
Manhattan Project Lesson Plans

Module 1: The Birth of the Atomic Bomb

- Basic Science of the Bomb
- The Race for the Bomb: Scientific Discoveries
- Lise Meitner: Refugee Scientists
- An Extraordinary Pair: Groves and Oppenheimer

Module 2: Life at Los Alamos

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- Secrecy and Spies
- Pueblos and the Project
- Women Scientists
- Not Just Science: Entertainment at Los Alamos

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- Interim Committee.
- Trinity Test and the Potsdam Conference
- Petition by Chicago scientists and the Potsdam Declaration
- Effects of the bombing on Hiroshima and Nagasaki

Module 4: Living with the Bomb

- The Nature of War
- International Control Efforts
- Peaceful Purposes

Module 1: The Birth of the Atomic Bomb

TOPICS TO COVER

- Basic Science of the Bomb
- The Race for the Bomb: Scientific Discoveries
- Lise Meitner: Refugee Scientists
- An Extraordinary Pair: Groves and Oppenheimer

LESSON PLANS

The Manhattan Project's inception was rooted in fear that Germany would make an atomic weapon before the United States and its Allies could. Since the early 1930s, scientists saw the serious military implications of their discoveries related to atomic energy. As war was brewing in Europe, British scientists petitioned their government to withhold sensitive information about nuclear technology. In the United States, Albert Einstein wrote to President Roosevelt to warn him about Germany's advances in developing the atomic bomb. In response, Roosevelt organized a government committee to research and later to produce an atomic bomb.

I) SCIENCE OF THE BOMB

Materials

- *Periodic Table of the Elements: The Actinide Series* program
- Writing materials
- Internet access for additional research. Some suggested sources include:
<http://www.spartacus.schoolnet.co.uk/USAmanhattan.htm>

Lesson

Have students watch "The Bomb: End of Innocence," a segment in *Periodic Table of the Elements: The Actinide Series*. (see the Discovery Website for more details: <http://school.discoveryeducation.com/lessonplans/programs/actinide/>).

Explain to the students that the development and use of the atomic bomb is controversial. During the lesson, students will learn about the events leading up to the development of the atomic bomb and debate whether it was a positive or

negative scientific endeavor, taking into account the development's historical context.

Divide students into two teams. Have one team take the position that the development of the atomic bomb was a worthwhile pursuit. This side will argue that the work was important and led to necessary and positive outcomes. The other side will argue that the problems that have resulted from the development of the atomic bomb outweigh the advantages. Make sure that students think about the historical context of the time, including the fear of the Germans developing the weapon, the ongoing war, and the nature of scientific discovery. Some useful resources for this include: Oppenheimer's Speech to Los Alamos Scientists (found in *The Manhattan Project* anthology). A useful passage of the speech is transcribed below:

I think that this resistance which we feel and see all around us to anything which is an attempt to treat science of the future as though it were rather a dangerous thing, a thing that must be watched and managed, is resisted not because of its inconvenience—I think we are in a position where we must be willing to take any inconvenience—but resist it because it is based on a philosophy incompatible with that by which we live, and have learned to live in the past. (J.R. Oppenheimer, pg. 369 in *The Manhattan Project*).

Preliminary question:

- What does Oppenheimer mean when he refers to the way that the scientists live?

Give students time in class to prepare for the debate. As they gather information, ask them to consider the following questions.

- What science was involved in the development of the atomic bomb? (*Scientists had to learn how to split the nucleus of an atom by using uranium, one of the heaviest elements in nature. They bombarded its nucleus with a neutron, bringing in a chain reaction that released great amounts of energy.*)
- Name some of the scientists involved in creating the atomic bomb? (*Examples include: Niels Bohr, Enrico Fermi, David Bohm, Otto Frisch, James Franck, J.R. Oppenheimer and Edward Teller.*)
- How did the scientists feel about the creating the bomb? (*Some were ambivalent and later signed a petition to try to convince policymakers not to use the bomb. Others, on the other hand, supported the scientific effort from beginning to end.*)

- What are some positive effects of the development of nuclear energy? (*The power of nuclear energy runs power plants, and some forms of nuclear energy are used in radiation therapy to treat cancer*).
- What are the overall effects of the development of the atomic bomb? (*The development of the atomic bomb brought in a weapon with unprecedented destructive force. It also incited a desire in other nations--especially the Soviet Union--to run their own nuclear development programs*).

