

GIFT Action Plan

GIFT Classroom Transfer Plan	
Title	Insect Ecology
GIFT Fellow	Anna Salvador Perrin
E-mail of Fellow	aperrin@tiftschools.com
Sponsoring Organization	University of Georgia-Tifton Campus
Mentor	Dr. Michael Toews
Subject(s) Targeted	Biology
Grade Level	10 th
“Big Ideas”	<ul style="list-style-type: none"> • Interdependence among organisms. • Arrange components of a food chain according to energy flow. • Human activities that influence and modify the environment such as pesticide use. • Classification of living things.
Essential Questions	<ul style="list-style-type: none"> • “How do living organisms interact with each other and their environment?” • “How does matter and energy flow through ecosystems?” • “How do humans affect the environment with the use of pesticides?” • “How are organisms classified?”
NEW Georgia Performance Standards	<p><u>Habits of Mind</u></p> <p>SCSh1. Students will evaluate the importance of curiosity, honesty, openness, and skepticism in science.</p> <ol style="list-style-type: none"> a. Exhibit the above traits in their own scientific activities. b. Recognize that different explanations often can be given for the same evidence. c. Explain that further understanding of scientific problems relies on the design and execution of new experiments which may reinforce or weaken opposing explanations. <p>SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.</p> <ol style="list-style-type: none"> a. Follow correct procedures for use of scientific apparatus. b. Demonstrate appropriate technique in all laboratory situations. c. Follow correct protocol for identifying and reporting safety problems and violations. <p>SCSh3. Students will identify and investigate problems scientifically.</p> <ol style="list-style-type: none"> a. Suggest reasonable hypotheses for identified problems. b. Develop procedures for solving scientific problems. c. Collect, organize and record appropriate data. d. Graphically compare and analyze data points and/or summary statistics.

- e. Develop reasonable conclusions based on data collected.
- f. Evaluate whether conclusions are reasonable by reviewing the process and checking against other available information.

SCSh4. Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

- a. Develop and use systematic procedures for recording and organizing information.
- b. Use technology to produce tables and graphs.

SCSh5. Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations.

- a. Trace the source on any large disparity between estimated and calculated answers to problems.
- b. Consider possible effects of measurement errors on calculations.
- c. Recognize the relationship between accuracy and precision.
- d. Express appropriate numbers of significant figures for calculated data, using scientific notation where appropriate.
- e. Solve scientific problems by substituting quantitative values, using dimensional analysis and/or simple algebraic formulas as appropriate.

SCSh6. Students will communicate scientific investigations and information clearly.

- a. Write clear, coherent laboratory reports related to scientific investigations.
- b. Write clear, coherent accounts of current scientific issues, including possible alternative interpretations of the data.
- c. Use data as evidence to support scientific arguments and claims in written or oral presentations.
- d. Participate in group discussions of scientific investigation and current scientific issues.

The Nature of Science

SCSh7. Students analyze how scientific knowledge is developed.

Students recognize that:

- a. The universe is a vast single system in which the basic principles are the same everywhere.
- b. Universal principles are discovered through observation and experimental verification.
- c. From time to time, major shifts occur in the scientific view of how the world works. More often, however, the changes that take place in the body of scientific knowledge are small modifications of prior knowledge. Major shifts in scientific views typically occur after the observation of a new phenomenon or an insightful interpretation of existing data by an individual or research group.
- d. Hypotheses often cause scientists to develop new experiments that produce additional data.
- e. Testing, revising, and occasionally rejecting new and old theories never ends.

	<p>SCSh8. Students will understand important features of the process of scientific inquiry. Students will apply the following to inquiry learning practices:</p> <ol style="list-style-type: none"> Scientific investigators control the conditions of their experiments in order to produce valuable data. Scientific researchers are expected to critically assess the quality of data including possible sources of bias in their investigations' hypotheses, observations, data analyses, and interpretations. Scientists use practices such as peer review and publication to reinforce the integrity of scientific activity and reporting. The merit of a new theory is judged by how well scientific data are explained by the new theory. The ultimate goal of science is to develop an understanding of the natural universe which is free of biases. Science disciplines and traditions differ from one another in what is studied, techniques used, and outcomes sought. <p>SB3. Students will derive the relationship between single-celled and multi-celled organisms and the increasing complexity of systems.</p> <ol style="list-style-type: none"> Examine the evolutionary basis of modern classification systems. <p>SB2. Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.</p> <ol style="list-style-type: none"> Investigate the relationships among organisms, populations, communities, ecosystems, and biomes. Explain the flow of matter and energy through ecosystems by <ul style="list-style-type: none"> Arranging components of a food chain according to energy flow. Comparing the quantity of energy in the steps of an energy pyramid. Explaining the need for cycling of major nutrients (C, O, H, N, P). Assess and explain human activities that influence and modify the environment such as global warming, population growth, pesticide use, and water and power consumption. Relate plant adaptations, including tropisms, to the ability to survive stressful environmental conditions.
<p>School Improvement Plan</p>	<ul style="list-style-type: none"> <u>Instruction Standard 1</u>: Tift County High School will ensure instructional design and implementations are clearly and consistently aligned with GPS and district expectations for learning. <u>Assessment Standard 2</u>: Tift County High School will ensure a variety of effective and balanced assessment techniques is routinely and systematically implemented by all instructional personnel as part of a comprehensive school-based assessment and evaluation system (i.e. rubrics, cooperative pairs, differentiated performance tasks).
<p>Overview of National Standards</p>	<p>Refer to State Standards since the Georgia Standards were rewritten several years ago to reflect the National Standards.</p>
<p>Safety Considerations</p>	<p>Flinn General Lab Safety - http://www.flinnsci.com/Documents/miscPDFs/Safety_Contract.pdf</p>

