

Teacher's Guide

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Social and Ethical Issues in Nanoscience and Nanotechnology

Purpose

- Introduce students to social and ethical issues (SEI) in nanoscience and nanotechnology.
- Demonstrate SEI through case studies using popular films or popular press.
- Stimulate discussion about SEI.

Level

High School

Time required

50-minutes

Advance Preparation

Materials:

- Video from list of popular movies that incorporate some aspect of SEI in nanoscience/nanotechnology
- News articles that discuss SEI

Teaching Strategies

1. Introduce topic
2. Watch clip of movie or read news article
3. Hand out discussion questions
4. Break into small group to discuss
5. Reconvene and discuss with entire class

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General Nanotechnology and SEI Background:

What is Nanotechnology?

Nanotechnology refers to the ability to manipulate matter at the nanoscale (i.e., 100,000 times smaller than the diameter of the human hair). Currently, manipulation of matter in the range of 1-100 nanometers is considered nanotechnology.

Importance of Nanotechnology

Some scientists predict that nanotechnology will be the next Industrial Revolution, having transformative effects on every aspect of society.

What are Social and Ethical Issues in Nanotechnology?

Science and technology do not occur in a vacuum but are shaped and utilized by social forces. Additionally, society is impacted by science and technology in ways that are difficult, if not impossible, to predict beforehand. Examples of social issues include societal changes such as workforce needs, longevity of human life, ways of interacting with one another, etc. Ethical issues include questions about a society's values and sense of right and wrong. For example, is it ethical for an insurance company to deny insurance to someone on the basis of having a genetic predisposition for a disease? Nanoscience and nanotechnology pose a host of social and ethical issues that will have to be addressed by society.

Resources for teachers

For more information on social and ethical issues in nanoscience and nanotechnology, contact Dr. Suzanne G. Brainard at the Center for Workforce Development, the University of Washington in Seattle, WA. Dr. Brainard can be reached by telephone at (206) 543-4810 or by email: brainard@enr.washington.edu.

Useful web sites:

<http://www.sei.nnin.org>

This site has information and resources on SEI for students and teachers. It is part of the National Nanotechnology Infrastructure Network.

<http://www.nano.gov>

This site gives information on the National Nanotechnology Initiative. There is a section for K-12 students and teacher resources.

<http://www.nano-and-society.org/>

Articles about nano in the news.

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List of books and movies that deal with nano SEI:

Fiction

- David's Sling — Mark Steigler
- [Earth — David Brin](#)
- [Nano — John Robert Marlow](#)
- [Prey — Michael Crichton](#)
- Queen of Angels — Greg Bear
- The Gentle Seduction — Mark Steigler
- The Nanotech Chronicles — Michael Flynn

Films

- [Face/Off \(1997\)](#)
- [Minority Report \(2002\)](#)
- [Godsend \(2004\)](#)
- [Resident Evil—Apocalypse \(2004\)](#)
- [Spiderman 2 \(2004\)](#)
- [SpyKids 3D—Game Over \(2003\)](#)
- [The 6th Day \(2000\)](#)
- [The Manchurian Candidate \(2004\)](#)
- [The Stepford Wives \(2004\)](#)
- [The Island \(2005\)](#)

Television

- [Alias](#)
- [Star Trek](#)
- [Farscape](#)
- [Battlestar Galactica](#)