LESSON PLAN: Natural Selection Segment

Grade: 7  
Course: 7th Grade Life Science/Health  
Content Area: Evolution

Student Context:
There are 34 students in the class including 1 English Language learner, 6 students with IEPs, 7 students in GATE, and 8 students who are part of an at-risk intervention program (SD-CEIS). Students broken up into 4 person table groups each group has one “leader” (high achieving or self-directed student).

PLANNING FOR THE EXTENDED LESSON:  Describe the standards, objectives and big ideas that work to unify the lessons within this segment plan.

Key Content Standard(s):
7.3: Evolution: Biological evolution accounts for the diversity of species developed through gradual processes over many generations. As a basis for understanding this concept:
   7.3.a: Students know both genetic variation and environmental factors are causes of evolution and diversity of organisms.
   7.3.e: Students know that extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient for its survival.

Segment Objective(s):
Students will collect and graphically display data on the variable survival rates of individuals in a species located in a particular environment as a basis for understanding Darwin’s theory of natural selection.

Big Ideas and/or Essential Questions:
What does it mean for a species to be successful?
Why is variation necessary for natural selection and evolution to occur?
How can variation within a species increase that species’ chance of success?
How can the environment influence a species survival?
How may particular traits found in a population change over time?
Evolution acts on phenotype NOT genotype.
How can people cause evolution or extinction of organisms?
How are overproduction, genetic variation, the struggle to survive, and differential reproduction involved in natural selection?
Why are organisms on earth so diverse?
Where did all the organisms on earth come from?

LESSON PLAN (DAY 1)

Key Content Standards:
7.3.a: Students know both genetic variation and environmental factors are causes of evolution and diversity of organisms.
7.3.e: Students know that extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient for its survival.

Key ELD Standards:
Grade 7: B. Interpretive. Expanding: 6.a. Reading/viewing closely:
Explain ideas, phenomena, processes, and text relationships (e.g. compare contrast, cause/effect, problem/solution) based on close reading of a variety of grade-level texts and viewing of multimedia with moderate support.

Grade 7: B. Interpretive. Bridging: 5. Listening actively:
Demonstrate active listening in oral presentation activities by asking and answering detailed questions with minimal prompting and moderate support.

Learning Objective:

A. Cognitive Task (use cognitive verbs):
After graphing historical trends in the phenotype of a population of peppered moths during the Industrial Revolution, students will analyze how a species can change over time.

B. Understanding or Skill to be Enhanced:
Students will look at a simple real world example of evolution to building an understanding of how a species can change over time. Students will enhance their graphing skills and build a foundation for understanding how variation and the environment influence evolution. Furthermore, students will understand how human activities, such as an increase in pollution due to industrial growth, can impact the evolution of a species.

Assessment(s):
Students will create a line graph depicting the change in the population of peppered moths with both the white and black phenotype during and after the Industrial Revolution.
Students will answer questions related to the line graph and the historical environmental conditions of the time.

Prerequisite Skills and Knowledge:
Students know that genetic material is passed from parent to offspring.
Students know that genetic material determines an organism’s physical characteristics (phenotype).
Students know that Charles Darwin visited the Galapagos where he developed a theory of evolution via natural selection by observing different species.
Students have been introduced to new vocabulary, but may not yet have a working understanding of vocabulary terms. Vocabulary includes:
On the previous day students completed an online simulation activity in which they briefly read about the historical circumstances surrounding Kettlewell’s Peppered Moth Experiment and then acted as birds trying to capture moths on a polluted and non-polluted forest backdrop. Students know that increased pollution levels, due to industrial growth, caused the darkening of trees and that the first black moth that was found was believed to be the result of a genetic mutation.

Lesson Resources/Materials:
Instructional Sequence (DAY 1)

Introduction (5 minutes):
Students come in, update activity log, and complete warm-up.
Warm-up: Metric Mania (provided by department to be completed every Friday)
Goals for today: Understand how the environment influenced a peppered moth population over time.
- Practice both productive and interpretive graphing skills
- Identify each factor of natural selection in this example of evolution.

