





# Hooked on 'Ponics:

# A Guide to Aquaponics in Schools In partnership with 100 Gardens







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# Foreword

By Sam Fleming

Dear teachers, students, and global citizens,

100 Gardens is proud to bring you "Hooked on 'Ponics", a hands-on curriculum for grades 6-8. We believe education that engages teachers, students, and the community can bring positive change to our world. As the Executive Director and co-founder of 100 Gardens, I can't wait to share the world of aquaponics, environmental stewardship, and healthy living to the world through this curriculum.

This curriculum is a collaboration between 100 Gardens and the Kenan Fellows Program for Teacher Leadership at North Carolina State University. The project lead and main author, Jennifer Keeler, worked diligently with the 100 Gardens team and two additional authors to develop a curriculum that helps students understand and find solutions for our future's largest challenges. The lessons are designed to engage students in aquaponics, environmental stewardship, and applied nutrition through hands-on activities and nutrition lessons.

We hope you will utilize this open-source curriculum to bring your school to life through aquaponics. To become an official 100 Gardens partner school, visit <u>100gardens.org</u> to explore our school aquaponics systems and learn about our school partnerships.

Sam Fleming Executive Director and Co-Founder 100 Gardens <u>www.100gardens.org</u>

# About the Authors & This Guide

Dear Teachers, Volunteers, and Committed Leaders,

I am thrilled that you have decided to try this aquaponics curriculum at your school! I believe that this curriculum will fully engage and excite your students while encouraging and motivating them to develop healthy habits for a lifetime. This curriculum involves 4 weeks (20 lessons) of standards-aligned (NCSCOS) materials for students in grades 6-8.

Each lesson includes an exploration lesson, a discovery lesson, and a nutrition lesson (see <u>page 11</u> for more information on the different types of lessons). Feel free to divide or modify the lessons at your discretion. You know what is best for your students, and I hope that they enjoy the activities that I have provided. I look forward to hearing how you are using aquaponics in your classroom!



Jennifer Keeler has been teaching for 8 years. She has taught early and upper elementary in New York, North Carolina, and Georgia. In 2020, she became a *Kenan Fellows Program Teacher Leader* in North Carolina where she had the opportunity to work with *100 Gardens* to develop this curriculum. She lives in Atlanta, Georgia with her fiancé and two dogs, teaches virtually for Elevate K-12, and is exploring EdTech opportunities.

# **Additional Authors**



Linda Autry is a veteran teacher with 30 years of experience. Her background includes teaching at a North Carolina STEM Certified school and training by NASA in PBL (problem-based learning) activities for elementary students. She currently teaches science and manages the Aquaponics program at Bonnie Cone Classical Academy in Huntersville, NC. Linda lives with her husband, Jim and her three, very spoiled dogs.



Morgan Mosher is an English teacher in Ballantyne, North Carolina. Her passion is teaching students to make meaningful and lifelong connections to literature and the world around them. She was an inaugural staff member of Bonnie Cone Classical Academy in Huntersville, North Carolina and was a Kenan Fellow in the 2020-2021 school year, where she assisted in the partnering between the school and *100 Gardens*. In her free time, Morgan likes to read, cook, and spend time with her husband and dog in Lake Norman, where she lives.

# Acknowledgements

I would like to express my gratitude and appreciation to the *Kenan Fellows Program for Teacher Leadership* in North Carolina for this amazing partnership with *100 Gardens*. Not only did I enjoy my time learning about the organization and working with different aquaponics systems at schools in the area, but I was able to bring this unique opportunity, along with Morgan Mosher, to our school. A special thank you to Sam Fleming, Executive Director at 100 Gardens, who has been a great resource to this curriculum and fun to work with during the process. He has provided us with the necessary materials and resources to make our school's aquaponics system a success, as well as volunteered to be a guest speaker, which has fully engaged many of our students in aquaponics–allowing them to explore a unique potential career option.

I also want to acknowledge with much appreciation the role of Mrs. Linda Autry. Linda is a science teacher at Bonnie Cone Classical Academy (BCCA), and has fully engaged the students in the aquaponics process. Without the extra hours that she spends working on the system, the program at BCCA would not be what it is today. Linda has written a two week-long Project Based Learning Lesson found in Focus 3 and Focus 4 of this curriculum that can be used as you are working through the curriculum or on its own.

