**Find Your Passion, Find Your Profession**

**Lesson Outline**

* Formative Assessment
  + Snowball game
    - Students will get out a piece of paper.
    - The teacher will ask the students a simple question. What jobs do you think people can have at TVA and the EPA?
    - The students will write their answer then wad their paper up.
    - The students will then throw their paper across the room to another student.
    - Each student will pick up a piece of paper and will read what the fellow classmate wrote.
    - Then the teacher will ask the same question again; this time asking the students to think of another job someone may have at this workplace.
    - The students will repeat what they did the last time with the papers and throw them to another student.
    - The teacher will repeat the question one more time and the students will do the same thing they did before.
    - This will get the students brainstorming about the lesson and the class can have a whole group discussion before the lesson.

Watch a few of STEM HERO videos and read about the jobs at <http://www.tvastem.com/stem-careers/>

Note these STEM HERO posters are in pdf form and can be printed for your room.

* Jobs: At TVA
  + What type of jobs do you think someone could get at TVA Browns Ferry?
  + How many people does Browns Ferry employ?
    - 1,500 people (TVA employs over 10,000 employees)
  + Engineers
    - What do you think a Power Utilization Engineer does?
      * Serves as an engineer with responsibility for the sales, promotion, and delivery of technical services and engineering consulting on a wide range of program areas involving the application and marketing of services and products that promote the efficient utilization of electrical energy and electric based technologies.
    - What do you think a mechanical engineer does?
      * They design power-producing machines, such as electric generators, internal combustion engines, and steam and gas turbines, as well as power-using machines, such as refrigeration and air-conditioning systems
    - What do you think an electrical engineer does?
      * An electrical engineer is someone who designs and develops new electrical systems, solves problems and tests equipment.
    - What do you think a chemical engineer does?
      * They apply the principles of chemistry, biology, physics, and math to solve problems that involve the production or use of chemicals, fuel, drugs, food, and many other products.
    - What do you think a nuclear engineer does?
      * They research and develop the processes, instruments, and systems used to derive benefits from nuclear energy and radiation.
    - They make around $95,000 a year
  + Control Room Operator
    - What do you think they do?
      * They work in the control rooms of large plants, power plants, where they monitor all of the operations of the plants to ensure that everything is working properly.
    - They make around $85,000 a year
  + Archaeologists
    - What do you think they do?
      * They investigate historic and prehistoric sites and physical remains to understand human links to the past and to preserve past cultures
    - They make around $70,000 a year
  + Nuclear Reactor Operator
    - What do you think they do?
      * They adjust control rods, which affect how much electricity a reactor generates. They monitor reactors, turbines, generators, and cooling systems, adjusting controls as necessary.
    - They make around $90,000 a year
  + Nuclear Reactor Engineer
    - What do you think they do?
      * They research and develop the processes, instruments, and systems used to derive benefits from nuclear energy and radiation. Many of these engineers find industrial and medical uses for radioactive materials.
    - They make around $65,000-$150,000 a year depending on how long they have worked.
* Jobs: EPA
  + Program Analyst
    - What do you think they do?
      * Program analysts perform the jobs of both a systems analyst and a computer programmer. Systems analysts design and develop software and computer systems. Computer programmers implement the designs by writing computer programs.
    - They make around $80,000 a year.
  + Environmental Protection Specialist
    - What do you think they do?
      * Their job tasks might include collecting water, oil, food and other types of samples for testing; analyzing samples to identify pollution or potential environmental threats; preparing reports of findings, and developing plans to correct or avoid pollution problems
    - They make around $50,000
  + Environmental Engineer
    - What do you think they do?
      * They use the principles of engineering, soil science, biology, and chemistry to develop solutions to environmental problems. They are involved in efforts to improve recycling, waste disposal, public health, and water and air pollution control.
    - They make around $90,000 a year.
  + Criminal Investigator
    - What do you think they do?
      * These agents are highly trained men and women dedicated to the enforcement of federal laws protecting our environment; specifically, our air, water, and land resources.
    - They make around $60,000 a year.
* Which job do you think would be best? Why?
* Which job do you think would be the most fun?
* Which job would you enjoy doing?