Body of the Lesson (33 minutes): Describe step-by-step what the teacher and the students will be doing during the lesson.

Review moth lab activity from yesterday (students did a simulation acting as birds and eating moths on a dark and light background). Ask students questions for understanding. (3 Min)

T: What color were the trees originally?
S: White/Light/Lichen covered
T: How did the industrial revolution change the color of the trees?
S: Black/Dark/Covered by soot or pollution
    T: Guiding Question: (if students just say ‘became black’ ask them how the trees were blackened, what was going on during this time period? What do factories produce? Make sure pollution due to industrial activity is discussed)
T: So what changed? Look at our wordwall, what is the term used to describe the forests?
S: Environment/surroundings
T: When you were a bird, which moths did you go after on the light background? Why?
S: Dark moths because they were easy to see.
T: Which moths were easier to catch on the dark background? Why?
S: Light moths because they were easy to see while the black moths blend in.
    T: When students answer look for use of word camouflage. Make sure they can define term. Camouflage is probably the best understood term in our class and so far has been very interesting and motivational to students. If they don’t bring it up on their own ask: What do we call an adaptation that makes it difficult to find an organism in its environment? OR What do we call the pattern on a soldier’s uniform? What is the purpose of this pattern?
    T: If students say they went after camouflaged moths (some will to try to mess with the simulation program) ask them: ‘If you needed to eat at least 50 moths in a minute or you starve to death, which moths would you go after?’ Remember species act to maximize their chances of survival.

Graphing Data (20 minutes)
Questions to move to next topic: How do you think the way you were eating moths may have changed the moth population?

   Students answer: No right answer, students are hypothesizing.

   T: Let’s look at some historical data to see if the population changed. Read first paragraph. Break down “industrial melanism”

   Industrial->industry->production/factories-> what do factories produce as a byproduct?

   Pollution

   Melanism-> who has heard of melanin? Show of hands. Call on students if any are familiar with term, otherwise tell students that it is a skin pigment. Those with more melanin have darker coloration.

   T: what would be an adaptation having to do with coloration and pollution?

   S: Camouflage to fit in with polluted environment (may also say something about mutating to eat pollution or survive pollution ect…but focus it back on melanism/pigmentation)

   T: Call on students to read next two paragraphs then look at the chart. What is the chart telling us?

   S: Answers may vary, try to get students to use word ‘population’ refer them to the wordwall or our previous sunflower seed activity to help them recall the term. To help them reach this understanding, point out that we catch moths in traps so numbers we catch tell us about how many moths are in the area NOT how easy it is to see or catch moths.

   T: Tell students that this is data very similar to what Kettelwell would have collected during his experiments. Ask students do you notice any trends?

   S: Some students may note that the numbers of light moths are decreasing while the number of dark moths are increasing.

   T: How do scientists represent data so that it’s easier to understand and see trends?

   S: Should say graphs (Ask: how can they visually show trends if students )

   T: What does every graph need? What can you remember from your other classes?

   S: should say units, title, axis labels (T briefly talks about SULTAN)

   T: What a good title would be? Remember a title needs to be specific. Should say what is being measured and how.

   Review manipulated and responding variables. Ask students, which is the manipulated variable (scientist controls) which is the responding (what scientist measures).

   T: How many variations are in this species. How many lines are we graphing? How can we represent that?

   S: Black and a white variation. Some students may know to use two colors and a key to represent both sets of data.

   T: Remind students to use two different colors for white and black moth populations and include a key. Then ask: What increments should we use? Can you explain how you got that?

   S: Students explain how they found their increments

   Teacher slowly models how to plot first three points for light moths. Color code chart to match colors used for lines for additional clarity. Give tables 5 minutes to graph data, they are allowed to speak within their table groups.

   Walk around and check in on students, go to IEP and SD-CEIS students to make sure they are on task.