I would also like to thank Mrs. Joan Roman, Director at Bonnie Cone Classical Academy, for being so open to the start of an aquaponics system at our school. With the use of our own aquaponics system, we were able to have better access to the materials needed to create our lessons. BCCA started with one system and now has a total of three.

Lastly, I would like to thank our students for being so open to feeding the fish, testing the water, harvesting the lettuce, weighing and calculating the amount of lettuce harvested, cleaning the outside of the tank, etc. They have totally immersed themselves in this experience, and I know that if you have the opportunity, your students will, too!

-Jennifer Keeler, 2022

# **Alignment to Teaching Standards**

All standards in this section are 6th grade North Carolina standards. However, you will see that each standard is expanded in each lesson and can be scaffolded to align to the 7th or 8th grade standards for each particular topic. Please feel free to differentiate, depending on your group of students.

#### **Reading & Writing**

RI.1 Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.2 Determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgements.

RI.3. Analyze in detail how a key individual, event, or idea is introduced, illustrated, and elaborated in a text.

RI.4 Determine the meaning of words and phrases as they are used in a text including technical meanings.

RI.7 Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.

W.1 Write arguments to support claims with clear reasons and relevant evidence.

W.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

W.5 With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.

W.6 Use technology, including the internet, to produce and publish writing as well as to interact and collaborate with others.

W.7. Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.

W.8 Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.

#### Speaking & Listening

SL.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on topics, texts, and issues, building on others' ideas and expressing their own clearly.

SL.2 Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.

SL.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

SL.6.5 Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.

#### Math

NS.B.3 Compute fluently with multi-digit numbers and find common factors and multiples.

NC.c.8 Solve real-world and mathematical problems.

#### **Social Studies**

H.2.3 Explain how innovation and/or technology transformed civilizations, societies, and regions over time (e.g., agricultural technology, transportation, and communication).

#### Science

L.1.1 & L.1.2 Understand the structures, processes, and behaviors of plants that enable them to survive and reproduce.

L.2.1-L.2.3 Understand the flow of energy through ecosystems and the response of populations to the different factors in their environment.

E.2.4 Conclude that the good health of humans requires: monitoring the lithosphere, maintaining soil quality and stewardship.

#### Health

NPA.1 Analyze tools such as Dietary Guidelines and Food Facts Label as they relate to the planning of healthy nutrition and fitness.

NPA.2 Apply strategies to consume a variety of nutrient dense foods and beverages in moderation.

NPA. 3 Apply lifelong nutrition and health-related fitness concepts to enhance quality of life.

# About the Curriculum

The *Hooked on Ponics* Curriculum is a 4-week program that can be adapted to any school in a variety of ways. It was originally designed to be a 4-week middle school summer curriculum with a 2-week option, but it can also be used as an after-school program. This curriculum contains 4 "focus" topics that incorporate 5 three-part lessons that build upon one another. It is important to start at Focus 1 to build students' knowledge of aquaponics systems, and then move through the remaining focus topics.

Throughout Focus 2 you will see two different options during each Discovery Lesson. Teachers who opt to follow option 1 have planned to continue student learning through Focus 4 (following a 4-week summer program or an extended after-school program). Focus 3 and Focus 4 center upon creating and designing a business design, an extension to the topics learned in Focus 1 and Focus 2. Teachers who opt to follow option 2 will be completing their program after Focus 2 (following a 2-week summer program or a shorter after-school program such as separate fall and spring sessions).

Each lesson involves three parts: an exploration lesson, a discovery lesson, and a nutrition lesson. The exploration lesson takes place using the aquaponics system, where students are going through the procedures, tracking data, and running the system. Running the system should happen during each session that you meet with students. The discovery lesson builds upon the conversation topic during the exploration lesson in which students will further explore a topic related to the focus for the week through interactive standards-aligned lessons and blogging. The nutrition lesson will involve a discussion around good habits and allow students to make and taste a healthy recipe.