The activity for this lesson will be a jigsaw of the career options for TVA and the EPA.

* The students will be numbered off and each number is associated with a specific career. The size of the class group will depend on the number of students assigned to each career. (Probably 2-3 students per career)
  + Power Utilization Engineer
  + Mechanical Engineer
  + Electrical Engineer
  + Chemical Engineer
  + Nuclear Engineer
  + Project Manager
  + Control Room Operator
  + Archaeologist
  + Nuclear Reactor Operator
  + Program Analyst
  + Environmental Protection Specialist
  + Environmental Engineer
  + Criminal Investigator
* The students will then break into groups with the other students who received the same career. The students will have 20 minutes to research their careers and dig deeper into what it is they actually do. Taking notes as they research.
* The students will then be split into new groups. This new group includes one student from each career.
* Each group will be given an envelope of scenarios. Each scenario will represent a problem in which the students must determine what careers in the group will solve it and how exactly they would solve it now knowing more about each of their careers. The students will write down their answers for each scenario.
  + The nuclear plant is wanting to expand the capacity of their system. There is land available right next to their plant. They want to add another reactor, but they need to make sure it is done safely and efficiently. What careers need to work together to help fix this problem, what is the order of events, and how do they solve this problem?
  + There has been a situation where an employee has noticed that a piece of equipment has started to malfunction. Since this is a nuclear plant, this can be a very serious matter. What careers need to work together to help fix this problem, what is the order of events, and how do they solve this problem?
  + Over the past several months there have been many complaints made to the city. Upstream from the nuclear power plant, there have been several sightings of large amounts of dead fish. What are the steps that need to be taken to make sure this is not being caused by the power plant itself? What careers need to work together to help fix this problem, what is the order of events, and how do they solve this problem?
  + The citizens of the town have made many complaints about air quality in the area. They are starting to question if the local plants are in compliance with the Clean Air Act. How do the citizens determine if this is actually the issue? What careers need to work together to help fix this problem, what is the order of events, and how do they solve this problem?
  + Every 18 months the nuclear power plant must have a refueling outage. Outages are very important to help the plant running smoothly. What would need to happen for the plant to have a smooth outage? What careers need to work together to help fix this problem, what is the order of events, and how do they solve this problem?
  + TVA is wants to build a new nuclear plant in town. There seems to be plenty of land for this and it could make energy cheaper and cleaner for everyone. There are many steps that need to be taken before this can happen. What careers need to work together to help fix this problem, what is the order of events, and how do they solve this problem?
  + There is a dog park located up the street from the nuclear power plant. At this park, there is a creek that attaches to the river the power plant uses. This creek has become overgrown with an algal bloom. How can the citizens determine if this is caused by the power plant? What careers need to work together to help fix this problem, what is the order of events, and how do they solve this problem?
* Once the students have determined how to solve their problem scenarios, they will pick one scenario on which to conduct a presentation.
* Each group will create a PowerPoint presentation explaining their problem, how each career will contribute to helping solve the problem, and what the overall solution is.

Sources

Wren, Bill. Project Manager TVA Browns Ferry. February 28, 2019

“Browns Ferry Nuclear Plant.” TVA - Browns Ferry Nuclear Plant, [www.tva.gov/Energy/Our-Power-System/Nuclear/Browns-Ferry-Nuclear-Plant](http://www.tva.gov/Energy/Our-Power-System/Nuclear/Browns-Ferry-Nuclear-Plant).

"Get Excited about Science, Technology, Engineering and Math & Get STEM Ready for Life!" Tvastem. Accessed June 12, 2019. http://www.tvastem.com/.