   While T walks around ask students: Did you see any trends? Look at your data, look at your graph, are the numbers getting larger for the black moths or lower? What does that mean? What does the population look like at the beginning? At the end?
Pick a volunteer to show their graph or show a completed graph and have him/her summarize what he/she thinks the data shows. 

Prompts for volunteer or class as a whole:
- What did the population originally look like? Which phenotype, which trait, did we see more?
- What started to happen during the industrial revolution? How did the relative amount of each phenotype change with the environment? Why is the population of dark moths going up?

Natural Selection Review (10 minutes)
We can use this chart to organize our background information and our data to explain how the trend we see in our data is caused by natural selection. This chart shows all the factors/steps in natural selection: overproduction, variation, struggle to survive, and reproduction.

Teacher asks students questions to fill in the chart. There are numerous ways to fill in the chart and understand concepts. Show students the comic. I drew this because it helps me understand something when I tell a story with pictures to explain what is happening. Students may use bullet points, pictures, or sentences to fill in chart. Students should reference the background information, data set, graph, or comic to answer questions.

T: what did the environment and moths originally look like?
S: light forest, light moths (T models filling in chart)
T: What did it look like at the end?
S: dark forests, dark moths (T models filling in chart)
T: Was there another animal that might have been dangerous for the moth in the environment? What did your cursor look like in the simulation?
S: Birds/predators (T models filling in chart)
T: this change in moths, from light to dark phenotypes is a type of change. What do we call the change over time of a species? (point to wordwall if necessary)
S: evolution
T: in the center of this chart we can see how each part of natural selection led to the moths evolution.
- T: What is overproduction? Does every moth that is born survive?
  S: Lots of moths born because some are going to die (model filling in chart)
- T: What variations are there in our moths? How did that first dark variation happen?
  S: Dark and light. Dark moth was a mutation (model filling in chart)
- T: How are the moths competing? (Remember zombie example: I only have to outrun you not the zombie so I’m actually competing with you to avoid predation)
  S: Compete to avoid birds (model filling in chart)
- T: What is causing the environment to change?
  S: Pollution (model filling in chart)
- T: Who is most likely to be selected for survival? Show cartoon again. Who would you eat? Who would survive?
  S: Camouflaged moths selected to survive. (model filling in chart)
  T: So who will be reproducing most? The dark moth or the light moth?
  S: dark moths (model filling in chart)
  T: What do you think those dark moth babies will look like? Who do you resemble?
  S: Their parents…the dark moths.
  T: Therefore the next generation will have more dark moths which is what we put in the last box earlier. This is also why our graph for the dark moth population goes up and doesn’t stay flat.
Pull out comic one last time to recap each step of natural selection leading from light to dark moths with a visual. Comic will be posted on blackboard for student reference.

Closure (2 minutes):
Have students pack up materials. Remind students to finish the graph and chart for homework if they did not complete in class. The questions should be completed by Wednesday and will be reviewed and turned in on Thursday.

ACADEMIC LANGUAGE (DAY 1)

1. Describe the cognitive task related to the content learning objective:
   After graphing historical trends in the phenotype of a population of peppered moths over time, students will analyze how a species can change over time and relate this change to natural selection.

2. Language Demands: How will students be communicating in relation to the content in the rich task?
   - Receptive – listening, reading, and viewing:
     Students will read background information and view a data chart
     Students will view line graphs
     Students will listen to questions and answers posed by both the teacher and peers
     Students will view a natural selection comic
   - Productive – speaking and writing:
     Students will produce line graphs
     Students will explain meaning of line graph
     Students will use appropriate vocabulary to convey meaning
     Students will explain the connection between data trends, historical background, and natural selection.