The Learning Plan: The following is the sequence and estimated time frames for the 5 E activities for the Insect Ecology Unit.

- 1) Insect Biodiversity Inquiry Lab – This activity will be completed on the first day of the Ecology Unit to “hook” the students and to encourage them to use their thinking skills. (1 hr)
- 2) Stored Product Infestation Hook – I plan to show this PowerPoint to the students on the 2nd day of the Ecology Unit to “hook” them into their Food Product Infestation Lab. (5-10 min)
- 3) Susceptibility of Stored Food to Insect Infestation – This experiment will be set up on the 2nd day of the Ecology Unit, since the insects have to remain in the food product for 2 weeks before students will analyze their results. (1 hr)
- 4) Pesticides In a Nutshell – I will show this PowerPoint on the 4th day of the Ecology Unit to “hook” the students into the lesson on how humans impact the environment. This PowerPoint will also serve as background information for the student’s assigned persuasive letter. (5-10 min)
- 5) Pesticide Use Persuasive Letter – This activity will be done on the 4th day of the Ecology Unit, after the pesticide informational PowerPoint and lecture notes on how humans impact the environment. (45 min)
- 6) “Facts About Bugs” – This “hook” activity will be done at the beginning of class on the 5th day of the Ecology Unit to get the students interested in their Insect Ecology Culminating Project. (5-10 min)
- 7) Insect Ecology Culminating Project – Students will be introduced and start on this activity on the 5th day of the Ecology Unit, but will work on it in over a 3 day period for various time amounts. (2 hrs)

Engage

Check one of the following:

- ✓ Original Work
- ✓ Source - Facts About Bugs website

- Insect Biodiversity Inquiry Lab - Students will make predictions on how many different types of insects they will find using a sweep net at the border of the woods and the grass, as well as specified distances in both directions. They will provide reasons for their hypothesis and create a bar graph of their data.
- Pesticides In a Nutshell.ppt - Hook and background information for “Pesticide Use Persuasive Letter” activity. This PowerPoint explains what pesticides are, how they are used in agriculture, and some of their advantages and disadvantages.
- Stored Food Product Infestation Hook.ppt - Hook for “Susceptibility of Stored Food to Insect Infestation” activity. This PowerPoint enlightens students that there are likely insect fragments in some of the food that they eat, especially grain based foods.
- “Facts About Bugs” website, <http://www.rusticgirls.com/animals/bug-facts.html>, contains interesting and unusual facts about insects which will serve as both a hook for the “Insect Ecology Culminating Project” as well as a resource for possible insects to research.
 - Action: Teacher will disseminate insect facts to each student as they enter the classroom. Students will take turns reading their interesting insect fact to the class.

Explore

Check one of the following:

- ✓ Original Work
- Source:

- Susceptibility of Stored Food to Insect Infestation.doc – Each group will be given four different types of common storage beetle pests and will determine through experimentation which one can survive the best on the specific stored food product their group is given. Both the group’s data and the class’ data will be illustrated using tables and graphs.