In order to adapt these lessons to your school, teachers may decide to omit lessons and pick-and-choose activities that best suit their students. Be mindful of your student population and what works best for your students when choosing and modifying the activities. Before beginning the program at your school, it is important to have some sort of aquaponics or gardening system set-up. See <u>page</u> 14 for information on partnering with 100 Gardens and setting up different types of systems at your school.

# **Curriculum Outline**

**Program Overview:** This program can be used as a summer or after-school curriculum for rising students in grades 6-8. There is an option of a 2-week or 4-week program with extension activities to bring home each day.

#### **Program Takeaways:**

-Students will develop innovative blog posts.

-Students will have experience creating different nutritious recipes and foods to try at home.

-Students will gain knowledge of growing and maintaining different types of edible plants in different environments.

-Students will produce and perform an engaging speech through a mock "Ted Talk." -Students will receive a certificate of completion at the end of the 2-week or 4-week program.

#### Weekly Lesson Outline:

	1.1	1.2	1.3	1.4	1.5
Exploration Lesson (120 minutes)	-Rules and expectations when using the space -Discussion and assignments of jobs and using the tracking sheets	-Icebreaker activities -Standard procedures and running the system -Planting procedures	-Standard procedures and running the system -Scientific Observation Lesson	-Standard procedures and running the system -Time for students to work on blog posts	-Standard procedures and running the system -Tracking the fish growth activity
Discovery Lesson (60 minutes)	-Introduction to blog posts and set-up of student blogging site	-Partner read of "Aquaponics: A Brief History" and completion of the guided notes -Vocabulary Quizizz Activity	-Blog post -½ of Ocean Health mini-PBL	-Complete Ocean Health mini-PBL -Carousel presentations and feedback for mini posters or infographics	-Blog post -Data Analysis- look at temperature trends over the past week

#### Focus 1: Balancing Ecosystems and Healthy Choices

Nutrition Lesson (60 minutes)	-Introduction to maintaining good physical health -Review the "Mission Possible: Healthy Eating" Take-Home Activity -Creation of a Broccoli Salad Recipe	-Review of physical health -Discussion and video describing where to find local, fresh produce -Creation of a Strawberry and Spinach Salad Recipe	-Team Garden Salad Recipe creation	-Discuss what it means to eat a healthy diet using Harvard University's Healthy Eating Plate -Creation of a Caesar Salad Recipe	-Review of physical health -Analyzing school lunches activity -Creation of a Fruit Salad Recipe
At Home: Enrichment Activities	-Mission Possible: Healthy Eating Task #1	-Mission Possible: Healthy Eating Task #2	-Mission Possible: Healthy Eating Task #3	-Mission Possible: Healthy Eating Task #4	-Mission Possible: Healthy Eating Task #5

#### Focus 2: Plant Genetics

	2.1	2.2	2.3	2.4	2.5
Exploration Lesson (120 minutes)	-Standard procedures and running the system *Assigning new Jobs -Plant Reproduction Lesson	-Standard procedures and running the system -Planting and Harvesting if needed -Orchids and Co-Evolution Lesson	-Standard procedures and running the system -Planting and Harvesting if needed -Pollen Lesson	-Standard procedures and running the system -Planting and Harvesting if needed -Seedless Plants lesson	-Standard procedures and running the system -Quizizz Activity
Discovery Lesson (60 minutes)	Option 1 (4-week): -Blog Entry -Blog Presentation Rubric and work time -Aztec Chinampas Reading passage and guided notes Option 2 (2-week): -TED Talk introduction and rubric -Aztec Chinampas Reading Passage and guided notes	-Vocabulary Activity <u>Option 1 (4-week):</u> -Blog Entry and work time <u>Option 2 (2-week):</u> -Body Language TED Talk Presentation and How do People Prepare for a TED Talk? article	-Genetically Modified Foods YouTube clip and WebQuest Option 1 (4-week): - Blog Entry and work time Option 2 (2-week): -Work time creating an index cards script and a picture slideshow	Option 1 ( <u>4-week):</u> - Blog Presentation work time and run through Option 2 ( <u>2-week):</u> TED Talk work time and run through	Option 1 ( <u>4-week):</u> -Blog Post Presentations Option 2 ( <u>2-week):</u> -Ted Talk Presentations