3. What key language skill(s), related to a single language demand above, will you help the students develop during the lesson?
   Interpreting a graph to visualize evolution
   Using technical language to explain intuitive understandings

4. Describe the genre of the chosen language demand.
   Interpreting graphs
   Explaining science concepts

5. Describe the instructional strategies you will use to support the development of academic language skills (related to the identified language demand above). Include strategies you will use to meet the needs of individual or groups of students with varying language abilities.
   Teacher questioning (using guiding questions/context clues)
Modeling (both by teacher and peers)
Working with partner when graphing
Word wall to reference technical terms
Visual representations of natural selection (comic)
Graphic Organizer
Lesson Plan (Day 2)
Grade: 7  
Course: 7th Grade Life Science/Health  
Content Area: Evolution

Student Context:
There are 34 students in the class including 1 English Language learner, 6 students with IEPs, 7 students in GATE, and 8 students who are part of an at-risk intervention program (SD-CEIS). Students will be broken up into 4 large lab groups (one group of 8-9 students per beak variation) each group has one “leader” (a mature, social, and self-directed student selected from several volunteers to collect and total individual group members’ data). There are signs above each group identifying their beak variation and all leaders are wearing an identifying sign.

Key Content Standards:

7.3.a: Students know both genetic variation and environmental factors are causes of evolution and diversity of organisms.
7.3.e: Students know that extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient for its survival.

Key ELD Standards:

Grade 7: B. Interpretive. Expanding: 5. Listening actively
Demonstrate active listening in oral presentation activities by asking and answering detailed questions with occasional prompting and moderate support.

Grade 7: A. Collaborative. Expanding: 1. Exchanging information/ideas
Contribute to class, group, and partner discussions by following turn-taking rules, asking relevant questions, affirming others, adding relevant information, and paraphrasing key ideas.

Learning Objective:

A. Cognitive Task (use cognitive verbs):
After learning about adaptations and Darwin’s Theory of Evolution, the student will perform a laboratory experiment to model how natural selection acts on different phenotypes to affect survival and population size in specific environments.

B. Understanding or Skill to be Enhanced:
Students will be able to understand the variable survival rate of individuals is based on their ability to obtain food in a particular environment by attempting to acquire food using a genetically determined beak variation. Furthermore, students will understand that successful phenotypes increase in a population by witnessing differential reproduction in the bird species.

Assessment(s):
Students will complete class data sheet.
Teacher will ask individuals questions to assess understanding while circulating during the lab. Deceased birds (students not currently in game) will be asked to consider why their bird died while other phenotypes lived. They will be asked to hypothesize if there are any environmental conditions they might have performed better under.

**Prerequisite Skills and Knowledge:**

Students know how to use calculators
Students understand terms: survival, success, environment, phenotype, genes, species, evolution and variation.
They have been introduced to but may still be building an understanding of natural selection.

**Lesson Resources/Materials:**

Prey items: toothpick worms. (Large bag at each station)
Bird beaks (phenotype variations!): spoons, chopsticks, forks, and straws (at least 30 of each in case some are lost. 10 should be distributed at each station at the beginning of class, the remaining 20 should be in the bins marked ‘Baby birds’)
Sign above each station stating the phenotype for that lab group.
Deceased bird sign at back of the room
Four clipboards with data sheets and sign/name tag to be given to the group leader for each beak variation
Stomach cups (at least 40 in case some are broken)
Stop watch (teacher sets bomb timer on computer)
Class data set worksheet
Document camera
Calculation chart on whiteboard
Excel file: set to calculate totals/averages
Wordwall (Whiteboard with Evolution Vocabulary)

**Instructional Sequence (Day 2)**

**Introduction (10 minutes):**

Students skip updating log and warm-up for today. Have class come in and begin quietly reading procedures instead.
Move students so that groups are roughly even for each beak variation (8-9 per group).
Ask for volunteers for group leader (ideal students marked on attendance sheet, should be sociable but responsible).

Goal: How does variation in a species’ phenotypes improve a species’ chances of survival in a given environment?
Body of the Lesson (35 minutes): Describe step-by-step what the teacher and the students will be doing during the lesson.