<p>Explain</p> <p>Check one of the following:</p> <p><input checked="" type="checkbox"/> Original Work</p> <p><input type="checkbox"/> Source:</p>	<p><input type="checkbox"/> <u>Pesticide Use Persuasive Letter.doc</u> - Students take a position being for or against pesticide use in agriculture and provide reasons for their position.</p>
<p>Extend</p> <p>Check one of the following:</p> <p><input checked="" type="checkbox"/> Original Work</p> <p><input type="checkbox"/> Source:</p>	<p><input type="checkbox"/> <u>Insect Ecology Culminating Project.doc</u> – Students choose an insect and explain the following: position in the food web (trophic level), a realistic food chain that it would be part of, competitors, predators, organisms that it forms a symbiotic relationship with including parasites. Then, students create one of the following to summarize their project: a PowerPoint, brochure, or poster.</p>
<p>Evaluate</p> <p>Check one of the following:</p> <p><input checked="" type="checkbox"/> Original Work</p> <p><input type="checkbox"/> Source:</p>	<p><input type="checkbox"/> <u>Insect Biodiversity Inquiry Lab</u> – Formative assessment will be done of student’s lab work on how well they formed hypotheses, collected, recorded, and analyzed their data, and developed a conclusion.</p> <p><input type="checkbox"/> <u>Susceptibility of Stored Food to Insect Infestation.doc</u> – Formative assessment will be conducted of student’s lab work on how well they formed hypotheses, collected, recorded and analyzed their data, and developed a conclusion..</p> <p><input type="checkbox"/> <u>Pesticide Use Persuasive Paper.doc</u> - Students will be graded by means of a rubric incorporated in attached activity.</p> <p><input type="checkbox"/> <u>Insect Ecology Culminating Project.doc</u> - Students will be graded by means of a rubric incorporated in attached activity.</p>
<p>*ENGAGE Activity:</p> <p><input type="checkbox"/> <u>Insect Biodiversity Inquiry Lab</u></p> <p><input type="checkbox"/> <u>Pesticides In a Nutshell.ppt</u></p> <p><input type="checkbox"/> <u>Stored Food Product Infestation Hook.ppt</u></p> <p><input type="checkbox"/> “Facts About Bugs” website - http://www.rusticgirls.com/animals/bug-facts.html</p>	
<p>*EXPLORE Activity:</p> <p><input type="checkbox"/> <u>Susceptibility of Stored Food to Insect Infestation.doc</u></p>	
<p>*EXPLAIN Activity:</p> <p><input type="checkbox"/> <u>Pesticide Use Persuasive Letter.doc</u></p>	
<p>*EXTEND Activity:</p> <p><input type="checkbox"/> <u>Insect Ecology Culminating Project.doc</u></p>	
<p>*EVALUATE Activity:</p> <p><input type="checkbox"/> Rubrics are included in the following activities, <u>Pesticide Use Persuasive Letter.doc</u>, and <u>Insect Ecology</u></p>	

<u>Culminating Project.doc</u> .	
Documentation of Resources	<ul style="list-style-type: none"> • Biology Standards - <u>Biology Standards revised 06.doc</u> • General Lab Safety - <u>http://www.flinnsci.com/Documents/miscPDFs/Safety_Contract.pdf</u> • Cool and Unusual Insects and Other Arthropods - <u>http://insects.about.com/od/coolandunusualinsects/Cool_and_Unusual_Insects_and_Other_Arthropods.htm</u>
GIFT Work Experience Summary	<ul style="list-style-type: none"> ▪ <u>GIFT Experience.ppt</u>
GIFT Communication Plan	<ul style="list-style-type: none"> ▪ <u>Your Students:</u> I will definitely share my GIFT Experience PowerPoint with my students to show them how I spent the summer getting hands-on experience in the insect ecology research field! Students will also be carrying out activities/labs that relate to or mock the types of experiments and activities that I performed this summer. ▪ <u>Your Classroom:</u> My personal vision for the classroom is that all students will at least meet the standards, but hopefully they will surpass the standards. Students, as well as adults, like to learn about things that are interesting to them. I think that the new “hooks” developed here will help the students become more interested in the Ecology Unit, which is the most heavily weighed unit on the Biology EOCT. ▪ <u>Mentor:</u> My mentor, Dr. Michael Toews, was a pleasure to work with and was always willing to offer a helping hand. He designed different experiments for me to work on during my GIFT experience, which I in turn altered to fit into my classroom. I will continue to communicate and consult with him as I implement my action plan in the biology classes. One of the experiments that the students will be conducting during our ecology unit will require several common storage beetles, which are readily available in Dr. Toews’ laboratory. I will be contacting him in the future to acquire insects. This is very helpful since the insect colonies have to be maintained and the food type has to be changed regularly. Lessons developed with his guidance all relate to ecology, however we did a little biotechnology this summer as well. We examined the presence of protein markers on insects using an enzyme based assay. Though I do not have some of the expensive equipment to perform this activity the way we did in his lab, he has offered to help me at a later time to develop a way to perform the assay without procuring more expensive equipment. Dr. Toews has also offered to come to my class as a guest speaker to talk about his research, education, and previous work experiences that were made possible after earning a science degree. ▪ <u>Colleagues:</u> I definitely plan on sharing my GIFT experience with my department by showing them my experience PowerPoint. Even though a couple of the teachers in my department have already participated in the GIFT program, I think it will be a great way of giving those that have never participated a snapshot of what the GIFT program is about and how much they could benefit from participating. Collaboration is very strong in my department. I am certainly going to share my new hands-on lessons with the other biology teachers. ▪ <u>Optional: District/State:</u> My mentor is planning on creating a link on his UGA

	<p>website that contains the lessons plans that I have developed; this way other teachers that are looking for inquiry based, hands-on activities/labs for ecology will have access to them. In addition to my lesson plans, my overall “GIFT Experience” PowerPoint will be posted on the same website so that other teachers interested in the GIFT program will be able to get an idea of what an enjoyable and enlightening experience it is to work with a researcher. I plan to share the activities with teachers at other schools, who have interests and responsibilities in insect ecology.</p>
--	---