Nutrition Lesson (60 minutes)	-Kevin's Build-A-Meal Game -Ranch Cucumber Bites Recipe -Introduction to <i>Mission Possible:</i> <i>Exploring New</i> <i>Foods</i>	-Kevin's Build-A-Meal Game -Mexican Street Corn Dip Recipe	-Kevin's Build-A-Meal Game -Strawberry Banana Smoothie Bowl	-Food Preservation- Pickling Cucumbers activity	-Lettuce Wrap Recipe <u>Option 1</u> ( <u>4-week):</u> Blog Post <u>Option 2</u> ( <u>2-week):</u> Certificate of Achievement Award Ceremony
At Home: Enrichment Activities	-Mission Possible: Exploring New Foods Task #1	Mission Possible: Exploring New Foods Task #2	Mission Possible: Exploring New Foods Task #3	Mission Possible: Exploring New Foods Task #4	Mission Possible: Exploring New Foods Task #5

### Focus 3: Business Extension and Design

	3.1	3.2	3.3	3.4	3.5
Exploration Lesson (120 minutes)	-Standard procedures and running the system *Assigning new Jobs -Podcast and Reflection	-Standard procedures and running the system -Podcast and Reflection	-Standard procedures and running the system -Podcast and Reflection	-Standard procedures and running the system -Podcast and Reflection	-Standard procedures and running the system -Create your own Podcast Activity
Discovery Lesson (60 minutes)	PBL Days 1/2	PBL Days 1/2	PBL Days 3/4	PBL Days 3/4	PBL Days 5/6
Nutrition Lesson (60 minutes)	-Food Safety Article and Guided Notes - Broccoli Salad Recipe -Introduction to <i>Mission Possible:</i> <i>Feedback from</i> <i>Home</i>	-Discussion about Task #1 of Mission Possible -Blog Post -Strawberry- Spinach Salad Recipe	-Discussion about Task #2 of Mission Possible -Garden Salad Team Recipe Activity	-Discussion about Task #3 of Mission Possible -Caesar Salad Recipe	-Discussion about Task #4 of Mission Possible -Complete Podcast Activity -Fruit Salad Recipe
At Home: Enrichment Activities	Mission Possible: Feedback from Home Task #1	Mission Possible: Feedback from Home Task #2	Mission Possible: Feedback from Home Task #3	Mission Possible: Feedback from Home Task #4	Mission Possible: Feedback from Home Task #5

	4.1	4.2	4.3	4.4	4.5
Exploration Lesson (120 minutes)	-Standard procedures and running the system -TED Talk Lesson	-Standard procedures and running the system -TED Talk Lesson	-Standard procedures and running the system -Tracking Fish growth activity	-Standard procedures and running the system -TED Talk presentation work time	-Standard procedures and running the system -TED Talk Presentations
Discovery Lesson (60 minutes)	PBL Days 5/6	PBL Days 7/8	PBL Days 7/8	PBL Days 9/10	PBL Days 9/10
Nutrition Lessons (60 minutes)	-Kevin's Build-A-Meal Game -Ranch Cucumber Bites Recipe -Introduction to Mission Possible: Feedback from Home 2	-How Healthy Are You? Survey and wellness goal setting -Mexican Street Corn Dip Recipe	-Blogging about wellness goals -Strawberry Banana Smoothie Bowl Recipe	-Pickling cucumbers activity and blogging steps	-Lettuce Wrap Recipe -Awards Ceremony
At Home: Enrichment Activities	Mission Possible: Feedback from Home Task #1	Mission Possible: Feedback from Home Task #2	Mission Possible: Feedback from Home Task #3	Mission Possible: Feedback from Home Task #4	Mission Possible: Feedback from Home Task #5

Focus 4	: Business	Extension	and Design	Continued
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# **Master List of Ingredients**

Focus 1 & Focus 3

-Fresh broccoli florets

-Shredded cheddar cheese

-mayonnaise

-onion

-white vinegar

-sugar

-Bacon bits

-Spinach

-Strawberries

-Crumbled Feta Cheese

-red onion

-Pecans

-Dressing (optional: provide choices for students)

-Romaine lettuce

-Parmesan cheese

-Croutons

-Caesar Dressing

-Pineapples

-Oranges

-apples

-seedless red grapes (halved)

-seedless green grapes (halved)

-Strawberry yogurt or cool whip

-Different Garden Salad ingredients (for this lesson, students will play around with the different ingredients, so it is good to have options): iceberg lettuce, grape tomatoes, carrots, black olives, cucumbers, radishes, buttermilk ranch dressing, italian dressing, etc.