Introduce lab. Summarize background information and model correct food collecting behavior. Our birds have been swept to this island(sweep arms to encompass the classroom) by a tropical storm. The only food on the island are these tough toothpick worms which are fairly hard to catch and digest. Luckily we are a very diverse bird species. We have a multiple variations: chomping chopstick beaks (point to group/sign), ferocious fork beaks (point to group/sign), slurping straw beaks (point to group/sign), and scary spoon beaks (point to group/sign). Emphasize that utensil beaks are to be handled with your hands, particularly with straws. Straws are being held in the hand never used to suck up objects with the mouth.

Give rules in terms of survival while modeling correct collecting behavior.

At the beginning of each round gently spread out your toothpick worms.

Toothpicks should always be handled with care!

Remember only one item can be picked up at once. You’re your bird will “choke” on all of the food and die. (T: how many toothpicks can you pick up at once? S: One)

Food must be dropped into an upright stomach not scooped. Food has to go through your mouth you can’t just pull your stomach out of your body and slid food into it!

Do not squeeze a stomach full of toothpick worms! You birds poor delicate stomach can’t handle that and your bird will die if holes get poked through their stomach.

Warn students that any dangerously rambunctious food collecting behavior, such as throwing toothpicks/poking people with toothpicks or utensils, draws the attention of top tier predators (the teacher) that will catch you and make you sit out of the lab as a deceased bird and then serve a lunch detention!

Tell students they will be given 1 minute to collect as much food as possible (T: How many minutes? S: One minute!)

Model how to fill out worksheet, the roles of the group leaders, death/survival, and reproduction.

At the end of one minute, count the number of toothpick worms you captured. Report this number to your group leader—all group leaders are wearing signs! Group leaders add up the number of worms caught by your entire group and write it up here (model) on the white board. (T: who do you give your total too? S: Group leader. T: Group leaders where do you write your group total? S: On the board.) This should take us about 4 minutes!

I will take a class average. If you captured the same number or more toothpicks than the average number your bird survives. If you caught less than the average you die! If you die you are out of the game and must go to the deceased birds section (point out sign at back of room). Your group leader will then report the number of surviving birds in your group. (T: If I collected less than the average what happens to me? S: you die. T: And where do I go when I die? S: deceased bird section).

Congratulations, you survived long enough to make it to mating season!

Survivors will be able to reproduce. (T: If I am a fork beak what kind of beak phenotype do you think my offspring will have? S: fork beak. T: why? S: genes/inherit characteristics/ect). Survivors can give a copy of their beak variation to one of the students in the deceased bird section. Pick up a baby bird beak from the bins labeled ‘Baby birds’. The new baby bird must report to the group leader for their new beak and a new total for the population AFTER reproduction will be recorded. This should take us about 5 minutes!
Repeat two more 10 minute rounds. Each round is a single generation. (T: How many generations will we perform in this lab? S: Three generations)

Right before the lab ask students:
T: How many toothpicks can you eat at once?  
S: One  
T: How long can you collect food?  
S: One minute  
T: Who do you give your total to?  
S: Group leader  
T: What happens if you eat less than the average food?  
S: You die

Start lab: 30 minutes  
Countdown before setting off timer and warn students when they have 5 seconds left.  
Circulate around room; look for improper utensil behavior or toothpick treatment.  
Re-iterate directions and answer student questions for each stage.  
Calculate class average with excel sheet.  
Record new population totals on the document camera.  
Repeat 2x  
Make sure to ask deceased birds to hypothesize if there could be different environments they would have survived better in to keep them engaged. Make sure a deceased bird left over from the previous round is selected first for the next reproduction stage.

If time allows, have students start to record class data onto their sheets.

**Closure (___5___ minutes):**
Have students pack up materials. Lab area needs to be as organized if not nicer than it was when they got there.

Have class take their seats once they are packed and the area is organized. Debrief them on their experiences based on class data.
Ex) So spoons your ENTIRE phenotype disappeared after one generation! What happened?  
Students answer: beak was not adapted to collect worms  
Ex) Which phenotype was the most effective at catching our prey? Why? Was their beak adapted to picking up the prey? Explain.  
Student answers will vary  
Ex) Why did we do multiple generations? Think about word evolution.  
Students answer: to see evolution (if students say means change ask them if change occurs instantly).  
Ex) If you survived why did you give your offspring a beak with the same phenotype when you reproduced?  
Students: survivors pass genes to next generation (genes control phenotype)  
Ex) How did variation improve this bird species chance of success? If we had marble snails on our island do you think we would have had the same survivors?  
Students answer: At least one of the bird phenotypes can probably get enough food to survive.

