

Pre assessment to determine readiness and/or interest:

Students Need to Know:

- How to understand persuasive arguments for and against the uses of nuclear energy.
- How to construct arguments that analyze the risks and benefits and for whom.

Students Need to be Able to:

- Calculate half life
- Explain the process of fission and fusion reactions
- Analyze the risks and benefits of constructing a nuclear power plant around Anchorage

Learning Experiences & Instruction

Procedure:

Guiding Question:

In what ways can nuclear energy be used? What are the potential risks and benefits associated with nuclear energy use and are they worth it?

Activities (Guided Practice, Independent practice and Closure):

Science:

- Explanation of fission and fusion reactions

This is done with lecture notes and accompanying practice sheets *

- Calculate half lives

Introduced in lecture, reinforced with practice sheets *, and final assessment done with a lab

- Radiation products of nuclear reactions: alpha, beta and gamma

Lecture, then practice sheets.*

*All practice sheets are started in class so I can help those who are struggling individually. I go around and ask each table how they are doing and pay special attention to Sp Ed and ELL students. We then go over it the next day in class together and all the students correct their own papers in red pen. If they tried to answer a question before coming to class, got it wrong and corrected in red, they get full credit. If they don't try it before coming to class and fill it in with red pen as we go over it, they get half credit for those particular questions. If they don't correct wrong answers they get no credit. This helps in differentiated instruction because it encourages everyone to try each question even if it is difficult because they can still get full credit with a wrong answer. It keeps students engaged and taking responsibility for their mistakes and for their own learning.

- The Nuclear Bomb Movie

This demonstrates the history of the nuclear bomb from the first explosion at Trinity, to dropping the two bombs on Japan in WWII (I tie into the English section during our discussion breaks at this time) through the Cold War and the treaty banning all new production of nuclear weapons. There is a worksheet that goes with the movie so every half hour or so I stop it and we fill it in together and we discuss what is going on to make sure everyone gets the nuances since it kind of goes quickly. This also ensures that the Sp Ed and ELL students don't get lost and give up trying to keep up with what is going on.

- Webquest: Should We Build a Nuclear Power Plant Here?

The students participate in a “town meeting” during class where they vote on whether to accept the proposal of building a nuclear power plant. One group of students represent Bright Energy Nuclear Power Company and will be presenting to the Anchorage city council and the mayor (the class and me) a proposal to build a nuclear power plant in the Mat-Su Valley. The rest of the students portray various characters and make their own presentations as to whether or not building the power plant is a risk worth taking. Some of these characters include: the director of the Chamber of Commerce, medical staff at a local hospital, waste water treatment manager, firefighters, farmers, geologists, and concerned citizens. The students must write a persuasive essay from their character’s viewpoint and create a power point for their presentation to the city council based on their essay. After everyone has presented their viewpoints uninterrupted, we hold a round table discussion where various groups can ask questions of each other and debate the risk/ benefit analysis of building a nuclear power plant so close to Anchorage. At the end of the block period, a vote is conducted where each individual votes whether they, not their character, would like a nuclear power plant build in the Mat-Su Valley.

Various characters have a bit more information available on the internet while other characters require a bit more research. I allow students to choose in which groups they would like to work, and then I encourage groups so that students who need the challenge and who will rise to it chose the more difficult characters or the difficult roles such as Bright Energy Nuclear Power, since most classes end up grilling them with questions during the round table discussion. I also encourage the SpEd and ELL students to chose the easier characters. It also gives some of these students the opportunity to shine in speaking or creative (in making the Power point) roles, or in using technology if these are their strengths.

English:

Choose one assignment from each group:

Group 1:

- Read *Hiroshima* and answer study questions.
- Reduced set of questions. Storyboard. Summary with captions.
- Write a multiple choice test with 2 questions with 5 possible answers from each chapter.

Group 2

- Read report about Project Chariot. Annotate.
- Read 4 short perspectives of the Project Chariot, and choose most meaningful.
- Research Project Chariot and submit an annotated bibliography of 4 sites.

Group 3

- Draw a continuum of potential and possibility for domestic nuclear uses on paper.
- Display a continuum of dangers or benefits with students choosing a side of the room and speaking.
- Draw a mind map that shows potentials for domestic uses on one side and dangers on the other.

Group 4:

- Seminar pros and cons about the who benefits and for what purpose
- Moodle forum to discuss benefits for whom and for what purpose.
- Write a persuasive paper for two different perspectives of the argument.

Group 5:

- Safety concerns posters by hand or using computers
- Business poster advertising the services provided by nuclear project
- Community members writing a petition to receive or not receive a nuclear project in their area.

Assessment:

Science: The power plant debate and final test on nuclear energy

English: Students submit one from each of the five groups of possible assessments.

Other Considerations

Materials Needed:	Science: <ul style="list-style-type: none">• Lectures (attached)• Half life lab (attached)• Practice sheets (attached)• Nuclear Bomb movie and accompanying worksheet• Computer lab with internet access: http://www.asdk12.org/staff/garner_kimberley/pages/Chemistry/NuclearPlant1.htm English: Class set of <i>Hiroshima</i> by John Hersey Class set of Project Chariot report Poster materials or computer and printer access
Resources:	<ul style="list-style-type: none">• Internet, textbook, <i>Hiroshima</i>
References/Credits:	<ul style="list-style-type: none">•
End of unit reflection:	<ul style="list-style-type: none">• The power plant debate and final test on nuclear energy