Lesson Plan: Choosing a STEM Career

Overview

Middle school and high school students will view short video clips about graduate and middle school students with interests in STEM careers and brief comparisons of technologies from yesterday with today. Students will then use multiple on-line resources to explore different career resources before writing an essay about their future career as a STEM professional.

If you are using these lessons in your classroom, please send an e-mail to stemcareers@science.psu.edu describing how you used the videos and lesson plan in your classroom, including any information about student interest in STEM careers after completing the lesson. Thank you!

Objectives

- discuss the personal characteristics STEM professionals share
- predict the differences that may be seen within the next ten years for five technology-based devices
- describe at least five different careers in science, technology, engineering, or mathematics fields
- compare and contrast the education requirements needed in two different STEM careers
- write a persuasive essay about choosing a STEM career over a career in the entertainment or sports industry

Grade Level: 6-8, 9-12

Suggested Time

- Two or three 45 minute class periods

Multimedia Resources

- STEM Careers Grad Students QuickTime Video

  30 seconds

- STEM Careers Middle School QuickTime Video

  30 seconds

- STEM Careers Guitar QuickTime Video

  15 seconds

- STEM Careers Boom Box iPod QuickTime Video

  15 seconds

- STEM Careers Cursive Text QuickTime Video

  15 seconds

- STEM Careers Phone Video Chat QuickTime Video

  15 seconds

- STEM Careers Pong Wii Tennis QuickTime Video

  15 seconds

- STEM Careers Typewriter Computer QuickTime Video

  15 seconds

On-line Resources

- Department of Labor *Career Voyages*
- National Institutes of Health *LifeWorks*
- American Medical Association *Careers in Health Care*
- Vocational Information Center *Engineering, Science, and Math Careers*
- WPSU *Cool Careers in Science*
- NASA *Careers in Earth Science*
- NOAA *OceanAGE Careers*
- Department of Labor Bureau of Labor Statistics *Occupational Outlook Handbook (OOH), 2008-09 Edition*

Materials

- Paper and pencils or colored markers
- Computers with Internet access (preferably one per student or pair of students)
- At least one computer with a projection system for the whole class to view

- STEM Career Information Worksheet PDF Document

Procedure

Introduction

1. Without any prior discussion, tell the students to draw a scientist on a piece of paper. (You may assign this activity in advance of the lesson as a homework assignment if you wish.) Provide at least 15 minutes of class time to complete this if not assigned as homework. Have each student give his/her scientist a name.
2. Have students share their drawings with a partner. Have each pair of students make a list of similarities and differences between their drawings.
3. Create a master list on the board of what a scientist looks like, what gender a scientist is, and what the scientist is doing. Include any specific characteristics such as 'wears glasses, crazy eyes, weird hair" etc.
4. Discuss students' perceptions of what a scientist looks like and what one does. Collect all drawings.

Main Lesson

1. Show the two STEM video clips about careers.

    - STEM Careers Grad Students QuickTime Video

      30 seconds

    - STEM Careers Middle School QuickTime Video

      30 seconds
2. Ask the students to list the similarities and differences of the people in the video clips. Compare these to the master list of the scientist on the board.
3. Discuss whether the students think any of the people in the video clips may become a scientist, engineer, or mathematician. Have them explain their reasoning.
4. Show the technology clips for air guitar, boom box, cursive writing, the telephone, Pong (computer games), and the typewriter.

    - STEM Careers Guitar QuickTime Video

      15 seconds

    - STEM Careers Boom Box iPod QuickTime Video

      15 seconds

    - STEM Careers Cursive Text QuickTime Video

      15 seconds

    - STEM Careers Phone Video Chat QuickTime Video

      15 seconds

    - STEM Careers Pong Wii Tennis QuickTime Video

15 seconds

- STEM Careers Typewriter Computer QuickTime Video

15 seconds

5. Lead a group discussion on how science and technology has transformed how we communicate, are entertained, and find out information.
6. Have small groups of students generate up to 10 objects that people use on a regular basis that their parents didn't have when they were the same age as the students.
7. Create a master list of the 10 most common items on the board. Lead a group discussion on why these items are useful and what life would be like without them.
8. Require students to choose five of the 10 items and write a short description of what they think the item might look like or be capable of doing 10 years in the future. (This can be assigned as a group task for two or three students or an individual homework assignment.)

