Alaska Oil (Spill) Education Spiral Curriculum

Track 2: Oil Resources & Energy Cycles

Grades 11-12

Discussions of safer drilling, transport, and use

- Mock Senate
- Energy & Conservation Science Fair

Invite guest speakers to present about careers and volunteer opportunities in energy & conservation

Title: Mock Senate

Adapted from Barbara Browning, Homer High School

Theme: Legislation surrounding oil spill prevention and restoration, energy development, and conservation must go through a rigorous process.

Objectives:

- Students will understand the legislative process.
- Students will participate in a senate simulation.
- Students will experience the give and take, the party alliances, and the stress and preparations involved in passing legislation.

Duration: 2 weeks

Age Range: 8th-12th Grade

Materials:

- Example bill
- Mock Senate Guidelines
- Roberts Rules of Order
- Journals or notecards
- Pens or pencils

Background:

As a result of the *Exxon Valdez* Oil Spill many types of legislative bills were introduced both at the state and national level. In recent years, many bills related to the development of renewable energy sources, cleaner energy technologies, and innovations in conservation have been deliberated. Introducing new, or changing old, legislation is a long and complicated process yet one that should be understood by citizens. Understanding the difficulties in making and changing laws will help students gain insight into the political process and the challenges of trying to implement change. The mock senate exercise is an opportunity for students to research issues of importance to their state and to role play the political process where they will introduce bills important to them. The Mock Senate exercise, developed by Barbara Browning, has been used with high success rates in her Homer High School classroom. Students enjoy being involved in the entire process.

The Senate can hold subcommittee hearings, committee hearings, and then, a final hearing on the floor before the full Senate for each issue or bill. Finally, one bill is passed out of the Senate. The same happens in the House. The Senate and House

then get together in conference and basically make trade-offs, concessions, compromises, etc., to pass one combined bill. The bill goes to the President who signs it into law or vetoes it.

Introduction:

Ask students if they remember learning about the process of passing a bill. List, on the board, points and procedures they remember. Ask students how they think companies such as Exxon are regulated. What do they think it takes to set aside land as a national park or a wildlife refuge? Introduce the idea of a "Mock Senate" where students will actually play the roles of legislators and write and pass bills.

Activities & Procedures:

Each student must pick a party affiliation and research their own state to find oil spill/energy issues and view points of their state and their party. They will present a state profile. (See Mock Senate Guidelines). Have students present their information in outline form. Elect or appoint a President of the Senate and a Secretary. Have the President review the roles of the President and Secretary of the Senate, as well as the senators. Inform them that the President will be responsible for presenting a sample bill and explaining the rules of conduct in the senate.

Introduce the sample bill. Review the format. Have students copy the format in their journals. Tell the students they will be responsible for introducing two (2) bills. One bill must concern an energy-related economic change that would benefit their state and/or nation; one must solve or deal with an oil related problem in their state and/or the nation. Have students review proposed bills related to these topics by searching the Alaska Bill Action Status Inquiry System (http://www.legis.state.ak.us/basis/start.asp) and the national GovTrack.us database (http://www.govtrack.us/congress/bills/)

This exercise assumes that the students are already familiar with party roles, legislative proceedings, passing bills, etc. If this is not the case, you will need to review some of these aspects with the students.

The senate proceedings should run by Roberts' Rules of Order. Students should be encouraged to assume the viewpoints of their respective party affiliation. The bills they introduce should also reflect their party's viewpoint.

During the Senate sessions have students submit a newspaper item about the Senate proceedings. It may be an article, letter to the editor, political cartoon, etc. It must concern someone or something that happens in the Senate proceedings. It should be typed or drawn in black ink.

The key to the success of the Mock Senate is participation. Students need to be encouraged to introduce bills or amendments and to speak in defense of or in

opposition to other bills, etc. The Mock Senate should be in session for at least one week in order to give students ample time to participate in the entire process.

Each day, take the first 5 minutes and have the students write a reaction to the session the day before either in their journals or on 8x10 note cards.

As a final activity, the secretary should publish, in the school paper or on the school website, a list of bills passed by the Senate. Have the sponsors of each passed bill write a short summary of the purpose and intent of the bill. Compare bills passed in the Mock Senate to state and federal legislative happenings.

Wrap-Up

Discuss how their experience in the mock senate reinforced or changed students' perceptions about the legislative process. Have students submit a public comment or letter to the editor about current local, state, or national legislation in reference to energy, oil spills, environmental restoration, fisheries, subsistence or wildlife. Be sure that the students' comments reflect their own opinions and provide an option for students to remain anonymous.