#### Focus 2 & Focus 4

-Cream cheese, softened

-Dried parsley

-Dried dill

-Garlic powder -Onion powder -Salt -Pepper -Sliced cucumbers -Halved cherry tomatoes -ears of grilled or cooked corn -Mayo -cayenne pepper -cotija cheese crumbled -cilantro chopped -Lime wedges -frozen bananas -Strawberries -almond milk -crunch granola -jars with lids -vinegar -water -mustard seed -peppercorns -fresh or dried dill -Cucumbers -lettuce leaves -Quinoa -black beans - red onion -cloves of garlic -tomato puree -Cumin -paprika powder -canned tomatoes, pureed or crushed -large tomatoes -lime juice -spring onions -Tahini -maple syrup or another liquid sweetener -lemon juice

# Setting up a System

### Getting Started with 100 Gardens

"Today's youth will be leading a world that by 2050 will have less freshwater, face the total depletion of major seafood species, and have 10 billion people to feed. They need to have awareness of the skills to succeed in that world." -Sam Fleming, Executive Director of 100 Gardens

The mission of *100 Gardens* is to provide exciting and engaging learning opportunities through aquaponics. Aquaponics is a method of farming that raises freshwater fish and vegetables together in a symbiotic environment. Fish create nutrients in the water through their waste, vegetables use the nutrients to grow, and return clean water back to the fish. This allows the recycling and conserving of water, takes pressure off of oceans by farming fish, and grows fresh vegetables for an increasing human population.

# How 100 Gardens Partners with Schools:

*100 Gardens* is an educational 501c3 non-profit organization that is seeking long-term partnerships with schools. This partnership requires both the school and *100 Gardens* to bring passion, commitment, and resources when using the *Hooked on Ponics* curriculum and beyond.

- 1. Development of physical facilities for aquaponics learning: 100 Gardens facilitates the construction of aquaponics greenhouses and indoor growing labs. Working directly with the school, an aquaponics learning lab is designed and built. The construction of a greenhouse is contracted to a local greenhouse builder and 100 Gardens installs the aquaponics system within the new facility using their staff, volunteers, and student interns.
- 2. Professional Development for Teachers: *100 Gardens* trains teachers to implement standards-aligned lesson plans to allow for teachers to engage students in learning that inspires a new way of thinking about learning, food, and the environment. *100 Gardens* also supports teachers in more hands-on lessons (such as fish-handling) by providing a staff member to lead the lesson as well as providing all of the necessary supplies.

- **3. Pre and Post Surveys:** In an effort to continuously improve programming, *100 Gardens* administers surveys to both teachers and students before and after the programming cycle for the school year.
- **4. Regular Harvesting and Distribution of Fresh Produce:** Students regularly harvest fresh vegetables from the aquaponics system and engage in tastings, cooking demonstrations, donation of produce to shelters/food banks and sales to local restaurants.
- **5.** End of Year Celebration: One of the goals for every partner school is to bring their fish to harvest size by the end of the school year. Once the fish are ready to harvest, *100 Gardens* will co-host a community fish fry with the school/institution to celebrate student achievements and engage the community in conversations surrounding education, food, and the environment. Donations are solicited at the event to raise funds for the next school year's programming.
- **6. Remote monitoring and service visits through tracking sheets:** *100 Gardens* uses google forms to track aquaponics system performance. Each day when students are operating the system, they enter critical data into the tracking sheet (that will be entered by a student or teacher into the google form). This allows for *100 Gardens* to monitor system performance remotely. The data is used by students to make decisions regarding system operation. Regular visits by *100 Gardens* ensures that all mechanical parts are functioning properly and that there are no leaks. Schools choose a service plan based on their experience and needs.

# Learning Lab Options

The next step is to choose a learning lab that works for your school.

