Lesson 4: Introduction Computer Model-Using modeling in Research

This page should be repeated for each individual lesson that makes up the unit.

Problem statement: restate problem statement with a focus on how each lesson fits into problem statement

A well-known, large tech company recently released a much anticipated social media app. Shortly after its’ release users began experiencing uncomfortable and fatal symptoms. You’re a Centers for Disease Control and Prevention (CDC) epidemiologist - someone who studies and analyzes effects of health and diseases. Your team has been tasked with understanding and containing this new infectious disease. After time, the disease began to mutate and is now transmittable between humans. Your team’s goal is to come up with a plan prevent, contain, or cure the disease. This unit helps students understand the spread of germs and how it affects our health through the application of computer modeling and simulation (agent based modeling).

Learning objectives: Students will be able to understand how computer modeling can help us understand the spread of diseases

Lesson standards (NGSS, CCSS, CTE):

What standards (content and practices) are you addressing in this unit/lesson(s)?

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

CCSS Math HS N-RN. Extend the properties of exponents to rational exponents.

If relevant to a single lesson, include:

Soft skills:

Habits of mind and ways of working together help students build their capacity for workplace expectations. What 21st century skills will students be applying in this lesson or unit (e.g. Communication, Collaboration, Critical Thinking, Creativity)?

Locally and/or personally relevant for students:

How do students build on their understanding of their school community or on what matters to students? Are there ways to make a strong connection to women or underrepresented minorities in STEM fields – to increase proportionate representation of those groups in STEM?

Connections to career and educational pathways:

How will students learn about connections to career and educational pathways into the unit/lessons?

Materials: Internet Access

Lesson preparation: internet connection, population graphreference sheet

Time required: 45-55min (1 class period)

Grouping of students for instruction:

Describe how students will be divided into groups, if applicable (random, ability, interest, social purposes, etc.) Will students have roles? If so, how will roles be assigned? How will students learn their roles?

What is the instruction? Consider the PBL Procedure that is being addressed here: See the PBL procedure on page 2. Are the students understanding, exploring, or resolving the problem? Or, are they doing all 3 in this lesson? Explain what the teacher is doing and what the students are doing. This section should be written as if you were writing very detailed substitute plans. Teachers should be able to teach this lesson from all the information you provide without having to ask the author questions

Essential Question: What does it mean to model?

Understanding the Problem

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| --- | --- | --- |
| Time | Teacher | Student |
| 3 min | Introducing the problem launch using a video.  Where is George.com?  Teacher ask students to pay attention what information was needed to model? | Students will watch the video |
| 5-10 mins | What information needed?  What is the benefit of using computer modeling?  How does this work impact science and engineering? | Students will pair/share their ideas about the video per the questions that are on the display |
| 5-10 mins | Teacher will ask students what factors contribute to the spread of the disease? From your research, what is needed to stop the spread of disease?  Teacher will record student responses on a large pad to keep posted in the room for later use | Students will share their response out |
| 20 mins | Teacher will begin showing other computer based models (3-5 need research other models)-TBD | Students will identify similarities and difference from the computer based model using a (Venn diagram?) |
| 1 min | Teacher will introduce StarLogo to students  Students ...We will now take a look at a web based program, that we will use to model an infectious disease  Teacher will direct students to the website: www.slnova.org | Students use technology to access the website: www.slnova.org/ |
| 10 min | Teacher will guide students to first explore the base model  Teacher will prompt students think about cause and effect, variables, | Students will explore the base model independently.  Students will record how they think the base model works by listing characteristics of the base model and in their own words describe what is happening/observation. |
|  | Teacher will prompt students to write their ideas in their notebooks and plan to share and compare responses with students | The student pair will share their initial ideas of the model and come to a consensus of how the base model works |

Accommodations: Describe special accommodations for any students with significant exceptional needs (i.e. visual impairment, deafness, physical impairments, etc.) Consider special groups like ELL, SPED, and Highly Capable when possible.

Students can work in pairs.

Encourage students to use previous research about diseases

Teacher will print the population graph and provide each group with a graph to explain what the model is doing.

Extensions: Students can research other models and compare the Starlogo base model.

Assessment:

How will you assess student learning during the problem? Will there be a final product? Will the final product criteria be clear for students from the beginning? Will there be both whole group elements and individual accountability? Attach appropriate rubrics

Formative Assessment in the Lessons

Summative Assessment for the Unit

Exit Ticket: Once you are cured have you developed an immunity?

Resources used for the whole unit can be captured at the end. Resources used only in one lesson should be noted individually for that lesson plan and at the end.

References/Resources:

Attach any materials students will use during the lesson; e.g., handouts, questions to answer, and worksheets. Acknowledge your sources. Give credit to the person who created the idea for the instructional plan, including yourself. You might use language such as "Instructional Plan adapted from \_\_\_\_\_”; “Instructional Plan Consultants (not responsible for the content of this instructional plan): \_\_\_\_\_\_\_”; and/or “Instructional Plan Created by \_\_\_\_\_” Cite scripted materials/curriculum if appropriate.