

Social Studies

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Discussion: Global Nuclear Power

TEACHER PAGE

What Is the Issue with Global Nuclear Power?

In the "Atoms for Peace" speech given by President Eisenhower in 1953—the speech that paved the way for the creation of the IAEA (International Atomic Energy Agency)— Eisenhower declared that a special purpose of Atoms for Peace would be "to provide abundant electrical energy in the power-starved areas of the world" (IAES, 2007).

Nuclear technology uses the energy released by splitting the atoms of certain elements. It was first developed in the 1940s, and during the Second World War, research initially focused on producing bombs by splitting the atoms of either uranium or plutonium.

Only after the war in the 1950s did attention turn to the peaceful purposes of nuclear fission, notably for power generation. By 2007, the world produced as much electricity from nuclear energy as it did from all sources combined in 1960. Civil nuclear power supplied 16% of global needs, in 30 countries. Many countries also built research reactors to provide a source of neutron beams for scientific research and the production of medical and industrial isotopes.

In 2007, only eight countries were known to have nuclear weapons capability (the United States, Russia, France, the United Kingdom, Israel, China, India, and Pakistan). Two countries were thought to be developing this capability—North Korea and Iran. By contrast, 56 countries operated civil research reactors, and 30 have some 439 commercial nuclear power reactors. By 2008, over 30 new power reactors were under construction, while over 80 were firmly planned, an equivalent to 24% of 2007 energy capacity (Australian Uranium Institution, 2007).

One key issue of concern for the further expansion of nuclear energy is safeguarding of nuclear fuels so that they do not get used to form nuclear weaponry.

Is This a Discussion, a Dialogue, or a Debate Topic?

This topic is best formatted as a discussion. It is in the news often, yet is it not well understood. You could use debate or dialogue formats as well, since opinions are strong on both sides of this topic. However, a general overview of the use of nuclear power in the world is helpful prior to having your students develop opinions. A discussion will allow your students to clarify their understanding of the issue.



I ME

Preparation: 15 minutes in class, plus homework

Instruction: two 45-minute class periods



Investigation Question

Should all countries be allowed to develop nuclear power?

Classroom Format

Begin by having students examine media reports on nuclear energy use in the world. Have each student select one and write a summary of the report. Ask each to identify the authors' conclusions, key points, and supporting evidence. In class, have students discuss their articles in small groups and then as a whole class. Pose questions that support them in drawing a response to the investigation question. As an extension, review the materials to determine if students found any fallacies in the reasoning presented in the resources they reviewed.

If your students have not used news media reports in the classroom before, it is best to have them do this for a few weeks before this discussion. A simple format is to have each student select one new article about a topic relevant to the course. Have them write a summary that includes the author's conclusion and three to four key points. Have them identify any errors in the reasoning expressed in any of the articles. They can use their Student Summary: Discussion handout that outlines possible types of fallacies in arguments. Articles should be brought to class and made available for other students to read. As students arrive for class, have them get into groups of three to share their articles. As a whole class, ask for a few key points from the articles.

Preparation (during prior class)

- 1. Hand out the Student Summary: Discussion section and the student pages.
- 2. For homework, ask students to find and read a news article on nuclear energy use in the world. (Do not discuss the issue unless they ask clarifying questions about the homework; tell them to find out about the issue for themselves.) (5 minutes)
- 3. As homework, have students write a summary report on their article. The summary should do the following:
 - define nuclear energy
 - identify the authors' conclusions and key points, including both positive and negative
 - opinions on the benefits or problems with nuclear energy
 - identify any fallacies in the authors' arguments



- 4. Have each student title his or her summary with a headline (3–8 word statement) that captures the key position in the article.
- 5. Describe the procedure that will occur in the next class. (5 minutes)

During Class

- 1. Organize students in small groups (3 to 4 students).
- 2. Within each group, have students share their news article summaries. Ask them to create common definitions, as well as a list of the pros and cons of the spread of nuclear energy in the world. (20 minutes)
- 3. Have each group create a poster that includes the following:
 - one agreed-upon definition for nuclear energy
 - a list of all the benefits of and concerns about the spread of nuclear energy (10 minutes)
- 4. Have each group select one member to review the poster for the rest of the class in a short, 3-minute presentation.
- 5. Have students present their posters to the class. Students should take notes on any differences they see in the definitions presented, and make a master list of any pros and cons for discussion later. (5–10 minutes per group; 30–40 minutes including questions—may take part of another class period)
- 6. Members of any other group can ask questions for clarification on any of the issues or opinions expressed. Any member of the presenting group may respond to the questions.
- 7. As students give their reports, make a master list of the pro and con opinions about the spread of the use of nuclear energy in the world. Try not to edit or combine points unless they are very obvious. This will be a class task during the discussion.
- 8. Begin by having students work in pairs to review the list and write any observations they may have. (5 minutes)
- 9. Open the discussion with the class by asking students to share their observations.
- 10. Record the observations. To raise the cognitive levels of the discussion, direct questions to the whole class, rather than to individual students. Ask them whether they agree with the observations. When students offer other ideas, be sure to ask for specific reasons why they don't agree, and what specifically they would say differently. You may ask a student to lead this section of the discussion. (10 minutes)
- 11. Possible discussion questions could include the following:
 - Is there a way to rephrase terms to make the statements more clear for an audience unfamiliar with the topic? (Bloom's Comprehension)



- Which are the most significant reasons for or against the expansion of nuclear power? Can you identify solutions that have been suggested for any of these problems? (Bloom's Application)
- Can you group any pros or cons that are similar within one area? (Bloom's Analysis)
- Can you summarize the ideas into one pro statement that refutes the major con ideas? Can you do the same for the opposition, making one con statement that counters all the pro ideas? (Bloom's Synthesis)
- Vote for either expansion or limiting the use of nuclear energy, and write the main reason why you think this. (Bloom's Evaluation) (30 minutes)

Extension

- 1. To further students' skills in analyzing explanations, ask them to review the section in the Student Summary: Discussion handout on fallacies in arguments. Ask students if they have any questions about the various types of fallacies. (10 minutes)
- 2. Ask students to identify any instances of fallacies they may have found in their articles. (15 minutes) (Bloom's Evaluation)

Assessment Criteria

Students should include the following in their news article summaries and discussion:

- an accurate definition of nuclear energy
 Nuclear energy is the energy released by nuclear fission (splitting atoms) or fusion
 (combining atoms). In commercial nuclear power plants, the nuclear energy is from
 nuclear fission. Energy is released by splitting uranium atoms. This process generates
 heat which can be used to produce steam that turns a turbine to produce electricity.
 Plutonium can also be used, but it must be manufactured as there is no natural source of
 plutonium.
- identification of the main conclusion from the selected article, as well as identifying supporting statements and evidence
- identification of any error presented in articles or by other students
- discourse contributions that connect ideas and pose questions for understanding
- identification fallacies in the opinions expressed (extension)