The following instructional plan is part of a GaDOE collection of Unit Frameworks, Performance Tasks, examples of Student Work, and Teacher Commentary. Many more GaDOE approved instructional plans are available by using the Search Standards feature located on GeorgiaStandards.Org.

Georgia Performance Standards Framework for Life Science - 7th Grade

Unit: Interdependence of Life
Inquiry Task
Effects of Changes in the Environment on Organisms

Subject Area: Life Science
Grade: 7th

Standards (Content and Characteristics):

S7L4 Students will examine the dependence of organisms on one another and their environments.
   c. Recognize that changes in environmental conditions can affect the survival of both individuals and entire species.
   d. Categorize relationships between organisms that are competitive or mutually beneficial.

S7CS1 Students will explore the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.
   a. Understand the importance of—and keep—honest, clear, and accurate records in science.
   b. Understand that hypotheses can be valuable, even if they turn out not to be completely accurate.

S7CS2 Students will use standard safety practices for all classroom laboratory and field investigations.
   a. Follow correct procedures for use of scientific apparatus.
   b. Demonstrate appropriate techniques in all laboratory situations.
   c. Follow correct protocol for identifying and reporting safety problems and violations.

S7CS3 Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations.
   a. Analyze scientific data by using, interpreting, and comparing numbers in several equivalent forms, such as integers, fractions, decimals, and percents.
   b. Use the mean, median, and mode to analyze a set of scientific data.
   c. Apply the metric system to a scientific investigation that includes metric to metric conversion. (i.e., centimeters to meters)
   d. Draw conclusions based on analyzed data.

One Stop Shop For Educators

Georgia Performance Standards Framework for Life Science- 7th Grade

S7CS4 Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities.
   a. Use appropriate technology to store and retrieve scientific information in topical, alphabetical, numerical, and keyword files, and create simple files.
   b. Use appropriate tools for measuring objects and/or substances.
   c. Learn and use on a regular basis standard safety practices for scientific investigations.

S7CS5 Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters.
   a. Observe and explain how parts can be related to other parts in a system such as predator/prey relationships in a community/ecosystem.

S7CS6 Students will communicate scientific ideas and activities clearly.
   a. Write clear, step-by-step instructions for conducting particular scientific investigations, operating a piece of equipment, or following a procedure.
   b. Write for scientific purposes incorporating data from circle, bar and line graphs, two way data tables, diagrams, and symbols.
   c. Organize scientific information using appropriate simple tables, charts, and graphs and identify relationships they reveal.

Enduring Understanding: The survival of organisms in a biome is affected by living and nonliving factors. Organisms are dependent upon their environment and on each other.

Essential Question(s): What affect do changes in the environment have on organisms?

Pre-Assessment: Write the word “competition” on the board. Have students list 3 examples of competition. Have them relate how competition can be a positive influence and how it can be negative.

<table>
<thead>
<tr>
<th>Outcome/ Performance Expectations</th>
<th>Identify the learning goals for this inquiry-based task. Students should acquire an understanding of how a change in the amount of living space affects the competition within a species and the overall population of a species. Students should investigate the features of scientific inquiry.</th>
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</thead>
<tbody>
<tr>
<td>Write a concept statement…How would you formulate an expert idea?</td>
<td>List examples of how students may incorporate their ideas into experiments. Students will be provided with pots of various sizes, soil, radish seeds, and the following scenario: Due to the building of a large...</td>
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One manufacturing plant in a traditionally rural area, there has been an increase in the town’s population. Not only has land been cleared to build the manufacturing plant, but also thousands of acres have been cleared to build new homes, businesses, and schools to meet the needs of the new residents. Use the materials that have been provided to you to devise and carry out an experiment to illustrate how this decrease in living space will affect competition and populations of the various species already inhabiting the area.