After students have completed their research for the debate, have each team write an opening argument and that each is prepared to challenge opposing arguments. Discuss the outcome of the debate. Did one team win? If so, why? What made its arguments more compelling?

II) EINSTEIN'S PLEA TO ROOSEVELT

Materials

- Writing materials
- Einstein's letter to FDR (can be found at: http://www.pbs.org/wgbh/amex/truman/psources/ps_einstein.html)

Lesson

Einstein's letter to Franklin Delano Roosevelt was instrumental in encouraging FDR to begin preparations for the Manhattan Project. Students read the letter, consult internet sources, and draft a response from FDR to Einstein depicting every measure that the United States plans to take in organizing the massive project. The letter should allude to potential difficulties with running an atomic research program without public scrutiny and assembling an alliance of industry, scientists and civilian workers without arousing Congressional suspicion.

Module 2: Life at Los Alamos

TOPICS TO COVER

- Secrecy Surrounding the Project
- Secrecy and Spies
- Pueblos and the Project
- Women Scientists
- Not Just Science: Entertainment at Los Alamos

LESSON PLANS

The scale of the effort to build the nuclear bomb was enormous, including huge manufacturing plants, dozens of universities and research centers across the United States. The entire operation was managed under a complete veil of secrecy. Secret cities at Oak Ridge, Hanford, and Los Alamos housed 125,000 military and civilian personnel involved with the project. Many worked as assistants to scientists and as machine operators. Some were involved in administering the communities. Others were directly involved in the design and testing of the bomb.

Only the top echelon military and scientific leaders knew the true nature of the work. Most Manhattan Project personnel did not know what they were doing and the ultimate purpose of their work. Their contact with the outside world was limited and correspondence was routinely monitored and censored. What factors might have led MP workers to accept this state of affairs? Would it be as easy to assemble such a large workforce for a project with this level of secrecy today?

D) LETTERS FROM HOME

Materials:

- Writing materials
- Access to internet sources

Lesson:

Imagine that you were member of the special engineering detachment (SED) program or a civilian worker during WWII who had just arrived at Los Alamos. Using information from the primary sources, write a letter to send home about

your experiences at Los Alamos, detailing your impressions of the project and of your work.

If you had tried to send such a letter in reality, the government censors would have returned it covered it in black marks and asked you to rewrite it so that it did not disclose anything that might provide a clue as to what your real job or location was. As a second part of the activity, another student should read the letter and mark it up as if they were a government censoring agent and explain to the letter-writer why he or she decided to eliminate parts of the letter.

II) A CLASH OF CULTURES: SCIENTISTS AND THE MILITARY

The clash between the scientists and the military was primarily over the scientists need for open collaboration versus the military's insistence on secrecy. Oppenheimer insisted on the need for collaboration between the scientists to solve complex scientific, engineering and technical issues of developing an atomic bomb. General Leslie Groves was adamant that the project had to protect the knowledge of the atomic bomb from falling into the wrong hands.

This tension was felt most acutely in three contexts: (1) in establishment of the laboratory and security procedures; (2) over the issue of whether the scientists could petition the President to consider whether to drop the atomic bomb on Japan; and (3) over the question of whether scientists should share the atomic secrets after the war with their colleagues.

Materials:

- Posters from the Manhattan Project emphasizing the need for secrecy.
- Security briefings, security manual and *The Daily Briefings*
- Transcripts from J. Robert Oppenheimer and other scientists about the need for collaboration and openness
- Niels Bohr's Letter to the UN urging an open exchange of scientific information

Lesson:

Divide the class into two groups, one representing the interests of the military and the other the scientists. Each side comes up with recommendations for the right balance of ensuring security and allowing for scientific collaboration from their point of view. Then the two sides must negotiate a common set of standards and procedures.

Compare these recommendations with the actual practices at Los Alamos. Which ones are more restrictive? Which ones might have been more effective in preventing espionage? What are some of the trade-offs between the need for controlling top-secret information and creating conditions for scientific innovation and productivity?

III) MANHATTAN PROJECT NEWSPAPER

Plan submitted by teachers Melinda Hopping and Denise Gianopoulos

Materials:

- Writing materials
- Access to the internet and computer

Lesson:

After students have studied the Manhattan Project, they will work either individually or with another student to produce a newspaper article to be placed in a newspaper in which the entire class will put together. Students will either interview an individual who lived during the time of the Manhattan Project or listen to oral histories of individuals who worked on the Manhattan Project (through the following websites www.losalamoshistory.org or publications@losalamoshistory.org)

If the students are to interview someone who lived during the time of the Manhattan Project, they will develop a set of interview questions. Students will obtain prior approval from the instructor before the interview. Once the students have completed the interview, they will draft a news article with the information. When the entire class has completed the news articles, they will assemble a newspaper for the classroom.