Evaluation:

Assess student understanding based on their completed state profiles, draft bills, newspaper contributions, and comments during the mock senate. Observe participation, adherence to Roberts Rules of Order, and respectful tone during debate and discussion.

Mock Senate - Example of a Bill

Senate Bill No. _____

In the Legislature of the state of _____

_____(#) Legislature - _____(1st or 2nd) session.

A Bill

For an Act entitled: "An Act Concerning .....

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF _____:

Section 1.

Section 2.

Mock Senate Guidelines

STATE PROFILE (All Senators):

A. State name

B. State Government: strongest political party, male: female ratio of Senators and Representatives, political parties, anything else of interest.

C. Economics: types of industry, unemployment rate, income levels, poverty rate, job growth rate, tax base, spending, etc. (see the Almanac)

D. People: population, changes in population, urban/rural ratio, racial mix, religion, age spread, etc.

E. Other: education, violent crimes, major concerns or problems, environmental concerns, pollution, development, etc. These should be items that as a Senator, you want to try to solve, or would influence how you vote.

PRESIDENT OF THE SENATE:

1. You must plan and deliver a presentation on the rules of conduct in the Senate (Roberts' Rules of Order).

2. Plan a bill that will be presented to the class as an example.

3. Prepare and give a quiz on the following day.

4. When in session, be present every day, maintain order, run by the rules you establish.

SECRETARY:

1. You must be present every day. If the President cannot be present, you will be expected to run the Senate.

2. Make a poster of all the Senators and their political parties and highlight socioeconomic characteristics of your state.

3. Keep a daily summary of bills introduced, passed and amended.

4. If your school has a newspaper, have a printed summary of the bills and the action on the bills.

Mock Senate Standards

Science and Technology: Students develop an understanding of the relationships among science, technology, and society.

SE1
Students develop an understanding of how scientific knowledge and technology are used in making decisions about issues, innovations, and responses to problems and everyday events.

The student demonstrates an understanding of how to integrate scientific knowledge and technology to address problems by:

[7] SE1.1 describing how public policy affects the student's life (e.g., public waste disposal)

[8] SE1.1 describing how public policy affects the student's life and participating diplomatically in evidence-based discussions relating to the student's community

[9] SE1.1 recognizing that the value of any given technology may be different for different groups of people and at different points in time (e.g., different uses of snow machines in different regions of Alaska)

[10] SE1.1 identifying that progress in science and invention is highly interrelated to what else is happening in society

[11] SE1.1 researching how social, economic, and political forces strongly influence which technology will be developed and used

Cultural, Social, Personal Perspectives, and Science: Students develop an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives.

SF1
Students develop an understanding of the interrelationships among individuals, cultures, societies, science, and technology.

SF2
Students develop an understanding that some individuals, cultures, and societies use other beliefs and methods in addition to scientific methods to describe and understand the world.

SF3
Students develop an understanding of the importance of recording and validating cultural knowledge.

The student demonstrates an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives by:

[10] SF1.1-SF3.1 analyzing the competition for resources by various user groups to describe these interrelationships

[11] SF1.1-SF3.1 investigating the influences of societal and/or cultural beliefs on science

Alaska History

Alaska as a State (1959-Present)

AH. PPE 5 comparing and contrasting the differing perspectives between rural and urban areas.

AH. CPD 5 using texts/sources to analyze the multiple perspectives in the continuing debate between conservation and development of resources.

AH. CC 7 comparing and contrasting the perspectives of sport, commercial, and subsistence users on policies regarding fish and game management.

Content Standards: Citizenship and Government

B: A student should understand the constitutional foundations of the American political system and the democratic ideals of this nation.

A student who meets the content standard should:

1) understand the ideals of this nation as expressed in the Declaration of Independence, the United States Constitution, and the Bill of Rights;

2) recognize American heritage and culture, including the republican form of government, capitalism, free enterprise system, patriotism, strong family units, and freedom of religion;

3) understand the United States Constitution, including separation of powers, the executive, legislative, and judicial branches of government, majority rule, and minority rights;

4) know how power is shared in the United States' constitutional government at the federal, state, and local levels;

5) understand the importance of individuals, public opinion, media, political parties, associations, and groups in forming and carrying out public policy;

6) recognize the significance of diversity in the American political system;

7) distinguish between constitution-based ideals and the reality of American political and social life;

8) understand the place of law in the American political system; and

9) recognize the role of dissent in the American political system.

