Science, Technology, Engineering, & Mathematics (STEM)

Career Cluster Teacher Guide

Resource Description

Good news for all of you out there who enjoy math and science. You're in demand! As our global economy evolves, the need for STEM capable workers is growing. STEM careers combine science, technology, engineering, and mathematics to create innovative solutions to solve everyday problems.

Materials and Resources

- Teacher guide
- http://mygpsforsuccess.com/science-technology-engineering-and-math-stem/
- Cluster student viewing guide
- KWL Chart
- Display paper or individual sheets
- Pen/Pencil
- 1:1 computer or laptops; or group students if limited resources

Vocabulary & Definitions

Physics: branch of science concerned with the nature and properties of matter and energy
Chemistry: branch of science that deals with the identification of the substances of which matter is composed
Qualitative Data: data that approximates and characterizes. This data type is non-numerical in nature
Quantitative Data: data expressing a certain quantity, amount or range. Usually, there are measurement units associated with the data
Energy: The many different forms of energy to power other industries, for example light, heat, mechanical, gravitational, electrical, sound, chemical, nuclear, etc.; often these different forms of energy transfer back and forth from each other
Advanced Manufacturing: A variety of activities that depend on the use and coordination of information, automation, computation, software, sensing, and networking, and/or making use of cutting-edge materials and emerging capabilities enabled by the physical and biological sciences; involves both new ways to manufacture existing products, and manufacture new products from new advanced technologies.
Analysis: Breaking an object or process into smaller parts to examine or evaluate systematically
Hypothesis: an idea or explanation that you then test through study and experimentation
Robotics: branch of technology that deals with the design, construction, operation, and application of robots
Renewable Energy: energy from a source that is not depleted when used, such as wind or solar power

Bell Ringer

1. Have the following displayed on an easel, whiteboard, or individual sheets of paper for students to review and write down their responses:

Pollution is a global issue that impacts people, animals, and the environment. What are a few ideas you can think of to solve the problem of pollution?

2. Have some students share responses.
3. Make a class list of responses and then open the floor to additional responses after the list is constructed.
4. Facilitate student discussions about how careers in STEM are essential to life for people and the world we live in, and how it is necessary for life to continue and progress.

Objectives

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The student will be able to:

- Identify the central aspects of the STEM Career Cluster including career paths, skills & interest, and education level
- Explore different careers within the Cluster
- Analyze what is known, wondered, and learned (KWL) about the career cluster to begin conceptualizing an individual career map

Anticipatory Set

1. Divide students into pairs – each student gets a KWL Cluster Chart.
   Verbal instructions (2 min):
   - *Review the information from the bell ringer regarding STEM careers.*
   - *With your partner, list at least 5 items you know about job details, necessary skills, etc. in the "Know" Section.*

2. Have two pairs of students join one-another to form a four-person group **(5 min)**
   Verbal instructions:
   - *Compare and discuss each list.*
   - *With your group, list at least 5 things you want to know about the STEM Cluster in the "Wonder" Section.*

3. Have groups share their new list with the class.

Introductory Questions

Introductory Questions:
Ask the following questions to the whole class for students to write down answers and/or discuss with a partner. Have 2-3 students or groups share their answers:

- Why is the STEM field essential to how we live, especially in our current time?
- How do people in the STEM field begin to solve problems?
- What are some careers that you would identify as belonging to the STEM field? Why?

Learning Task & Exploration Activity

1. Introduce STEM Career Cluster Videos.

Video Introduction:

Good news for all of you out there who enjoy math and science. You're in demand! As our global economy evolves, the need for STEM capable workers is growing.

2. View the STEM videos. Have students complete the Student Viewing Guide as they learn about the Career Cluster.

3. Students will fill out the "Career Cluster Research" section of the viewing guide and explore the Science, Technology, Engineering, & Mathematics (STEM) webpage on http://mygpsforsuccess.com/science-technology-engineering-and-math-stem/

Closing

1. Have students complete the "Learned" Section of their KWL with at least 3 pieces of information they learned about the cluster. Students may share out in class as well as discuss with a partner once they have finished.
2. Engage students in a whole class or small group discussion using the Discussion Questions section of this instructional plan – students may use their KWL chart as reference.

Discussion Questions

1. How would you define this Career Cluster?
2. What surprised you about this Career Cluster?
3. What career pathways were represented in this video?
4. Are there any careers in STEM that surprised you? What other careers could be included in the STEM field?
5. Why is there a shortage of people in the STEM field? What are the effects of that shortage?
6. Why are there so many engineering fields?
7. What other career clusters are dependent on the STEM Career Cluster?
8. What does it mean when the video mentions that STEM is an "evolving" field?

Extended Learning

Suggested activities to increase student learning and exposure to this Career Cluster.

- Host a class or schoolwide science fair or encourage students to sign up for an outside science fair.
- Identify a global problem – world health, climate change, pollution, etc. And have students work in teams to design solutions to the problem.
- Conduct various physics and engineering experiments like – egg drops, spaghetti bridges, making circuits, etc.
- Field Trips: Science Museums or centers, wildlife centers, engineering firms, manufacturing plants, and laboratories
- Have an airplane engineering contest with students for the best airplane design using aerodynamics
- Have students solve problems within the school and design a solution to the problem while consulting school administration and school boards.
- Have each student select a career from this Career Cluster. Students will research the career and present information to the class in the form of an oral presentation, poster, PowerPoint, video or Prezi presentation. Information to research and share might include: salary, education required, typical day schedule, roles and responsibilities, positive aspects of the job and challenges associated with the job.
- Have each student make a list of the Career Readiness Skills that are his/her personal strengths, as well as a list of the skills and behaviors required for a career as an educator. Students compare the lists to determine what Career Readiness Skills need to be strengthened.
- Have students complete a job application and/or job interview with a local employer.
- Help students construct a resume for a specific career in this Career Cluster.
- Arrange for students to meet with the school counselor to discuss classes that would help prepare a student for careers in this Career Cluster and certifications that can be obtained during high school that would be of value.
- Have each student identify a postsecondary institution that is offering certifications or degrees that are required for working in this Career Cluster. He or she should obtain and complete admissions and scholarship applications for the school or program.

Notes to Educator

This packet includes suggested activities questions, and materials to enhance student understanding of this career cluster. Each component may be used individually or modified to fit the needs of your classroom.
More information on this Career Cluster can be found at:
http://mygpsforsuccess.com/science-technology-engineering-and-math-stem/

In addition, GPS For Success has an array of resources, including:

- Interest Profiler: *online quiz to assist students in categorizing their interests by possible careers those interests apply to.*
- Scholarship opportunities
- Information on internships
- Sample resumes and cover letters
- Interview preparation materials
- Opportunities for students with disabilities