1. The "Flow Lab" Classroom Aquaponics System (see page 18)

### 2. The High School/University "Aquaponics Learning Lab" (see page 19)

\*Contact <u>sam@100gardens.org</u> if you would like to set-up a system at your school.

# The "Flow Lab" Classroom Aquaponics System Option #1



This system is the smaller of the two options and can produce 12-18 heads of lettuce per week and 15 pounds of fresh fish each school year. This system takes only one day to install and can be delivered within 45 days of ordering. All of the lesson plans included in this curriculum can be implemented using this system.

Features:

- 150 gallon fiberglass fish tank with viewing window
- Custom welded shield stand with gloss white finish
- 3' x 6' floating raft glowing tray
- High Efficiency LED grow lights
- Water pump and plumbing
- Air pump and plumbing
- Rigid sign panels describing system functions
- Digital water chemistry monitor for transferring live water data to the cloud

### The High School/University "Aquaponics Learning Lab" Option #2



This system is the full scale Aquaponics Learning Lab. This system produces 150-200 bunches of leafy vegetables per week and 200 pounds of fresh fish per school year, essentially a small enterprise run by students. All of the lesson plans included in this curriculum can be implemented using this system.

Features:

- 30' x 60' Climate Controlled Greenhouse
- (4) 440 gallon fish tanks with viewing windows
- 192ft^2 of floating raft growing space
- Water pump and plumbing
- Air pump and plumbing
- Rigid sign panels describing system functions
- Digital water chemistry model for transferring live water data to the cloud

# Setting up your own system:

For schools who wish to construct or purchase aquaponics systems from sources other than 100 Gardens, here is an example of an off-the-shelf option and DIY kit:

## **Off-the-Shelf Aquaponics Systems**

## AquaSprouts Garden (Desktop Size System) \$160



Click to Purchase an AquaSprouts Garden

Pros: Affordable and can be placed anywhere

**Cons:** The system can demonstrate the concept of aquaponics, but it is not large enough to produce enough food for multiple students to try. The 10-gallon aquarium is not included but is also affordable.

Other Options for setting up your own system

# Focus 1: Balancing Ecosystems and Healthy Choices Lesson 1.1

### About the Activities:

For Focus 1, Lesson 1.1, students will be introduced to the aquaponics system. During the exploration lesson, students will receive a tour, learn about the operating procedures, receive their job for the next couple of days, and become familiar with the tracking and observation sheets.

During the discovery lesson, students will be introduced to blogging, how to write a blog post, and how to use different technologies. Students will complete their first blog prompt: *What do you hope to learn during your experience with this program? What are your initial thoughts and feelings after seeing the greenhouse?* Students will complete blog posts every other lesson. They will be encouraged to take pictures and videos throughout the exploration lessons to further supplement their blog posts.

In the nutrition lesson, students will be introduced to healthy eating and food choices as well as the food log and food pyramid that will be used throughout these focus lessons. Students will be participating in the creation of a broccoli salad through modeling, reading a recipe, and adding the ingredients themselves. Students will have the opportunity to try the salad to wrap up the day's lesson.

### **Objectives:**

Students will be able to engage in a range of collaborative discussions with diverse partners, building on others' ideas and expressing their own clearly (SL.1).

Students will be able to use technology to produce and publish blog posts, as well as to interact and collaborate with others (W.6).

Students will be able to apply tools and strategies to consume a variety of nutrient dense foods to enhance their quality of life (NPA.1, NPA.2, NPA.4).

### Here's What You'll Need:

- Aquaponics system
- Aquaponic Operating Procedures: <u>Aquaponic Systems: Teacher Version</u> and <u>Aquaponic Systems: Student Copy</u>
- Small athletic ball (or multiple)

- Anchor Chart Paper
- Markers
- <u>Tracking google form</u> (be sure to make a copy and edit according to your preferences based on your site)
- Job Description Page
- Noticing Notebook- 1 composition notebook per student
- Chromebooks or Individual Student devices
- Video clip: <u>https://www.youtube.com/watch?v=AEPnYII8uSI&feature=youtu.be</u>
- *<u>Mission Possible: Healthy Eating</u>* (one copy per student)
- <u>How to Set-Up Student Blogs</u>
- <u>Broccoli Salad Recipe</u> (quantity will vary):
  - \*Be sure to check with families about student allergies BEFORE attempting each recipe.
  - Broccoli florets
  - Shredded cheddar cheese
  - Chopped onion
  - Mayonnaise
  - White vinegar
  - sugar

#### **Directions:**

### **Exploration Lesson (120 minutes):**

 (5 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students. This informal time is a great opportunity to connect with students while you are waiting for everyone to arrive.

