books, see also the Literature list in packet for guidance. Chart paper, computers/laptops, research outline, writing utensils, folders and camera if available.

Though there are many ways you can encourage your female students to become interested in STEM, I have provided an "interest inventory" to help them assess (and you as well) their own areas of strengths, likes, and interests. I've also added Projected Lessons to provide you with ideas to implement with your own iSTEM Girls initiative.

Projected Lessons:

- Science – Women that paved the path: learning about women that made a difference in our past, our present and empowering our girls to be pathfinders in the future.
- Create and design t-shirts "iSTEM Girls" and watch Hidden Figures for inspiration!
- Technology – solving a problem and meeting a need. Have students learn about a "need" in the world. (I had my girls work on a Plastic Pollution project). Also, sign them up for Code.org. On this website, students will be able to learn coding.
- Engineering – iAsk, iImagine, iDesign, iCreate, iImprove – Making what we imagine a reality. Give students an opportunity to use the engineering design process by coming up with an innovative solution to a problem.
- Math – Make the use of Math relevant to their everyday lives. Have them "see" Math around them and create a quilt or collage of pictures depicting Math ideas and examples.
- iSTEM Girls culminating project Fair. Mapping out "our future" (see worksheet)

What Are Your Strengths?

Many skills that you use every day are important skills for many different careers. Underline your skills. Then circle the top 10 underlined skills you most enjoy using.

Communicate
Talk about Ideas
Write
Edit
Summarize
Listen
Lead discussions
Teach
Use Languages
Ask questions
Make presentations
Debate
Entertain
Create art
Use humor

Use the Computer
Organize information
Use math
Keep records
Code
Use logical thinking

Plan and Design
Brainstorm new ideas
Plan
Design
Anticipate problems
Anticipate consequences
Think visually
Create images
Compose music
Improvise

Investigate
Do research
Read for information
Analyze ideas and data
Gather data
Summarize
Observe
Form hypotheses
Compare/Calculate
Solve problems

Teamwork
Collaborate with others
Solve problems
Make decisions
Motivate
Resolve conflicts
Start projects
Organize
Give directions

Service to Others
Sensitive to others
Social skills
Listen
Work in a group
Teach/Coach
Provide help/care

Physical
Build
Create art
Invent
Fix things
Play sports, musical instruments,
Or dance

(adapted from the Sally Ride Science Academy with permission as a certified trainer)



All About Me

The more you know about yourself, the better you'll be able to plan your future. Start an About Me Journal so you can investigate your interests, and your skills and strengths.

1. These are things I'd like to do someday. Choose from this list or create your own.

- Investigate Earth's atmosphere
- Design sports equipment
- Experiment with sound waves
- Design instruments
- Understand the physics of how things form
- Write about science
- Observe swarms of insects
- Program computers to run virtual experiments on real phenomena
- Analyze and review new inventions
- Study theories of dark matter
- Use physics to help athletes
- Use high-intensity X-rays to study ancient writings

2. These would be part of the perfect job. Choose from this list or create your own.

- Public speaking
- Brainstorming new ideas
- Working independently
- Designing a project
- Writing
- Using creativity
- Making things by hand
- Discussing ideas
- Teaching
- Testing hypotheses

3. These are things that interest me.

- Painting
- Collecting insects
- Working with magnets
- Skiing in competitions
- Swimming
- Watching rocket launches
- Scuba diving
- Watching TV nature shows
- Making discoveries
- Studying English and physics
- Programming computers
- Hiking
- Sketching insects/nature

For journal entries, the following can be used.

4. These are my favorite subjects in school.

5. These are my favorite places to go on field trips.

6. These are things I like to investigate in my free time.

7. When I work on teams, I like to do this kind of work.

8. When I work alone, I like to do this kind of work.

9. These are my strengths-in and out of school.

10. These things are important to me-in and out of school.

11. These are three activities I like to do.

12. These are three activities I don't like to do.

13. These are three people I admire.

14. If I could invite a special guest to school for the day, this is who I'd choose, and why.

15. This is my dream career.

(adapted from the About Me section in the Sally Ride Careers in Science)



Literature

- Sally Ride Cool Careers in STEM/Science Books
- Ada's Ideas – The Story of Ada Lovelace, the World's First Computer Programmer by Fiona Robinson
- Solving the Puzzle Under the Sea – Marie Tharp Maps the Ocean Floor by Robert Burleigh
- Fearless Flyer – Ruth Law and Her Flying Machine by Heather Lang
- Ada Lovelace, Poet of Science by Diane Stanley
- Ada Byron Lovelace and the Thinking Machine by Laurie Wallmark
- The Most Magnificent Thing by Ashley Spires
- Trailblazers: 33 Women in Science Who Changed the World by Rachel Swaby
- Wangari Maathai – The Woman Who Planted Millions of Trees by Franck Prevot
- Women Who Launched the Computer Age by Laurie Calkhoven
- Hidden Figures by Margot Lee Shetterley
- Women in Science: 50 Fearless Pioneers Who Changed the World by Rachel Ignotofsky
- STEM Superstar: Katherine Johnson: Guiding Spacecraft by Megan Borget-Spaniol



STEM Websites for Girls

- https://girlstart.org
- www.engineeringirl.org
- https://women.nasa.gov/nasagirls/
- pbskids.org/scigirls/home
- carnegiestemgirls.org
- www.madewithcode.com
- www.girlsopp.org
- girlsrisenet.org/engineering/for-girls-only
- www.girlgeeks.uk/resources/
- www.sciencebuddies.org
- www.careergirls.org
- gc3.edc.org/index.html