IV) MINI LESSONS ON LIFE AT LOS ALAMOS

Submitted by teacher Kati Steinberg

Materials:

- “A Boy on the Hill” book for *Picturing Los Alamos* mini-lesson and “A Sense of Place” video for *Writing Los Alamos* mini-lesson

Lessons:

Picturing Los Alamos

- Read “A Boy on the Hill” by Raymond Bences Gonzalez, which tells the story of a boy growing up in Los Alamos in the 1930s when his dad was the manager of the Ranch School Trading Post.
- Imagine what the mesa looked like 80 years ago. Draw a picture of what the area around the pond and Fuller Lodge might have looked like.
- Show pictures from the Ranch School days to compare to their pictures.

Writing Los Alamos

- Show “A Sense of Place.”
- Write about what a day in the life would have been like if you had lived at the Ranch School.
- Play some games or do an outdoor science lesson as they might have done at the Ranch School.

Module 3: Truman's Decision

TOPICS TO COVER

- Interim Committee.
- Trinity Test and the Potsdam Conference
- Petition by Chicago scientists and the Potsdam Declaration
- Effects of the bombing on Hiroshima and Nagasaki

LESSON PLANS

The decision to drop the atomic bomb on Hiroshima and Nagasaki was not a single decision made by a single actor. On the contrary, President Truman knew nothing of the Manhattan Project until he was briefed on it by Henry Stimson on April 24, 1945 and thus relied on the advice of his Cabinet officials to guide him in the process. In addition to the recommendations that his closest advisers provided him directly, Stimson organized the Interim Committee to consider various policy and political issues related to the bomb. Though its role was strictly advisory, the Interim Committee went outside of its assigned scope and ended up officially recommending the use of the atomic bomb on June 1—a recommendation that was later communicated by Stimson and James Byrnes to President Truman before his preparation for the upcoming Potsdam Conference.

I) PRESS CONFERENCE: THE DECISION TO DROP THE BOMB

Materials

- Writing materials
- For teachers: Discovery.com has more information about how to host a mock press conference
- For students playing Truman, Groves, and Oppenheimer:
 - In *The Manhattan Project* anthology:
 - Robert DeVore, “Decisive, Confident, and Cool” (Groves)
 - Colonel Kenneth D. Nichols, “The biggest S.O.B.” (Groves)
 - Colonel John Lansdale Jr., “Not right—do it again” (Groves)
 - Jennet Conant, “The Most Compelling Man” (Oppenheimer)
 - President Harry S. Truman, “The battle of the laboratories” (Truman)

- Henry L. Stimson, “The Decision to Use the Atomic Bomb” (Truman)
 - Online
 - http://www.trumanlibrary.org/whistlestop/study_collections/bomb/large/index.php (Truman Library resource with documents relating to the decision to drop the atomic bomb)
- For students playing reporters:
 - In *The Manhattan Project* anthology:
 - Paul Boyer, “For all we know, we have created a Frankenstein!”
 - William Laurence, “Eyewitness over Nagasaki”
 - Henry DeWolf Smyth, “A Citizen’s Guide to the Atomic Bomb: The Smyth Report”
 - Barton J. Bernstein, “History is often not what actually happened”
 - Felix Morley, “The Return to Nothingness”

Lesson

Students are assigned roles. Three individuals are selected to play President Truman, General Leslie Groves, and J. Robert Oppenheimer. The remaining students are assigned to the role of reporters. In more advanced classes, each reporter should select a publication to represent and research that publication’s views. The class should set a historic date for the press conference. This will shape students’ research in the next step as they trace historical attitudes towards nuclear weapons.

Students playing Truman, Groves, and Oppenheimer must research each individual’s response to dropping of the bomb. They should also be encouraged to learn as much as possible about the personality of each man to help them stay in character during the conference. Students acting as reporters must come up with questions for the men, taking care to only ask information that was available to the public in the immediate aftermath of the bomb. If students have elected to represent specific publications, they should tailor their questions to the focus and readership of those.

Students host a mock press conference. Truman, Groves, and Oppenheimer make brief remarks about the dropping of the bomb on Hiroshima. The floor is then open to the reporters. Truman, Groves, and Oppenheimer must take care not to divulge information that was not yet public.