Some possible questions to ask are:

- How is your summer/day going?
- How are you feeling today?
- What are you most excited about learning through this program?
- 2) (20 minutes) Get student's attention and welcome them to camp, after school club, etc. Move students into a circle and show them one of the athletic balls. Let them know that when they are holding the ball, they can talk to the group. When it is their turn with the ball, they should introduce themselves and share one thing that they are most excited about. Students can pass the ball in a random order throughout the circle while sharing, but they must remember who they passed the ball to. After everyone has introduced themselves, tell students that they will try to remember the order in which they passed the ball. Try passing the ball in the same order a few times, and then try without talking. Time students

and see how fast they can pass the ball throughout the circle. You may also try adding in more balls to make the game more difficult.

- (30 minutes) Give students a tour and go through the operating procedures. Refer to the links: Aquaponic Systems: Teacher Version and <u>Aquaponic Systems:</u> <u>Student Copy</u>. You may need to modify these versions depending on the type of system that you are using.
- 4) (30 minutes) Sit students down and go over the rules and expectations while using the space. Lead an open discussion with students and write these rules and expectations on anchor chart paper to be posted by your system. You will refer back to these rules and expectations before students begin running the system each day. If time permits, you may want to create a contract with students based upon respecting and taking care of the materials and the space.
- 5) (30 minutes) Review the different assignments and the <u>google form tracking</u> <u>sheet</u> with students. Pass out the composition notebooks and tell students that these notebooks will be called their "Noticing Notebooks" where they will keep track of data or complete activities based on the lessons. You and your team will decide when students will change jobs. It is recommended that students will change jobs once during each set of focus lessons. See the <u>Job Description Page</u> to explain possible student jobs, using the tracking google form, and the use of the Noticing Notebooks.

### Discovery Lesson (60 minutes):

- 1) (20 minutes) Introduce students to blogging by showing different models of student blogs and allowing students to be engaged in discussions about what they see. See "<u>How to Set-Up Student Blogs</u>."
- 1) (40 minutes) Tell students that they will be blogging every other session. They may use their personal devices such as their cell phones to take pictures of the aquaponics system to supplement their blog posts. Give students the first writing prompt and allow them to begin setting up their blog and writing their first post. If time permits, allow students to share their first blog post with one another. Walk around and monitor students for questions and support while they are blogging.

**First Blog Prompt**: What are your initial thoughts and feelings after exploring the greenhouse and/or system? What do you hope to learn during this program?

### Nutrition Lesson (60 minutes):

- 1) (5 minutes) Ask students to discuss the following in pairs: *What's your favorite food? Why?* Allow students to share-out responses to the group.
- 2) (10 minutes) Tell students that they will be exploring physical health. Physical health refers to the state of your physical body and how well it's working. You can also show students this short video clip: <u>https://www.youtube.com/watch?v=AEPnYII8uSI&feature=youtu.be</u> "What is Physical Health"
- 3) (5 minutes) Help students understand why this topic is important- Eating healthy plays a huge role in determining how well a person's body is working. It's not about being skinny or having big muscles. It's all about making sure your body has the fuel it needs to operate. Food is to your body what gas is to a car. Explain to students that not only do our bodies require food, they need the <u>right</u> food. If you want your body to be working at an optimal level, you need to provide it with optimal fuel. Give students some time to discuss what this means and share out to the group.
- 4) (10 minutes) Pass out a copy of *Mission Possible: Healthy Eating* to each student and introduce the mission for the week. Students are responsible for completing one mission per day at home and filling their plate by the end of the week. Answer any questions that students may have before moving on to the recipe.
- 5) (30 minutes) Introduce the <u>Broccoli Salad recipe</u> to students (one copy per student or written on anchor chart paper). Support students in the creation of the broccoli salad and tasting.
  \*Be sure to check with families about student allergies BEFORE attempting each recipe.