1. Students may put the same amount of seeds in the number of pots that they choose to use in the task. They will make a hypothesis as to which pot will have seeds that grow better and why. This will lead them to the idea that less space promotes competition of the species and causes the population of that species to change.
2. Students may possibly put different amounts of seeds in the various sized pots, thereby changing 2 variables. Teacher should lead students to recognize and conclude that one cannot test 2 variables at the same time and maintain validity.
3. Students should be guided to form a hypothesis, identify a variable, create an experiment to test a hypothesis, and formulate an explanation of collected evidence from their test.

Write a concept statement / question…What kind of situation would cause this concept to become apparent in students’ understanding?

Write questions or statements to assist students develop and explain their ideas (i.e. aid in conceptualizing their knowledge-making exploration).

- What do the different sized pots represent?
- What is the variable in your experiment?
- What non-living factors are affecting the plant growth?
- What living factors are affecting plant growth?
- What do you predict will happen as the plants are allowed to grow for the 2 week period?
- Does your data support your prediction?
- How is competition among members of the species affected by the amount of available living space?
- What factors other than the amount of living space can affect competition within a living space?
- What happens to populations of species as living space decreases?
- How could the amount of available living space ultimately affect human beings?
- How does this task illustrate interdependence of life?

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<th>Identify necessary data and observations... <em>What data would demonstrate the mastery of the concept by ALL students in the classroom?</em></th>
<th>Identify relevant observations and data collected made students to aide in conceptualizing their knowledge-making exploration. In addition, lists misconceptions that arise and may prohibit students internalizing their own understandings, and what steps should a teacher take to overcome these misconceptions?</th>
</tr>
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</table>
| **Possible observations and data:** Number of germinated seedlings Height of seedlings Overall appearance of seedlings (color, wilted/not wilted, etc.) | Possible misconceptions: 
- Competition is always harmful to species. Relate this to species of organisms that live in your area and discuss what would happen if no competition existed to help control populations (coyotes, mice, insects, etc.).
- More seeds always produce more plants. |

| Write procedures that will cause students to organize data... *Test a procedure using known concepts.* | List sample procedural statements that students may use to organize their data. Students may record procedures, observations, and data in a log book. Students may record data in a table. Tables will vary depending upon the experimental data being completed. Students may draw illustrations of the varying appearance of the seedlings at regular time intervals. Data may be organized in a graph of student’s choosing (bar or line graph would be best for this type of data). |

| Write questions or activities to use or apply the concept (represent, model, visualize, or design new experiments). | How does this relate to deforestation? How does this task simulate the destruction of the tropical rain forests? How is competition beneficial to species? Can population control be useful? Why or why not? Are there populations in the biome in which you live that are affected by competition or the lack of competition? Describe. Students may want to investigate other types of organisms affected by competition. Students may wish to design another experiment that investigates how a variable other than amount of available living space could affect populations (introduction of a new predator, change in climate, change in amount of available food, etc.). |

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<th>Homework/Extension</th>
<th>Complete a self-evaluation. Possible items: How did you participate productively in the inquiry task? How did you ensure that data and observations were accurate? What did you find difficult in completing this task? Why is the knowledge that you gained from this task important?</th>
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<tr>
<td>Instructional Tasks Accommodations for ELL Students</td>
<td>Cooperative group with English speaking peers Utilize a graphic organizer for data collection Show a picture of a rural area to demonstrate what the land used to look like and a picture of what it might look like today with a factory plant and homes. Hi-light key words in the provided concept questions that are provided.</td>
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<td>Instructional Tasks Accommodations for Students with Disabilities</td>
<td>Assign specific questions for members of the group, varying the complexity for those students with disabilities. Have group members then discuss/explain answers to each question individually to ensure acquisition of knowledge by all group members.</td>
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<tr>
<td>Instructional Tasks Accommodations for Gifted Students</td>
<td>Have students construct a comic strip written in the competing organism’s point of view describing how it is affected by competition and loss of living space.</td>
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