E: A student should have the knowledge and skills necessary to participate effectively as an informed and responsible citizen.

A student who meets the content standard should:

1) know the important characteristics of citizenship;

2) recognize that it is important for citizens to fulfill their public responsibilities;

3) exercise political participation by discussing public issues, building consensus, becoming involved in political parties and political campaigns, and voting;

4) establish, explain, and apply criteria useful in evaluating rules and laws;

5) establish, explain, and apply criteria useful in selecting political leaders;

6) recognize the value of community service; and

7) implement ways of solving problems and resolving conflict.

Title: Energy Science Fair

By Katie Gavenus, Children of the Spills, http://childrenofthespills.org.

Theme: There are many innovations yet to be developed in the fields of energy and conservation.

Objectives:

- Students will follow the scientific process.
- Students will develop a unique experiment or engineer a product related to the topic of energy and conservation.

Duration: 4-8 weeks

Age Range: 7th-12th Grade

Materials:

- ASEF science fair rules & paperwork (https://www.alaskasciencefair.org/)
- Materials required for science fair projects
- Volunteers
- Tables
- Display boards for exhibits
- Energy Science Fair Project – Engineering Rubric
- Energy Science Fair Project – Experiment Rubric

Background:

Science fairs are an excellent way to foster curiosity, familiarize students with the scientific method, and encourage independent thinking. There is an established Alaska Science and Engineering Fair in mid-March that students can participate in. Hosting a preliminary science fair at your school is a good way to introduce students to the process and explore different topics in conservation, even if no students choose to participate in the statewide event. Invite local experts in the fields of energy, engineering, and science to be judges.

From the ASEF website, "The Alaska Science and Engineering Fair is an Intel ISEF-Affiliated Science Fair. All grade K-12 students in Alaska are invited to enter a science, engineering, computer science, mathematics, or ocean sciences project in the Fair. It is not necessary to win at a local fair in order to enter the Alaska Science and Engineering Fair. All Alaskan K-12 students are welcome!"

Preparation:

A science fair is no simple undertaking. It is well worth involving a number of volunteers, including a fair coordinator, mentors for projects, and judges. Read through the ASEF rules and Intel ISEF-Affiliated Science Fair tips and resources (http://www.societyforscience.org/page.aspx?pid=311).

Introduction:

Ask students to create a list of important innovations and research in the fields of energy and conservation. Discuss as a class how those innovations and research were developed.

Activities & Procedures:

Review the inquiry-based scientific process:

1) choose a "testable" question
2) conduct background research
3) form a hypothesis
4) design an experiment
5) collect data
6) draw conclusions based on data
7) prepare report and exhibit
8) discuss findings with peers and experts
9) identify new questions to pursue

Projects to create a new product often follow a different process, called the Engineering Process:

1) define a need
2) develop or establish design criteria
3) conduct background research
4) prepare preliminary designs and material list
5) build and test prototype
6) retest and redesign
7) present results

Explain to students that they are going to design their own inquiry-based science research project or engineering project on a topic related to energy or conservation. Provide students with some examples of successful science fair projects. You may wish to divide students into teams, or have students participate individually. Work with students as they identify a research question or engineering need and pair students with mentors. Review ASEF rules and guide students to the ISEF website for resources on completing a science fair project. Science Buddies (http://www.sciencebuddies.org/) also provides more resources for students.

Provide time in class for students to work on projects and check in frequently with students and mentors.

Prepare a large space (school gym or cafeteria) for the science fair. Have students set up their display boards on the tables. Invite community members and other classes to attend the fair. Enlist a panel of expert judges to discuss each project with its creator and decide upon awards. Any participant can choose to move on to the Alaska Science and Engineering Fair, but the top projects should definitely be encouraged to do so.

Wrap-Up:

Bring the class together. Discuss what students learned about their topics and from their classmates, as well as how they approached the scientific/engineering process. Identify new questions or challenges that arose through projects.

Guide students to write thank you notes to volunteer judges, coordinators, and mentors.

Evaluation:

Use the Energy Science Fair Project – Engineering and Energy Science Fair Project – Experiment Rubrics as appropriate to evaluate student work.