After the press conference, each reporter writes a newspaper article based on the conference. Truman, Groves, and Oppenheimer write brief reflections on the experience of being interviewed. Which questions did they find particularly challenging? How were their beliefs called into question?

The class shares their reflections and articles. Discussion topics may include how personal biases shape news coverage or how the public responded to the dropping of the bomb. How have our attitudes toward nuclear weapons shifted over time? Why?

II) PRESIDENTIAL BRIEFING: THE DECISION TO DROP THE BOMB

Materials

- Selected readings from the *Manhattan Project* anthology:
 - Excerpt from the Franck report, “Advising Against the Bomb”
 - Excerpt from the Science Panel’s Report to the Interim Committee, “No Acceptable Alternative”
 - Gar Alperovitz, “Why Does This Decision Continue to Haunt Us?”
 - J. Samuel Walker, “Hiroshima in History”
 - Kai Bird and Martin Sherwin, “Anticipating the End of War”
 - Leo Szilard, “Scientists Petition the President”
 - Patrick M.S. Blacket, “A Question of Motives”
 - Paul Fussell, “Thank God for the Atom Bomb”
 - President Harry S. Truman, “The battle of the laboratories”
 - Tsuyoshi Hasegawa, “The Bomb in National Memories”
 - William Lanouette, “Scientists will be held responsible”
- Access to Internet for additional research

Lesson

Divide students into two groups. One will represent the military. The other will represent scientists who signed the petition for President Truman for a demonstration of the bomb. Provide each group with primary source material from *The Manhattan Project* anthology. Students can also use the Truman Library as a resource (<http://www.trumanlibrary.org/>).

Students discuss within their groups whether or not to drop the atomic bomb on Japan. They will compose a one- or two-page outline of their recommendations

and prepare a presentation to make in person to Truman in which they are prepared to justify their recommendations.

Factors students should take into consideration: length of the war, possibility of land invasion, possibility of Soviet entrance into war, deterrent effect of demonstrating weapon, “war-ending” nature of weapon, and the U.S. role in postwar period.

Groups present presidential briefs to the class. Classmates may step in at any point to question the recommendation the group is making, although the exercise should not become a debate. After each group makes the presentation, the entire class votes on whether or not the atomic bomb should have been dropped on Hiroshima and Nagasaki.

III) DELIBERATION ROOM: THE INTERIM COMMITTEE CONVENES

Materials

- Role Cards
- Interim Committee deliberation meeting minutes (can be accessed at: http://www.trumanlibrary.org/whistlestop/study_collections/bomb/large/index.php)
- Access to Internet and anthologies for additional research

Lessons

Students are assigned roles and given role cards that describe their character. No student sees the role card of any other student.

Student	Role	Role Description
1	Harry S. Truman, President	You approved the Committee after Stimson proposed it and appointed James Byrnes to be your “personal representative” on the Committee. You do not receive regular updates about what goes on in the deliberation room, but Stimson and Byrnes separately approach you to deliver the final recommendation that the Committee makes.
2	Henry L. Stimson, Secretary of War	You have been a lifetime policymaker and worked directly with FDR and with the Manhattan Project. Even though you are open to the possibility of not using the bomb, you don’t call that into question at any point during

		the deliberations of the Interim Committee.
3	James F. Byrnes, Secretary of State*	You are an assertive adviser and Truman's "personal representative" on the Committee. You are strongly opposed to sharing nuclear technology with the Russians (and argue against anyone that proposes this idea) and believe that the bomb should be used to end the war. You are also in the process of being confirmed as Secretary of State, giving you extra leverage in the Committee deliberations.
4	General George Marshall, Army Chief of Staff**	Though you are not officially a member of the Interim Committee, you are invited to witness the discussions and participate in them as well. A key moment is when the Committee is discussing whether the US should share nuclear secrets with the Russians —you propose that the US invite Russian scientists to witness nuclear tests.
5	Dr. J. R. Oppenheimer, Scientific Panel	You are not part of the official Committee, but you attend certain meetings as a representative of the scientific community. You are a big proponent of sharing nuclear secrets with the Russians and talk about the advantages with George Marshall when the Committee considers the question of whether they should share secrets with the Russians.

