STEM Empowerment Teacher's Guide

Feel free to use this as a tool but change anything that is needed for your students in particular. Email any questions at eschissler@oxy.edu or under the feedback section under the tab "Resources."

Day 1 of STEM Empowerment

Objectives

- Learn about famous scientists from diverse backgrounds
- Have students imagine themselves as future scientists
- Encourage students to get involved with the world of STEM
- Increase student curiosity about the world

Material needed

- STEM Empowerment information guides - these guides include more information about each topic and help with answering questions
- Paper and writing material to take notes
- Worksheets found on the website (optional) - can be filled out during or after the lesson
- Videos found under educational videos on websites (Optional)

Recommendations

- Encourage students to take notes and draw during the lesson
- Encourage them to interject, tell them to feel free to tell stories
- Encourage kids to be curious and ask questions. If you don't know an answer to something, try to respond with something like, "let's look it up together."

Introduction

- There are many underrepresented and famous scientists not covered in history books and science classes.
- We will be learning about Alexa Canady, Ellen Ochoa, and Mario Molina, all of whom bring representation of marginalized groups to science and inspire many worldwide.
- Starting question: Do you know any famous scientists?

Instruction (20 minutes)

- Lesson: Famous Scientists
    - Alexa Canady
        - The first female African-American neurosurgeon in the United States
        - The first female African-American to be certified by the American Board of Neurological Surgery

    - Ellen Ochoa
        - She was the first Hispanic Women in Space in 1990
        - From Los Angeles
        - Awarded: Women in Aerospace Outstanding Achievement Award and Hispanic Heritage Leadership Award.
    - Roger Arliner Young
        - First African American women to receive her doctorate in Zoology
        - Her article from 1924 was published in Nature magazine, which was the first time an African American woman in this field had her research published.

- Activity: Draw yourself as a scientist
    - First, instruct students to make a full-body drawing of themselves.
    - Then tell them to draw themselves as a scientist - they can either start from scratch or add onto the drawing. Ask what kind of scientist they want to be.
    - Each student should add at least three things to the drawing, which makes them look like a scientist.
    - Tell students to include any images in the background that make them curious as part of being a scientist is having a curiosity of the world.
    - Encourage students to really think about what they want to look like as a scientist and to think outside the box. For example, they don't have to draw the classic test tube and beaker, but they can draw animals in the background and label themselves a zoologist.
    - After every student is done, encourage them to talk to each other and explain why the picture they drew makes them a scientist.
    - *Inspiration from Boundless Brilliance's Draw a Scientist: https://www.boundlessbrilliance.org/brilliant-blog/2020/8/1/draw-a-scientist*

Conclusions

- Today we learned about some famous scientists and their accomplishments, including Alexa Canady, Ellen Ochoa, and Mario Molina.
- We also imagined ourselves as our own unique scientists and thought about what kind of scientist we would like to be.
- Does anyone have any last questions before we wrap up?
- Tomorrow we will be looking at what STEM stands for, different types of science, and how to be more involved in science in the future.

Day 2 of STEM Empowerment

Objectives

- Learn about different types of sciences and what STEM stands for
- Provide resources to help further their understanding of science (zoology related or not)
- Have students imagine themselves as future scientists
- Encourage students to get involved with the world of STEM

Recommendations

- Encourage students to take notes and draw during the lesson
- Encourage them to interject, tell them to feel free to tell stories
- Encourage kids to be curious and ask questions. If you don't know an answer to something, try to respond with something like, "let's look it up together."

Material needed

- STEM Empowerment information guides - these guides include more information about each topic and help with answering questions
- Paper and writing material to take notes
- Worksheets found on the website (optional) - can be filled out during or after the lesson
- Videos found under educational videos on websites (Optional)

Introduction

- STEM stands for science, technology, engineering, and mathematics - all of which cover a wide range of topics.
- Although many people think of science as just studying cells, plants, or molecules, there are many different types of science.
- Science is about learning and answering questions we don't know the answer to yet.
- There are many easy at home activities we can do to make ourselves think like scientists and increase our knowledge and involvement in science.
- Starting question: What are some different types of sciences?

Instruction (20 minutes)

- Lesson: How to be more to be involved in STEM and different types of science
    - STEM is Science, Technology, Engineering, and Math.
        - SCIENCE: Activities can include nature and earth sciences (what we have been doing).
        - TECHNOLOGY: Using computers and calculators and more.
        - ENGINEERING: Designing and building anything from bridges and towers to simple machines and robots!

        - MATHEMATICS: From the very first one-to-one counting, sorting, and patterning all the way up to higher levels of math such as calculus.
    - Science is the study of the world around us. Scientists learn about their subject by observing, describing, and experimenting.
    - We've talked a lot about animals during this course, but that's just one of the many types of science! Specifically, studying animals is called Zoology, a type of Biology (the study of life). There are many other types of sciences, such as:
        - Astronomy is the study of the solar system, outer space and the objects in it.
        - Chemistry is the study of the behavior, properties, and composition of matter.
        - Marine biology is the study of living organisms that live in the ocean and other bodies of water.
        - Paleontology is the study of prehistoric life and fossils including dinosaurs.
    - How to get more involved
        - Conduct your own experiments and answer your own questions
        - Go outside or on a hike or camping and explore the outside world. Ask yourselves questions and make observations about the stars, insects, the weather, backyard birds, the changing color of leaves, etc.
        - Interact safely with animals and learn about them like we have been doing during this course! Visit a zoo, local aquarium, or a petting zoo!
        - Don't be afraid to be curious and ask questions. That's a part of science!
        - Most importantly, have fun!

- Activity: Animal guessing game or increasing curiosity lookup
    - Using what we learned during this course, our last activity for this course will be a fun guessing game called the animal game (made by the creator)
        - Have each student think of an animal and have the other students guess the animals with yes or no questions. Each student will tell the teacher their animal in case they need help answering the questions, but the guessing should be from the other students.
            - Some questions that might be helpful: Does it live on land (sea)? Does it have (2,4,0) legs? Can we see it in our backyard? Can it fit in a microwave? Does it have a main color? Does it live in___ habitat? Is it a carnivore (omnivore, herbivore)?
        - Alternative activity if students are not confident in guessing animals: have each student ask one scientific question they are curious about and look up the answer to share with the class.

Conclusions - 5 min

- Today we learned what STEM stands for and some different types of sciences.
- We also learned how to become more engaged in moving forward in STEM.
- Does anyone have any last questions before we wrap up?
- And this wraps up our 2- week curriculum on Animals - give yourselves a pat on the back!
- Does anyone have any reflections or good favorite parts of the course they would like to share?
- (If students are interested in learning more and pursuing science, please read below and feel free to distribute the supplementals page from the website)

If you want to learn more, please reference the supplemental and website document at the bottom of the “Curriculum” pages.
References will be under the references tab on the website.