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Career Cluster:



Planning, managing, and providing scientific research and professional and technical services (e.g. physical science, social science, engineering) including laboratory and testing services, and research and development services are the career areas of the Science, Technology, Engineering & Mathematics cluster.

North Dakota Energy Sources

Introduction

There are thousands of challenging educational and training opportunities within the high skilled world of Science, Technology, Engineering and Mathematics. This activity will give the students an opportunity to experience the resources and opportunities that exist in the State of North Dakota in this cluster. This lesson provides an opportunity for students through the mock town-hall meeting to present their findings.

Warm-Up Activity

Direct the students to imagine that they and four of their friends represent the finest scientists North Dakota has to offer. They have been contracted by the State of North Dakota to investigate renewable sources of energy. Their job is to research the five types of renewable energy sources, compile data, and make a recommendation to the State as to the type of alternative energy they believe would be the easiest to implement in widespread use in North Dakota.

It is important to examine controversial issues associated with renewable energy sources from multiple perspectives by exploring benefits, drawbacks, and social ramifications. The group will develop a proposal and present it to the class in oral and written formats. Each group member will have to research specific areas and compile the information in a logical manner.

Procedure

Ask the following questions in order to review basic ideas and find out what students already know about renewable and nonrenewable energy sources.

- What are some sources of energy?
- What is meant by a renewable energy source? What are some examples?
- What are the major differences between nonrenewable and renewable/alternative energy sources?
- Do you know of any places in North Dakota where renewable/alternative energy sources are being used?

Count off the students 1-5, assigning one topic of research to each number group.

- #1 – will research Solar energy.
- #2 – will research Wind energy.
- #3 – will research Geothermal energy.
- #4 – will research Biomass energy.
- #5 – will research Hydropower energy.

In addition to researching the energy source, students will review employers in North Dakota that exist at least in part because of that energy source. Have students visit the www.imaginend.com website and click on Employment. Explore the sites listed to research employment opportunities in North Dakota. As a group, the students will write a one-page summary of the energy source assigned, address how a change in the use of energy would affect job opportunities and employers in North Dakota, and prepare a presentation for the class. After listening to all class presentations, the students will write a “community news article” in which they choose the type of alternative energy they feel would be the easiest to implement in wide spread use. Students will defend their choice using information learned in this lesson.

Finally, the students will participate in a mock town-hall meeting in which they will be advocates for particular energy sources. Students will discuss and debate the various alternative energy sources, and at the end, participate in a class vote to determine what type of alternative energy the “state” will adopt.

Assessment

Design a rubric for this lesson by visiting the following website:

4 Teachers -- <http://www.4teachers.org/>

Standards

This activity addresses the following North Dakota Social Studies Standard:

Standard 4: Social Studies Resources.

- 8.4.1 Use various map forms, tools, and technologies to acquire, process and report information related to social studies.
- 8.4.2 Use primary and secondary sources to gather, interpret, analyze, and evaluate information related to social studies.
- 8.4.3 Use technology to gather, organize, record, interpret, and evaluate information related to social studies.

Time Frame

This lesson will take approximately five class periods.

Resources

This lesson was taken from “Marcopolo: Science NetLinks” and modified to meet the needs of Imagine ND. It is recommended to visit this website and use the links provided to complete this lesson.

<http://www.sciencenetlinks.com/Lessons.cfm?DocID=26>

The “Renewable Energy Resources” activity sheet will be helpful for student direction and assessment.

<http://www.4teachers.org/>

The Cluster/Pathway Model for Science, Technology, Engineering & Mathematics outlines the pathways and occupations as well as the related cluster knowledge and skills. This model can be located by clicking on Career Clusters at www.imaginend.com.

Career Cluster: Science, Technology, Engineering & Mathematics

Planning, managing, and providing scientific research and professional and technical services (e.g., physical science, social science, engineering) including laboratory and testing services, and research and development services.

Sample Career Specialties / Occupations	<p>Aerospace Engineer* Aeronautical Engineer* Agricultural Engineer* Agricultural Technician* Application Engineer* Architectural Engineer* Automotive Engineer* Biomedical Engineer* Biotechnology Engineer* Chemical Engineer* Civil Engineer* Communications Engineer* Computer Engineer* Computer Hardware Engineer* Computer Programmer* Computer Science Technician* Computer Software Engineer* Construction Engineer* Consultant* Development Engineer* Drafter* Electrical Engineer* Electrician* Electronics Technician* Energy Transmission Engineer* Environmental Engineer* Facilities Technician* Fire Protection Engineer* Geothermal Engineer* Hazardous Waste Engineer* Hazardous Waste Technician* Human Factors Engineer * Industrial Engineer* Industrial Engineering Technician* Licensing Engineer* Manufacturing Engineer* Manufacturing Technician* Manufacturing Processes Engineer* Marine Engineer* Materials Engineer* Materials Lab & Supply Technician* Mechanical Engineer* Metallurgic Engineer* Mining Engineer* Naval Engineer* Network Technician* Nuclear Engineer* Ocean Engineer* Operations Research Engineer* Packaging Engineer* Packaging Technician* Petroleum Engineer* Pharmaceutical Engineer* Plastics Engineer* Power Systems Engineer* Product Design Engineer* Project Engineer* Project manager* Prototype Engineer* Quality Engineer* Quality Technician* Radio/TV Broadcast Technician* Radiology Engineer* Researcher* Safety Engineer* Software Engineer* Sound Technician* Structural Engineer* Survey Technician* Systems Design Engineer* Technical Sales Manager* Technical Writer* Telecommunications Engineer* Textile Engineer* Transportation Engineer*</p>	<p>Analytical Chemist* Anthropologist* Applied mathematician* Archeologist* Astronomer* Astrophysicist* Atmospheric scientist* Biologist* Botanist* CAD operator* Cartographer* Chemist* Communications technologist* Conservation scientist* Cosmologist* Cryptographer* Crystallographer* Demographer* Dye chemist* Ecologist* Economist* Electronmicroscopist * Environmental scientist* Expert systems scientist* Geneticist* Geologist* Geophysicist* Geoscientist* Herpetologist* Hydrologist* Ichthyologist* Inorganic chemist* Laboratory Technician * Mammalogist* Marine scientist* Materials analyst* Materials scientist* Mathematician * Mathematics* Metallurgist* Meteorologist* Microbial Physiologist* Mycologist* Nanobiologist* Nuclear chemists* Nuclear technician* Numerical analyst* Nutritionist* Oceanographer* Organic chemist* Ornithologist* Paleontologist* Physicist* Polymer scientist* Programmer* Protein scientist* Protozoologist* Quality-control scientist* Radio chemist* Research chemist* Research Technician* Science Teacher * Lab Technician* Scientific visualization / graphics expert* Spectroscopist* Statistician* Technical writer* Technologist* Toxicologist* Zoologist*</p>
Pathways	Engineering and Technology	Science and Math
Cluster K&S	<p>Cluster knowledge and skills</p> <ul style="list-style-type: none"> ◆ Academic Foundations ◆ Communications ◆ Problem Solving and Critical Thinking ◆ Information Technology Applications ◆ Systems ◆ Safety, Health and Environment ◆ Leadership and Teamwork ◆ Ethics and Legal Responsibilities ◆ Employability and Career Development ◆ Technical Skills 	