Energy Science Fair Project - Engineering

Teacher Name: _____

Student Name: _____

CATEGORY	4	3	2	1
Idea	Independently identified a design solution which was interesting to the student, relevant to the topic, and which could be tested.	Identified, with adult help, a design solution which was interesting to the student, relevant to the topic, and which could be tested.	Identified, with adult help, a design solution which could be tested.	Identified a design solution that could not be tested/investigated or one that did not merit investigation.
Information Gathering	Accurate information taken from several sources in a systematic manner.	Accurate information taken from a couple of sources in a systematic manner.	Accurate information taken from a couple of sources but not systematically.	Information taken from only one source and/or information not accurate.

Plan	Provided an accurate, easy-to-follow plan with clear measurements and and labeling for all components.	Provided an accurate plan with clear measurements and and labeling for most components.	Plan does not show measurements clearly or is otherwise inadequately labeled.	Did not provide a plan OR the plan was quite incomplete.
Construction -Materials	Appropriate materials were selected and creatively modified in ways that made them even better.	Appropriate materials were selected and there was an attempt at creative modification to make them even better.	Appropriate materials were selected.	Inappropriate materials were selected and contributed to a product that performed poorly.
Construction - Care Taken	Great care taken in construction process so that the structure is neat, attractive and follows plans accurately.	Constuction was careful and accurate for the most part, but 1-2 details could have been refined for a more attractive product.	Construction accurately followed the plans, but 3-4 details could have been refined for a more attractive product.	Construction appears careless or haphazard. Many details need refinement for a strong or attractive product.
Modification/Testing	Clear evidence of troubleshooting, testing, and refinements based on data or scientific principles.	Clear evidence of troubleshooting, testing and refinements.	Some evidence of troubleshooting, testing and refinements.	Little evidence of troubleshooting, testing or refinement.

Function	Product or structure functions extraordinarily well, holding up under atypical stresses.	Product or structure functions well, holding up under typical stresses.	Product or structure functions pretty well, but deteriorates under typical stresses.	Fatal flaws in function with complete failure under typical stresses.
Display	Each element in the display had a function and clearly served to illustrate some aspect of the experiment. All items, plans, graphs etc. were neatly and correctly labeled.	Each element had a function and clearly served to illustrate some aspect of the experiment. Most items, plans, graphs etc. were neatly and correctly labeled.	Each element had a function and clearly served to illustrate some aspect of the experiment. Most items, plans, graphs etc. were correctly labeled.	The display seemed incomplete or chaotic with no clear plan. Many labels were missing or incorrect.
Conclusion/Summary	Student provided a detailed discussion of results clearly based on the product function, testing data and related to previous research findings.	Student provided a somewhat detailed discussion of results clearly based on the product function and previous research findings.	Student provided a discussion of results with some reference product function.	No discussion was apparent OR important details were overlooked.

Energy Science Fair Project - Experiment

Teacher Name: _____

Student Name: _____

CATEGORY	4	3	2	1
Idea	Independently identified a question which was interesting to the student, relevant to the topic, and which could be investigated.	Identified, with adult help, a question which was interesting to the student, relevant to the topic, and which could be investigated.	Identified, with adult help, a question which could be investigated.	Identified a question that could not be tested/investigated or one that did not merit investigation.
Hypothesis Development	Independently developed an hypothesis well-substantiated by a literature review and observation of similar phenomena.	Independently developed an hypothesis somewhat substantiated by a literature review and observation of similar phenomena.	Independently developed an hypothesis somewhat substantiated by a literature review or observation of similar phenomena.	Needed adult assistance to develop an hypothesis or to do a basic literature review.

Descripton of Procedure	Procedures were outlined in a step-by-step fashion that could be followed by anyone without additional explanations. No adult help was needed to accomplish this.	Procedures were outlined in a step-by-step fashion that could be followed by anyone without additional explanations. Some adult help was needed to accomplish this.	Procedures were outlined in a step-by-step fashion, but had 1 or 2 gaps that require explanation even after adult feedback had been given.	Procedures that were outlined were seriously incomplete or not sequential, even after adult feedback had been given.
Variables	Independently identified and clearly defined which variables were going to be changed (independent variables) and which were going to be measured (dependent variables).	Independently identified which variables were going to be changed (independent variables) and which were going to be measured (dependent variables). Some feedback was needed to clearly define the variables.	With adult help, identified and clearly defined which variables were going to be changed (independent variables) and which were going to be measured (dependent variables).	Adult help needed to identify and define almost all the variables.
Data Collection	Data was collected several times. It was summarized, independently, in a way that clearly describes what was discovered.	Data was collected more than one time. It was summarized, independently, in a way that clearly describes what was discovered.	Data was collected more than one time. Adult assistance was needed to clearly summarize what was discovered.	Data was collected only once and adult assistance was needed to clearly summarize what was discovered.
Display	Each element in the display had a function and clearly served to illustrate some aspect of the experiment. All items, graphs etc. were neatly and correctly labeled.	Each element had a function and clearly served to illustrate some aspect of the experiment. Most items, graphs etc. were neatly and correctly labeled.	Each element had a function and clearly served to illustrate some aspect of the experiment. Most items, graphs etc. were correctly labeled.	The display seemed incomplete or chaotic with no clear plan. Many labels were missing or incorrect.

