What About Bugs?

Pictures taken by Angela Ostrander at the Yana Yacu Biological Research Station in Napo Province, Ecuador.
Developing an Entomology Curriculum for High School Students

Senior Honors Thesis
Angela Ostrander
Why are insect important to you?

- Pollination
- Nutrient Cycling
- Decomposition of Waste
- Predatation and Parasitism
- Natural Pest Control
- Food for Wildlife
- Model Organisms for Biological Studies (e.g. genetics)
- Sources of Products (honey, waxes, dyes, scents, drugs)
- Inspiration for Artists, Writers, Poets, and Cinema

Pictures from personal collection and also taken from basic Google search.
Wyoming Teaching Standards

• SC8.1.4 - Diversity of Organisms
• SC8.1.6 - Interrelationships of Populations and Ecosystems
• SC11.1.4 - Interdependence of Organisms
• SC11.1.5 - Matter, Energy, and Organization in Living Systems
• SC11.2.1 - Students conducting research on scientific information and present findings.
• SC11.2.2 - Students using inquiry to conduct scientific investigations.
• SC11.3.2 - Students examining how scientific information is used to make decisions.
First Principles of Instruction Model

The First Principles of Instruction Model was developed by M. David Merrill in 2002 and states that in order for students to learn and solve problems:

1. First there must be activation of prior experience.
2. Then demonstration of skills.
3. Application of these skills.
4. Finally, integration of these skills into real world activities.
Day 1: Covering the Basics

1. Students are given a blank cricket anatomy diagram and are asked to fill it out.

2. Diagram is discussed as a group.

3. Students are asked to write a paragraph describing why insects are important to their lives.

First Principles of Instruction Model:
Activates Student’s Prior Experience

Wyoming Teaching Standards:
SC8.1.4 - Diversity of Organisms
SC8.1.6 - Interrelationships of Populations and Ecosystems
Day 2: A Deeper Look

1. Students discover more in depth anatomical and physiological features of insects through the dissection of a common cricket.

2. Organ systems such as the reproductive, digestive, respiratory, and circulatory are discussed in detail.

The First Principles of Instruction Model:

- Demonstration of Skills
- Application of Skills

Wyoming Teaching Standards:

- SC11.1.4 - Interdependence of Organisms
- SC11.1.5 - Matter, Energy, and Organization in Living Systems
Day 3: Field Trip!

1. Students are given a field trip map and a list of 10 important insect orders.

2. Students are then asked to make hypotheses regarding which orders of insects they will find and in which areas of the field trip location they will find them.

3. Students need to collect at least 5 insects in the field trip environment.

The First Principles of Instruction Model: Integration of Skills into Real World Activities

Wyoming Teaching Standards: SC11.2.1 - Students conducting research on scientific information and present findings.
Day 4: Identification

1. Students are asked to identify at least 5 of their gathered insects to the 10 given insect orders and illustrate and label the insects.

2. Students are given access to an online dichotomous key and also books such as The Field Guide to Insects.

The First Principles of Instruction Model: Integration of Skills into Real World Activities

Wyoming Teaching Standards: SC11.2.2 - Students using inquiry to conduct scientific investigations.
Day 5: Reflection

1. Students are asked to analyze their hypotheses by either accepting them or rejecting them and addressing any errors in the experiment.

2. Students are then asked to summarize their finding in a report format.

The First Principles of Instruction Model: The entire model has been applied now and students reach maximum learning and problem solving potential.

Wyoming Teaching Standards: SC11.3.2 - Students examining how scientific information is used to make decisions.
# Entomology Curriculum Rubric

<table>
<thead>
<tr>
<th>Name of Student:</th>
<th>Points Available</th>
<th>Points Earned</th>
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</thead>
<tbody>
<tr>
<td><strong>1st Day</strong></td>
<td></td>
<td></td>
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<tr>
<td>Anatomy Diagram Completion</td>
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<td></td>
</tr>
<tr>
<td>Insect Relevance Paragraph</td>
<td>10</td>
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<tr>
<td><strong>2nd Day</strong></td>
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<td></td>
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<tr>
<td>Participation and Understanding Dissection</td>
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<tr>
<td><strong>3rd Day</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypothesis of Field Trip Findings</td>
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<td></td>
</tr>
<tr>
<td>Participation and Overall Behavior During Field Trip</td>
<td>25</td>
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<tr>
<td><strong>4th Day</strong></td>
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<td></td>
</tr>
<tr>
<td>Identification of 5 Insects</td>
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<td></td>
</tr>
<tr>
<td>Illustrations/Labeling of Identified Insects</td>
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<td></td>
</tr>
<tr>
<td><strong>5th Day</strong></td>
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<td></td>
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<tr>
<td>Final Report/Paper</td>
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<tr>
<td><strong>Total Points Available</strong></td>
<td>150</td>
<td></td>
</tr>
</tbody>
</table>
Discussion and Conclusions

Great for high school students, but could also provide a starting point for entomology curricula in K-12 classrooms.

Plan to incorporate this curriculum into my future classroom and make it available to teachers across Wyoming in any way that I can!
Acknowledgments

First, I would like thank the Honors Program at the University of Wyoming for allowing me to express my passion for academia through this project. I would also like to thank Rachel Watson for advising me these past four years and providing guidance during my senior Honor’s thesis. I would also like to thank Scott Shaw for mentoring this project and sparking my interests in entomology by allowing me to explore this science in the lab, classroom, and even abroad.


Picture taken by Angela Ostrander at the Yana Yacu Biological Research Station in Napo Province, Ecuador.