The student in charge of playing Henry Stimson, as Chair of the Committee, should guide the discussion on two topics: (1) the question of whether nuclear technology should be shared with the Soviets and (2) general discussion of the bomb. James Byrnes should secretly reveal the recommendation that the bomb be used. Henry Stimson should do the official briefing to Truman, summing up the major conclusions of the Interim Committee. In the end, students read the minutes from the Interim Committee deliberations and compare and contrast reactions and discussions among the members mentioned.

Module 4: Living with the Bomb

TOPICS TO COVER

- The Nature of War
- International Control Efforts
- Peaceful Purposes

LESSON PLANS

After the atomic bombings on Hiroshima and Nagasaki, citizens and policymakers felt the jubilation of victory. But very soon fear that other nations might develop an atomic bomb and use it on the United States dampened the mood of the country. As a result, most scientists and policymakers supported international control efforts aimed at containing the spread of nuclear technology. Unfortunately, early efforts aimed at international control (especially the Baruch Plan) failed, but simultaneously paved the way toward a successful treaty (Nuclear Nonproliferation Treaty) that was agreed to in 1968. In addition, the peaceful uses of nuclear technology have brought off-setting improvements in the quality of life in fields of medicine, biotechnology, agriculture, materials science, and energy. The legacy of the Manhattan Project is complex, with both the threat posed by nuclear weapons and the promising advances in health, energy and many other areas.

I) THE MAN WHO SURVIVED TWO BLASTS: TSUTOMU YAMAGUCHI

Materials

- Writing materials
- Access to Internet, including the following websites:
<http://www.cnn.com/2010/WORLD/asiapcf/01/06/japan.bomb.victim.dies/index.html>
<http://www.aasc.ucla.edu/cab/index.html>

Lesson

Though the Hiroshima and Nagasaki blasts produced thousands of casualties, some Japanese citizens survived the blasts. One of them—Tsutomu Yamaguchi—miraculously survived both blasts and lived to be 93 years old (he recently

passed away in January 2010). Students should first use the Internet to research Yamaguchi to get a better understanding of his life story. They should then consult the Children of the Atomic Bomb website (hosted by UCLA) to get a better understanding of the physical and mental suffering that blast victims endured. After researching both angles, students should complete one of the suggested three writing assignments:

1. Imagine that you are Tsutomu Yamaguchi writing a diary entry after you are discharged from the hospital following the second blast. Using primary accounts of the visual effects of the blast, compile a diary entry describing the scene of the blast and Yamaguchi's feelings about surviving the blast and about the destruction around him.
2. Compile an obituary for Tsutomu Yamaguchi detailing his life story and the destruction of Hiroshima and Nagasaki.
3. Write a newspaper article about the "human face" of atomic blasts, using Yamaguchi in the introductory paragraph. Write primarily about the physical and mental effects of the blasts on civilians (consult the UCLA website for facts). You should also include a section explaining why the story is relevant to current disarmament debates.

II) DESIGNING A MANHATTAN PROJECT MUSEUM

Materials

- Writing materials
- Internet and anthology for research
- Poster board, markers, and other materials for designing presentations

Lesson

The teacher tells the students that a new, fictional history museum is looking to host an exhibit on the Manhattan Project. Their task is to design this exhibit.

The class discusses together which areas of the Manhattan Project to highlight (e.g. scientific aspects, military aspects, spying, life at Los Alamos, environmental aspects of the project, presidential decision-making, etc.). Why have they chosen these areas?

Students are divided into groups, each of which will focus on a different area. They must design that part of the exhibit, selecting artifacts, historical documents, written historical explanations, and experiential aspects. They then summarize their research and presentation on the poster board.

III) ATOMIC CULTURE

Materials:

- Video of *Dr. Strangelove*.
- Nevil Shute's *On the Beach* book excerpts
- Writing materials

Lesson:

Dr. Strangelove is one of the most popular videos that reflected the anxieties associated with nuclear bombs. Similarly, Nevil Shute's *On the Beach* effectively induced its readers to consider the disastrous human consequences of such a weapon. Students should either watch the video or read the short novel and discuss how the atomic bomb seeped into consciousness of public consciousness and consider how this "fear" has changed over the past couple of decades.

IV) MINI-LESSON: THE NUCLEAR TIPPING POINT/COUNTDOWN TO ZERO VIDEO MODULE

Materials

- A copy of *The Nuclear Tipping Point* or *Countdown to Zero*

Lesson

Both films explore the history of atomic developments in the Manhattan Project and the Cold War and the magnitude of the threat of nuclear weapons in the world today. Students should watch either film and compare and contrast their impressions.