Broadening Research Interest in Geoscience, Habitat, and Technology (BRIGHT)

Investigation 10: STEM SPEED MENTORING

Grades 9-12

Time requirement: 1.5 hours

Next Generation Science Standards (NGSS)

Science and Engineering Practices
Scientific Investigations Use a Variety of Methods • Scientific investigations use a variety of methods, tools, and techniques to revise and produce new knowledge.
Disciplinary Core Ideas

Earth and Space Science
• ESS3: Earth and Human Activity
  ◦ ESS3.C: Human Impacts on Earth Systems
  ▪ The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.

Crosscutting Concepts
Science is a Human Endeavor • Scientific knowledge is a result of human endeavor, imagination, and creativity. • Individuals and teams from many nations and cultures have contributed to science and to advances in engineering. • Scientists' backgrounds, theoretical commitments, and fields of endeavor influence the nature of their findings.

OVERVIEW

Students use a speed dating format (short, rotating conversations) as a fun, informal way to get to know local STEM mentors. STEM speed mentoring can be a capstone experience following students' successful research projects, or a stand-alone activity.

LEARNING OBJECTIVES

Students will be able to:

- Scientists use a variety of methods, tools, and techniques to revise and produce new knowledge.
- Scientific knowledge is a result of human endeavor, imagination, and creativity.
- Individuals and teams from many nations and cultures have contributed to science and to advances in engineering.
- Scientists' backgrounds, theoretical commitments, and fields of endeavor influence the nature of their findings

INSTRUCTIONAL APPROACH

The instructor should establish a safe, collaborative, and value-neutral space to share experiences, and assist students and STEM mentors in doing so.

Students and STEM mentors enjoyed these events immensely in Fairbanks and Juneau, Alaska. Female students benefited from meeting female STEM professionals and shared that talking to them helped them figure out what they wanted to do. Several of the STEM mentors commented that they enjoyed meeting each other and wanted each others' contact information, a bonus benefit of this student-focused event. One even said she wished she had experienced something like this in high school, that it would have saved her years of uncertainty!

SCIENCE BACKGROUND

Studies like the Draw-a-Scientist Test show the importance of representation in STEM. Students from underrepresented groups (and students in general) benefit from a chance to interact with STEM mentors from diverse backgrounds. (https://www.theatlantic.com/science/archive/2018/03/what-we-learn-from-50-years-of-asking-children-to-draw-scientists/556025/)

MATERIALS

- Name tags, 1 per person (students and STEM mentors)
- Markers, 1 set
- Lists of questions for students, 1 per STEM mentor
- Lists of questions for STEM mentors, 1 per student
- Timer

ACTIVITY

Setup

1. Invite STEM mentors (ideally, one per student). Send them the questions to contemplate beforehand, and invite them to bring interesting objects, equipment, or figures with them, if they wish. Consider representation, e.g., mentoring and role modeling from underrepresented groups. Ask for mentors' permission to share their contact information with students and with each other.

2. Revise and print questions for students and STEM mentors.

3. Decide if refreshments will be served, e.g., tea, coffee, juice, fruit, pastries. If so, purchase refreshments and paper plates, cups, napkins, and forks.

4. Arrange space for speed mentoring, similar to a speed dating format, e.g., parallel rows of chairs. Put question lists on chairs.

Investigation

1.5 hours (depending on number of students and mentors and length of conversations)

1. STEM mentors arrive and fill out name tags; they have contemplated the questions for themselves and for students beforehand, and may have brought interesting objects, equipment, or figures with them.

2. Students arrive, fill out name tags, and receive example questions to ask professionals (which have also been shared with students and professionals prior to the event).

3. Give everyone a chance to get refreshments, if applicable. The ideal event atmosphere is fun and informal, but the timing is strict!

4. STEM mentors and students each take 30 seconds (timed) to introduce themselves to the entire group (name, field, title), to avoid repeating this information during each conversation.

5. Students rotate and talk to each STEM mentor individually (or in pairs, depending on the number of students and mentors). Time rotations depending on the number of attendees, e.g., 10 STEM mentors x 5 minutes per conversation. Use an amusing timer sound to signal the end of each rotation.

6. After the last conversation (every student has talked to every STEM mentor), share emergent themes as a big group, thank everyone for participating, and encourage students to engage in follow-up chats.

7. Share contact information to continue the conversations!

Extension

One possible extension for this activity is including remote participants, students or STEM mentors, e.g., using FaceTime. Students could also expand upon their initial conversations by interviewing STEM mentors, e.g., for their school or local paper or public radio station.

Example questions for STEM mentors

- *How did you enter your field?*
- *What has your career path been like?*
- *When you were in school, did you know that you would join this profession? If not, were you disappointed when you did not follow the first career you had in mind?*
- *Has your career changed over the years? Do you think your career will change in the future?*
- *Do you have an analogy to help me understand your work?*
- *On a typical day/week in your position, what do you do?*
- *What tools do you use in your work?*
- *Do you work alone, in pairs, in teams, or in another arrangement?*
- *What are the toughest problems you solve?*
- *What is the most rewarding part of your work?*
- *Do you encounter obstacles in STEM, e.g., as a member of an underrepresented group? If so, what are they, and how do you overcome them?*

- *What kinds of prior experience does your role require?*
- *What interests, skills, and abilities benefit you in your role?*
- *What advice would you give a student interested in your field?*
- *How do people find out about positions like yours?*
- *How do you see your field changing in the future?*
- *What are your concerns about your field?*
- *What do you do if you don't like your work/job?*
- *What do you like to do when you're not working?*

Example questions for students

- *What do you like to do in your free time?*
- *Describe a typical day/week in your life.*
- *What kinds of problems do you like to solve?*
- *Do you prefer to work alone, in pairs, in teams, or in another arrangement?*
- *Do you have ideas about possible career paths you might take?*
- *Do your ideas about possible careers connect to classes you've taken in school and/or to interests outside of school? If so, which ones?*
- *Do you have particular skills or abilities that you hope to use in a future job?*
- *Do you encounter obstacles in high school? If so, what are they, and how do you overcome them?*
- *What was the BRIGHT program like? What kinds of things did you did you do during the program?*
- *How did you decide on your research project?*
- *What did you think of research?*
- *When you encountered problems, how did you solve them?*
- *What advice do you have for scientists like me?*

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