

LESSON 5: INFECTIOUS DISEASE AND HUMAN DENSITY

OVERVIEW:

Students will explore the relationship between the risk of infectious disease and population densities. The lesson is in two distinct parts, the second of which is revealed to students only at the end of the lesson. In the first part, students will investigate a set of case studies about people suffering from some infectious illness in a neighborhood. From the data provided, students will try to figure out what is the source of the infectious agents causing people to get sick. In the second part of the lesson, students will look at their hands under an ultraviolet light in order to see if they have any glow powder on their skin. This harmless powder will have been applied to one of the case study files before the lessons began. The second part of the lesson reinforces how easily and surreptitiously infectious diseases are spread. Students will be asked to reflect on what factors most influence the spread of infectious disease within human communities.

SUB-QUESTION:

How do infectious diseases spread so quickly in urban areas?

WAYS OF KNOWING URBAN ECOLOGY:



Students will...

Understand

1. Explore the pathways and genesis of infectious disease (*human impact, ecosystem state and structure, forces and drivers*).

Talk

No specific goals connected with talking urban ecology in this lesson.

Do

1. Evaluate and analyze infection data in a disease outbreak simulation.
2. Construct a hypothesis about the nature of a disease outbreak.

Act

No specific goals connected with doing urban ecology in this lesson.

SAFETY GUIDELINES

The specific safety issues associated with this lesson involve thoroughly washing your hands following the activities. The light sensitive powder is relatively harmless, but students may associate the powder with infectious disease. In addition, some students may experience skin irritation. See <http://www.germwise.com/pdfs/msds-glogerm-powder.pdf> for more information.

PREPARATION:

Time:

1 class period

Materials:

Activity 5.1

GloGerm powder (<http://www.glogerm.com/>) or equivalent

For each student:

Public Health Worksheet

Activity 5.2

For each student or group of students:
UV lamp

INSTRUCTIONAL SEQUENCE

Activity 5.2 will actually be implemented during the student activities in Activity 5.1. Activity 5.2 investigates the role of social contact in the spread of infectious disease. You should apply some of the glow powder to the student work sheets before handing them out. The glow powder is harmless and invisible under normal lighting conditions. As the students handle the worksheets they will get some of the powder on their hands. Then, when the first lesson is complete, you can initiate Activity 5.2 and discover how the glow powder has been distributed using the special UV light included in the packet.

Introducing the Lesson

Remember, the students are initially aware of only the first part of the lesson (Activity 5.1). They will conduct that activity without knowledge of the glow powder. This is critical if Activity 5.2 is to have its intended impact!

Activity 5.1: You are the Public Health Investigator!

1. Have your students review the interview transcripts and complete the PHI Data Analysis Sheet.
2. Ask your students to review the data and look for any activities which may be consistent across all of the people interviewed.
3. Have your students fill out the PHI Final Analysis Sheet with their understanding of the source of the infection and the common clues that helped them reach this conclusion.
4. Have students come up with questions about their own neighborhood such as “Do I know where *my* water supply comes from?” Have students share these questions.

Activity 5.2: Am I Infected?

1. Depending on the number of ultraviolet (UV) lights available, students can either work independently, in pairs, or as a group.
2. Using the worksheet as a guide, students will examine their hands under an ultraviolet light. Some students will show the presence of the glow powder, others will not.
3. After viewing their hands, students should try to find which of the data files were “infected” with the glow powder. Once this has been discovered, students can reflect on the hidden nature of infectious disease.

Teaching Alternatives

Although the glow powder is harmless, it does require soap and water to clean up. In

some instances, access to sinks and running water may be limited, or pose an undue management stress to the class. If this is the case, the teacher can choose to do this activity as a discussion for the entire class. Instead of revealing the powder on the skin, discuss a food poisoning scenario by reviewing what everyone had for lunch. Make a data table on the board or screen. Look for common items and estimate the number of people who would be sickened if a certain food was tainted. The data obtained from the class can be used for discussion.

Concluding the Lesson

1. As an end of the class reflection, have students consider the following question:
 - How did physical contact increase the spread of the glow powder, which was serving as a surrogate for an actual disease?
 - How might you respond to news of a food poisoning incident in the school or neighborhood?

Teacher Background Knowledge

The University of Minnesota has developed a public health disease outbreak scenario game called *Outbreak at Waters Edge*. The game uses an infectious disease outbreak incident similar to what we use in this lesson. The game takes a full period to play. They have done a great job at simulating the details:

<http://www.mclph.umn.edu/watersedge/index.html>

There is also River City, which occurs in an online virtual world:

<http://muve.gse.harvard.edu/rivercityproject/index.html>

While it is geared towards middle school, it is also appropriate for high school students.