Conclusion/Summary	Student provided a detailed conclusion clearly based on the data and related to previous research findings and the hypothesis statement(s).	Student provided a somewhat detailed conclusion clearly based on the data and related to the hypothesis statement(s).	Student provided a conclusion with some reference to the data and the hypothesis statement(s).	No conclusion was apparent OR important details were overlooked.

Science Fair

Science As Inquiry and Process: Students develop an understanding of the processes and applications of scientific inquiry.

SA1
Students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments

The student demonstrates an understanding of
the processes of science by:

[6, 7, 8, 9] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating

[10, 11] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, analyzing data, developing models, inferring, and communicating

[6] SA1.2 collaborating to design and conduct simple repeatable investigations

[7,8] SA1.2 collaborating to design and conduct simple repeatable investigations, in order to record, analyze (i.e., range, mean, median, mode), interpret data, and present findings

[9] SA1.2 hypothesizing, designing a controlled experiment, making qualitative and quantitative observations, interpreting data, and using this information to communicate conclusions

[10] SA1.2 reviewing pertinent literature, hypothesizing, making qualitative and quantitative observations, controlling experimental variables, analyzing data statistically (i.e., mean, median, mode),and using this information to draw conclusions, compare results to others, suggest further experimentation, and apply student's conclusions to other problems

[11] SA1.2 recognizing and analyzing multiple explanations and models, using this information to revise student's own explanation or model if necessary

SA2 Students develop an understanding that the processes of science require integrity, logical reasoning, skepticism, openness, communication, and peer review.

The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by:

[6] SA2.1 identifying and differentiating fact from opinion

[7] SA2.1 identifying and evaluating the sources used to support scientific statements

[9] SA2.1formulating conclusions that are logical and supported by evidence

[10] SA2.1 examining methodology and conclusions to identify bias and determining if evidence logically supports the conclusions

[11] SA2.1 evaluating the credibility of cited sources when conducting the student's own scientific investigation

SA3 Students develop an understanding that culture, local knowledge, history, and interaction with the environment contribute to the development of scientific knowledge, and that local applications provide opportunity for understanding scientific concepts and global issues.

The student demonstrates an understanding that interactions with the environment provide an opportunity for understanding scientific concepts by:

[11] SA3.1 conducting research and communicating results to solve a problem (e.g., fish and game management, building permits, mineral rights, land use policies)

Science and Technology: Students develop an understanding of the relationships among science, technology, and society.

SE2 Students develop an understanding that solving problems involves different ways of thinking, perspectives, and curiosity that lead to the exploration of multiple paths that are analyzed using scientific, technological, and social merits.

The student demonstrates an understanding that solving problems involves different ways of thinking by:

[6] SE2.1 identifying and designing a solution to a problem

[9] SE2.1 questioning, researching, modeling, simulating, and testing a solution to a problem

[10, 11] SE2.1 questioning, researching, modeling, simulating, and testing multiple solutions to a problem

[6, 7] SE2.2 comparing the student's work to the work of peers in order to identify multiple paths that can be used to investigate a question or problem

[8] SE2.2 comparing the student's work to the work of peers in order to identify multiple paths that can be used to investigate and evaluate potential solutions to a question or problem

SE3 Students develop an understanding of how scientific discoveries and technological innovations affect and are affected by our lives and cultures.

The student demonstrates an understanding of how scientific discoveries and technological innovations affect our lives and society by:

[10, 11] SE3.1 researching a current problem, identifying possible solutions, and evaluating the impact of each solution

History and Nature of Science: Students develop an understanding of the history and nature of science.

SG3 Students develop an understanding that scientific knowledge is ongoing and subject to change as new evidence becomes available through experimental and/or observational confirmation(s).

The student demonstrates an understanding that scientific knowledge is ongoing and subject to change by:

[10] SG3.1 using experimental or observational data to evaluate a hypothesis