

Connection to Characteristics of Complex Systems Project

Lesson Title:

Modeling Dynamic Systems, Section 10: Pollution Model

Overview:

Modeling Dynamic Systems: Lessons for a First Course (3rd Edition) is a model-based curriculum developed by Diana Fisher.

Related Characteristic(s) of Complex Systems:

- Conflicts arise between short-term and long-term goals.
- Cause and effect are not closely related in time or space.

Ideas and Examples for Connecting to the Characteristic:

Section 10 of *Modeling Dynamic Systems* takes students through most of the steps of creating a system dynamics model. The problem students examine is whether or not a city can support a tanning industry and not be poisoned by it. Pollution is often considered a “necessary evil” in the pursuit of the benefits of economic growth. The following ideas can help guide a classroom discussion about complex systems:

1. What are the probable short-term goals of the main actors of the system (the population and the tanning industry)? What are the probable long-term goals of each? What goals are in conflict, and how? For example, most businesses want to maximize profits, particularly in the immediate future, or they risk complete failure. How does such a goal affect the ability of a group of people to live in a healthy environment? Remember that pollutants often accumulate over time.
2. What incentive do people have to protect the tanning industry despite any pollution the industry may release into the water supply? Discuss the implications of population regions being dependent on particular industries for the jobs they provide.
3. Discuss the role of delays in environmental pollution. From an industry standpoint, if a company has operated for decades with no complaints, is it reasonable for them to accept blame for a sudden increase in the death rate of the local population? Why might they be skeptical that there is any connection between their activities and a higher death rate? What else could cause the increase?

Resource(s)

Modeling Dynamics Systems, Diana Fisher, available here:

<http://www.iseesystems.com/store/ModelingBook/default.aspx>

”Hope for Using Coal, Cutting Air Pollution”

http://billingsgazette.com/news/opinion/editorial/gazette-opinion/gazette-opinion-hope-for-using-coal-cutting-air-pollution/article_3987585e-4c17-5133-8700-eeaaca9ae68c.html

Cancer clusters on Wikipedia: http://en.wikipedia.org/wiki/Cancer_cluster