**ACADEMIC LANGUAGE (DAY 2)**
1. Describe the cognitive task related to the content learning objective:
   After learning about adaptations and Darwin’s Theory of Evolution, the student will perform a laboratory experiment to model how natural selection acts on different phenotypes to affect survival in specific environments.

2. Language Demands: How will students be communicating in relation to the content in the rich task?
   - Receptive – listening, reading, and viewing:
     - Students will view teacher modeling lab protocol
     - Students will listen for timer
     - Students will listen to and record their lab members’ data.
   - Productive – speaking and writing:
     - Students will collect and record data
     - Students will answer lab questions

3. What key language skill(s), related to a single language demand above, will you help the students develop during the lesson?
   Recognize scientific concepts by interpreting data and lab experiences

4. Describe the genre of the chosen language demand.
   Explaining scientific reasoning
   Recounting lab procedures

5. Describe the instructional strategies you will use to support the development of academic language skills (related to the identified language demand above). Include strategies you will use to meet the needs of individual or groups of students with varying language abilities.
   Model procedures
   Comprehension/recall questions
   Refer students to vocabulary terms on the board
   Have students work in lab groups
   Visual/kinesthetic representations
LESSON PLAN (DAY 3)

Key Content Standards:

7.3.a: Students know both genetic variation and environmental factors are causes of evolution and diversity of organisms.
7.3.e: Students know that extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient for its survival.

Key ELD Standards:

Grade 7: A. Collaborative. Expanding: 1. Exchanging information/ideas
Contribute to class, group, and partner discussions by following turn-taking rules, asking relevant questions, affirming others, adding relevant information, and paraphrasing key ideas.

Grade 7: C. Productive. Expanding: 11a. Justifying/arguing
Justify opinions or persuade others by providing relevant textual evidence or relevant background knowledge with moderate support.

Learning Objective:

A. Cognitive Task (use cognitive verbs):
After collecting data on how each phenotype impacts the bird species’ ability to collect food, the students will analyze class data and consider their personal lab experiences, to draw conclusions about how different traits increase or decrease not only individual bird’s ability to survive but the survival and success of the entire species.

B. Understanding or Skill to be Enhanced:
After reviewing data for each island environment, students will understand that a species’ particular phenotypes determines whether a species will survive, flourish, or go extinct and that a variety of different phenotypes increases a species chance for survival. Students will enhance their ability to justify their conclusions using observations and data references.

Assessment(s):

Students will hand in a natural selection packet at the end of the week after discussing questions and analyzing graphs as a class. Packet includes a graph of the class data collected and comprehension questions. Students will participate in class discussion as part of an informal assessment. Extension activity: Students will be assigned a comic strip/story board (due the following week) which shows how natural selection acts to cause a population to change over time in response to the environment based on existing genetic variations. Lower students can
make a comic of the moth lab or bird beak lab, but encourage students to think of their own examples.

**Prerequisite Skills and Knowledge:**
Interpreting line graphs
Working in groups
Understanding of extinction, species, survival, phenotype, and adaptation. Know what evolution is (purpose of this segment is to know factors that are involved in the process of evolution). Basic concept of natural selection from previous vocabulary assignment.

**Lesson Resources/Materials:**
Document camera
Class data sheet (to finish copying)
Lab packet (contains graph template and questions)
PowerPoint with discussion questions
Graphs of class data for beans compared to our classes toothpick data
Colored pencils (for graphing)
White paper (for comic strip/story board assignment)
Wordwall

**Instructional Sequence (DAY 3)**

**Introduction (8 minutes):**
Students update log and complete warm-up
Warm-up: A population of foxes has genes for long claws and genes for short claws. The foxes enter an environment where the only food source is delicious mice that burrow into the hard ground. Predict which phenotype will be able to survive better in this environment. Which phenotype do you think will be more common in the population 10 years later?

