Predicting Infectious Disease

Driving Question:
How do infectious diseases constantly outsmart us and continue to threaten human populations around the globe?

Context: This unit is focused on ideas, concepts, and practices related to the study of infectious disease. The course relies on students' experiences with infectious disease to frame much of the discussion. The course activity draws heavily on various web-based and board games that are models of different infectious disease concepts. During the course project, students select an infectious disease-related idea, concept, and/or practice and design a game that models it.

Project: Students design a game that models or simulates the infectious disease process.

Approach: Students explore transmission of infectious pathogens from the cellular to the global level by using game-based learning and by conducting interdisciplinary investigations. Students delve deeply into the human immune system through a digital game called *Pathogenika*. In addition, they design their own board game that models infectious disease. As part of extension activities, students have the opportunity to watch several videos of scientists and public health officials discussing some of their infectious-disease related work and engage with other types of media such as TED talks, commercial movies, and books on the subject.

Expert Involvement: Classrooms using experts will invite them to review student research and their ideas about infectious disease through discussions and shared documents. Infectious disease specialists and health care professionals give students feedback on their work by asking students additional questions and by providing intellectual resources and support.

Primary Standards: Next Generation Science Standards- Performance Expectations

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

HS-LS4-2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

HS-LS4-3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

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<< Standards continued from previous page >>

Primary Standards: CC Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects

WHST 9-10.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

WHST 9-10.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

WHST 9-10.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

WHST 9-10.6 Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

WHST 9-10.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

Primary Standards: CC Reading Standards for Literacy in Science and Technical Subjects

RST.9-10.1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.