Summer 2013

Population Dynamics Lesson Plan

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Date: -

Grade Level/ Course Name: Living Environment: 9th or 10th Grade

Time/Period: -

Lesson Topic: AgentSheets Simulator

Unit: Populations within an Ecosystem

Material/management and safety issue:

-Computers for every student, with AgentSheets and internet connection

-Instructor computer and projector, with excel template

-Worksheet

-Website: C:\Users\ItsLabs\Desktop\project project Applet 2\index.html

Content Standards:
Standard 1:
1.1a Scientific explanations are built by combining evidence that can be observed with what people already know about the world
1.1c Science provides knowledge, but values are also essential to making effective and ethical decisions about the application of scientific knowledge.

1.3a Scientific explanations are accepted when they are consistent with experimental and observational evidence and when they lead to accurate predictions.

2.1 Devise ways of making observations to test proposed explanations.

2.2a Development of a research plan involves researching background information and understanding the major concepts in the area being investigated. Recommendations for methodologies, use of technologies, proper equipment, and safety precautions should also be included.

2.3a Hypotheses are predictions based upon both research and observation.
2.3c Development of a research plan for testing a hypothesis requires planning to avoid bias (e.g., repeated trials, large sample size, and objective data-collection techniques).

2.4 Carry out a research plan for testing explanations, including selecting and developing techniques, acquiring and building apparatus, and recording observations as necessary.

3.1a Interpretation of data leads to development of additional hypotheses, the formulation of generalizations, or explanations of natural phenomena.

3.2 Apply statistical analysis techniques when appropriate to test if chance alone explains the results.

3.4a Hypotheses are valuable, even if they turn out not to be true, because they may lead to further investigation.

Standard 4:
1.1a Populations can be categorized by the function they serve. Food webs identify the relationships among producers, consumers, and decomposers carrying out either autotropic or heterotropic nutrition.
1.1c In all environments, organisms compete for vital resources. The linked and changing interactions of populations and the environment compose the total ecosystem.
1.1d The interdependence of organisms in an established ecosystem often results in approximate stability over hundreds and thousands of years. For example, as one population increases, it is held in check by one or more environmental factors or another species.
1.1f Every population is linked, directly or indirectly, with many others in an ecosystem. Disruptions in the numbers and types of species and environmental changes can upset ecosystem stability

6.1f Living organisms have the capacity to produce populations of unlimited size, but environments and resources are finite. This has profound effects on the interactions among organisms
6.1g Relationships between organisms may be negative, neutral, or positive. Some organisms may interact with one another in several ways. They may be in a producer/consumer, predator/prey, or parasite/host relationship; or one organism may cause disease in, scavenge, or decompose another.

Content Objectives:
C1: Students will be able to (SWBAT) label the food web in the AgentSheets simulation
C2: SWBAT: identify two cause and effects of changing a variable within the system
C3: SWBAT: complete the worksheet with a 75% or higher.

Academic Language Demands:
Predation- Biological interaction where a *predator* kills and feeds on *prey*.
Predator- Attacking animal.
Prey- Animal that is hunted by a predator
Population dynamics- A branch of biology that studies population changes in the short-term and long-term. Changes can be caused by birth, death, immigration, and emigration.
Food Web- Shows patterns of predator/prey relationships.
Invasive Species- A species that has been introduced to an area that is not its native environment.

Assessment (formal and informal assessment):

Formative: Teacher will monitor student learning throughout the class. Group discussion about cause and effect throughout simulation will provide useful insight into student learning.

Summative: Worksheet will provide feedback for learning.

Instructional Strategies:

Time	Learning Activities	*Purpose*
1-5	***Beginning Activities***	*Bell Work:* Focuses students on the topic of predator/prey and invasive species interactions. Assess prior knowledge of the topic (***Summarize, in your own words, three main points for the reading?)***. Allows a student to relate new material to previously covered material (***How do these interactions relate to what we've been talking about?***). Allows students to connect material to "real life" examples (***Do you know of any invasive species that are in our local ecosystem?***).
5-47	***Learning***	*Activity*: Students will use the AgentSheets simulation and excel spreadsheet to understand population dynamics, food webs, invasive species, and predator/prey relationships.
47-50	***Closure***	The last 3 minutes provides students an opportunity to demonstrate their understanding of the material in a more traditional assessment. Provides the teacher quantitative data on individual understanding, mitigating the students that coast through the simulation. (Worksheet attached)
1-50	***Differentiation***	Adjust questions for specific student level (low achieving: What is…? Average achieving: What are the interactions in this food web? High achieving: Why is this important and can you include any other variables?). Encourage lower performing students to drastically change variables to see a profound change on the system. Have students work in pairs. This will benefit all students. Higher performing students will cement material by explanation, while lower performing students will have the opportunity to learn from their peers in a pair setting. The worksheet provides differentiated questions allowing students to answer at different levels.