Materials and Budget

Sally Ride Cool Careers in STEM/Science Books: 6 @ $10 each - $60

Literature (see list): range $60 - $150

Tablet or GoPro - $199

Hidden Figures DVD - $15.99

T-Shirts - $3.00 - $5.00 each

Fabric Markers/Paint/Stencils - $18

Folders – Box of 100 - $16

Field Journals - $1.00 each

Index Cards 100 per pack - $1.00 each

Masking Tape 3-Pack - $6.00

Sketching Pencils - $5.00 per box

Science Boards (for specific projects) $3.00 - $5.00 each

Color Tissue Paper Sheets 10 pk. $2.00

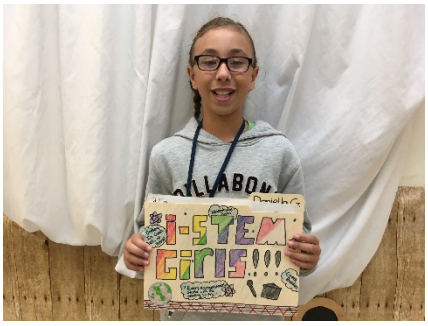
String - $1.00 - $4.00

Budget may range depending on materials you would like to use and purchase. Some materials may be donated by parents/guardians (see sample letter to send home for donations). They may also be found in Science kits at your school. The tablet/GoPro can be adjusted to a digital camera that would cost less to use for pictures and videotaping in the classroom, field trips and/or projects.

Sample Student Work and Pictures



















Books

Music

Sports

Computers

Travel

Art

Map Out Your Future

Map out your past and your future – in ANY way you'd like. Here are some ideas to get you started.

You might want to include: Hobbies, Sports, Math classes, Science classes, Personal goals, Things you want to work on…

Ways you might want to fill in your timeline:
Write, Draw, Paste photos, Use icons

When I was younger;	Middle School:	High School:	College:	My Career:

(Adapted from Sally Ride Careers in Science)


Place Value
Division
WARNING



Middle School Journey

Camila

Beginning of School Year	6th Grade	7th Grade	8th Grade
Educational Goals	straight A's	8th gr. level on i-ready	1rst an science board
Personal Goals	Read and write alot.	Save up alot of money	become better at soccer
Career Goals (High School)	Become an intern for a scientist	Get a doctor's degree in college	Become a scientist or capcom at NASA
Other:	1rst place science board	write an article	learn to make more food
My thoughts/ideas	Invent something amazing	Stay a phenomenal student	Create a company when I'm older

Inventory: Strengths: Science, organizing, cooking, baking, school

Challenges: Accept not alway being a perfect student. Invent!

Support: Family

SELF-REFLECTION ON PROJECT WORK

Think about what you did in this project, and how well the project went.
Write your comments in the right column.

Student Name:	Daniella
Project Name:	The MGB
Driving Question:	What did I learn about boats, how did this affect my knowledge, and STEAM?
List the major steps of the project:	• Brainstorm ideas on which boat to study. • Create a backstory for our boat about what it does, how it works, and what is it used for • Design and build our boat, then research boats. • Write up a board to add all the information and photos we took. Then present it to a class!
About Yourself:	I like playing around, photography, and tennis. I like having fun, and being a "sea: I'm curious, weird, and wacky.
What is the most important thing you learned in this project:	I learned a lot about boats. Including how the float, density, and a lot about STEAM. There is more to boats than people think.
What do you wish you had spent more time on or done differently:	I wish we made a video presentation explaining our boat and its rooms. I also wish our board was a little bit more professional, and less messy. Our paint job wasn't good
What part of the project did you do your best work on:	I think we did a great job on giving a story to our ship. We made also a great model, too.
About the Project:	A boat project/The marine green boat/helps marine biologists
What was the most enjoyable part of this project:	I liked working in a team, with my partner Cecilia. We did a great job all together. The backstory of our boat was wonderful.
What was the least enjoyable part of this project:	I didn't like painting the boat, because it made me frustrated that I kept messing up.
How could your teacher(s) change this project to make it better next time:	Next time our teacher could've made the project better by giving us a more specific guide to help us. My teacher can also help us by going over more. Next time, she/he can list some websites to research information.

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SELF-REFLECTION ON PROJECT WORK

Think about what you did in this project, and how well the project went.
Write your comments in the right column.

Student Name:	Cecilia [illegible]
Project Name:	Plastic Pollution Presentation
Driving Question:	How can we solve the problem of plastic pollution?
List the major steps of the project:	- Find information on plastic pollution - Prepare for your presentation - Also learning to find new ways to reduce the amount of plastic we use
About Yourself:	Like to make new inventions, energetic/athletic, intelligent, curious, determined
What is the most important thing you learned in this project:	That there are many ways to improve our environment ~~because~~ of this problem. Also to be proffesional in presenting.
What do you wish you had spent more time on or done differently:	I wish we had brought a tank of water with plastic to show the enormous amount of plastic in our oceans.
What part of the project did you do your best work on:	Our video presentation. We worked really hard to find good visual pictures and took time to transfer our information to the video.
About the Project:	We made a video presentation, an essay, and a board.
What was the most enjoyable part of this project:	For me it was presenting. We showed our hard work and explained the defining harmfulness of plastic to our ecosystems. We expressed all our information.
What was the least enjoyable part of this project:	The least enjoyable part was coloring my pictures because we didn't have colored ink. Coloring is not one of my strengths.
How could your teacher(s) change this project to make it better next time:	They could have made it more challenging type of project where we had to go deeper and really inform and express the topic. They also could've added a certain rule to make it more organized and professional.

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