Day Two

1. Lead a discussion about the changes in technology in the past five or six years (depending upon the age of the student). Use student responses from the prior assignment and have them explain why they think the objects will change in the way they've predicted.
2. Discuss how some technical occupations have changed in the past decade or two:
   - computer programmer
   - computer game designer
   - rocket scientist
   - meteorologist
   - pilot
   - telephone operator
   - DNA lab technician
   - auto mechanic
   - national security agent
3. Have the students discuss how rapidly changing technologies create new jobs and radically change old ones, or even render them obsolete.
4. Discuss how STEM professionals cannot work in isolation, but need to work with teams of people who may never actually meet in person, due to effective methods of electronic communication.
5. Direct the students to explore several of the Web-based career information sites.
6. Students should work alone or in teams to describe at least five different careers in science, technology, engineering, or mathematics fields from three or more different Web sites.

Day Three

1. Have students complete their worksheets listing information about five different STEM careers.
2. Lead a discussion about which careers sound the most interesting and which ones have the highest income. Project the graph from National Institutes of Health *Office of Science Education* that shows how the level of education one attains is directly linked to income.
3. Discuss the educational requirements of several careers described by the students. Using the

Web resources, choose two careers from similar fields and discuss which one requires more education and why. (Some of this information is found on the government career sites.)

4. Discuss the following statistics from the National Football Players Association and the National Basketball Association:

   What are my chances of becoming an NFL Player?

   While many young people every year set their goals on becoming NFL players, it is extremely difficult to reach that level. Statistically of the 100,000 high school seniors who play football every year, only 215 will ever make an NFL roster. That is 0.2%! Even of the 9,000 players that make it to the college level only 310 are invited to the NFL scouting combine, the pool from which teams make their draft picks. As you can see, most people who want to become NFL players will not. Therefore it is very important to come up with alternative plans for the future. (Source: National Football Players Association, 2009 *NFL Hopeful FAQs*)

   Only 60 players are taken each year in the National Basketball Association draft, and only 40 or so actually get a spot on a team. Most of those are college students or college graduates. Over 5 million high school boys are playing basketball each year. So 40 out of 5,000,000 is a 0.00008% chance of becoming a basketball player, much less a basketball star.
5. Ask the students which is more likely: someone from their class will become a pro athlete or an award-winning entertainment star (movie or TV), or that someone from their class will become a scientist, engineer, or mathematician who helps work on a new technology that will help improve people's lives.
6. Using information from the Department of Labor Occupational Outlook Handbook, list the science and technology careers that have the largest expected growth from 2006 – 16:
   - network systems and data communications analysts
   - home health aides
   - computer software engineers and applications
   - veterinary technologists and technicians
   - personal financial advisors
   - medical assistants
   - veterinarians
   - financial analysts
   - gaming surveillance officers and gaming investigators
   - physical therapist assistance
   - pharmacy technicians
   - forensic science technicians
   - dental hygienists

   (Source: Department of Labor Bureau of Labor Statistics *Occupational Outlook Handbook (OOH), 2008-09 Edition*)
7. Have students write a persuasive essay about choosing a STEM career over a career in the entertainment or sports industry. Assign this for homework. (You can ask a language arts teacher for advice in specifying the criteria for a persuasive essay.)

Extension

Have students research one career in depth and devise an educational plan for the remainder of their school career to choose the proper courses that would allow them to enter a degree or certificate program after high school graduation. You could also bring in guest speakers to discuss their careers in STEM.