Go over warm up and agenda.
Warm-up

Student answers will vary accept all answers if they can support them. Tell students that they must share their reasoning and support their hypothesis to receive credit. When discussing focus on students reasoning processes not their answer. Tell students, what you did just now? Justifying your hypothesis? Explaining your reasoning? You need to make sure you do that in your lab questions. Without justification I have no way of knowing whether you understand or you are just guessing/copying someone else.

Agenda

Moth Survey should be completed will be reviewed/turned in tomorrow
Natural selection packet due on Friday
Comic Strip/Story Board not due till next week but you should start thinking about it.

Goal: Students understand that depending on the environment and phenotype certain individuals will survive better than others.
**Body of the Lesson (37 minutes):** Describe step-by-step what the teacher and the students will be doing during the lesson.

Put up class data in case students did not finish copying (1 minute if necessary)

Start Lab analysis:

Graphing:
What are we graphing? Why are we graphing the population AFTER reproduction?
  S: To see population growth (Guiding questions: ask students what happened to population after reproduction. Ask if only survivors played next round or if survivors and offspring played next round)

What type of graph should we use?
  S: Should say line graph. If they say bar graph point out that we are taking measurements over time (generations) ask: what kind of graph is best for measuring over time?

What is our responding variable? What are we measuring? What goes along the vertical axis?
  S: Should say population size.

What increments should we use?
  S: should explain how they figured out their increments to the class.

How many lines are we going to graph? How many variations did we have? How will we tell them apart?
  S: Four lines. Use a different color and a key for each line (the key is already on the graph template point it out if students have difficulty)

What are some possible titles? What are we measuring? What about axis labels?
  S: responses will vary (T will write in title/labels but students do not have to use same titles)

Plot the ferocious forks data with students (Modeling-make sure to explain that I color code my chart data to make sure I plot the correct point. Students don’t have to do this but it helps) then give students 7 minutes to finish graphing.

Teacher will circulate around the room to assist students. Make sure that IEP/ELL students color code their chart data to match the color of the line (ex: ferocious forks line and chart data colored green) to help them correctly graph data.

Graphing should only take 10-12 minutes total

Review Lab Discussion Questions on Power Point. Questions and teacher comments included with the power point slides.

Let groups know that tables will be randomly called on to answer one lab question. Each lab group must be able to explain their answer. Give table/lab groups 2-5 minutes to discuss each question depending on difficulty. Teacher will circulate around class to assist groups.

**Closure (5 minutes):**
Have students pack up then go over comic assignment once everything is put away. Brainstorm traits and adaptations to use (have students recall adaptation activity from previous week). Show examples and invite students to view examples. Requirements will be discussed tomorrow.
ACADEMIC LANGUAGE (DAY 3)

- Describe the cognitive task related to the content learning objective:
  After collecting data on how each phenotype impacts the bird species’ ability to collect food, the student will analyze class data and consider their personal lab experiences, to draw conclusions about how different traits increase or decrease the bird’s ability to survive in different environments.

- Language Demands: How will students be communicating in relation to the content in the rich task?
  - Receptive – listening, reading, and viewing:
    - Listen to lab groups reasoning
    - Interpret graphs
  - Productive – speaking and writing:
    - Incorporate vocabulary terms in their explanation of lab data and experiences

- What key language skill(s), related to a single language demand above, will you help the students develop during the lesson?
  I will help students incorporate academic terminology into their interpretation of the graphs and explanations.

- Describe the genre of the chosen language demand.
  Explaining scientific reasoning.

- Describe the instructional strategies you will use to support the development of academic language skills (related to the identified language demand above). Include strategies you will use to meet the needs of individual or groups of students with varying language abilities.
  Working in small groups (with lab members).
  Wait time.
  Rephrasing and leading questions
  Refer to vocabulary list (up on wall)