# Focus 1: Balancing Ecosystems and Healthy Choices Lesson 1.2

### About the Activities:

For Focus 1, Lesson 1.2, students will continue their introduction to the aquaponics system. During the exploration lesson, students will refresh themselves on the standard procedures and on running the system. Students will also partake in their first planting session.

During the discovery lesson, students will review some of the vocabulary that they have learned through the hands-on lessons thus far. In order to help support students' acquisition of this new vocabulary, they will play a Vocabulary Quizizz. After reviewing the questions on the Quizizz, students will participate in a partner reading of "Aquaponics: Introduction and Brief History" while they complete the Guided notes.

In the nutrition lesson, students will be presented with the question, *Where in my community can I find healthy food?* Students will participate in a discussion and be given resources appropriate to their community to support healthy eating habits and provide fresh, healthy food. Some resources may be Farmers' Markets, food banks, or local organizations such as farms. At the end of the lesson, students will try a new recipe: a spinach-strawberry salad.

#### **Objectives:**

Students will be able to engage in a range of collaborative discussions with diverse partners, building on others' ideas and expressing their own clearly (SL.1).

Students will be able to explain how and why civilizations, societies, and regions have used, modified, and adapted to their environments (6.G.1.4).

Students will be able to apply tools and strategies to consume a variety of nutrient dense foods to enhance their quality of life (NPA.1, NPA.2, NPA.4).

### Here's What You'll Need:

- Aquaponics system
- Anchor Chart Paper
- Markers
- Tracking Google Doc
- Composition Notebook- 1 per student
- <u>Quizizz</u>
- Aquaponic Introduction Lesson Document: <u>Adapted "Aquaponics: Introduction</u> <u>and Brief History"</u>

- Aquaponics: A Brief History Guided Notes
- Aquaponic Operating Procedures- used in Lesson 1.1
- Chromebooks or Individual Student devices
- Mission Possible: Healthy Eating- used in Lesson 1.1
- YouTube link (nutrition lesson): https://www.youtube.com/watch?v=6zILRyCTMLU
- Spinach-Strawberry Salad Recipe:

\*Be sure to check with families about student allergies BEFORE attempting each recipe.

- Spinach
- Strawberries
- Feta Cheese (optional)
- Balsamic Vinegar
- Extra Virgin Olive Oil

#### **Directions:**

### Exploration Lesson (120 minutes):

1) (5 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students.

Some possible questions to ask are:

-How are you feeling today?

-What are you most looking forward to about being in the greenhouse today? -What was your favorite part about the last lesson?

2) (25 minutes) Play your choice of get-to-know-you games where students have to work together to accomplish their end goal. Some great options are:
 <u>-Human Knot</u>
 <u>-Telephone</u>

At the end of the game, remind students that they will be working together (as a team) to ensure that the system is well taken care of by completing the Operating Procedures each day. Review the Operating Procedures, read over the rules and expectations written on the anchor chart paper from the previous day.

- 3) (30 minutes) Review and run through Operating Procedures, then prepare students for the planting.
- 4) (20 minutes) Introduce students to the materials needed for planting. This may be different depending on the type of system that you are using. With the 100

Garden aquaponics system, you will need seeds, rock wool, a deep tray, and a table with a grow light. This should all be set-up and ready prior to starting the curriculum, and you should have a teacher who is trained in these procedures.

Before showing students the procedures for planting, explain that the start of a plant is through a seed- which needs to go through a growing process called germination. Germination happens inside the seed, and with just the right combination of soil, water, and sunlight (warmth), the plant will start to grow. Tell students that instead of soil they will be using rock wool and instead of sunlight they will use a grow light with their aquaponics system. Once the seed has germinated, the seed will split, and they will start to see a sprout of the plant. Once a few leaves appear on the sprout, the plant is ready to be transferred to the aquaponics system to begin making food on its own. Tell students that today they will be observing the teacher as they go over the steps in the planting process. Take time to stop during the planting procedures, and allow students to ask questions or jot down notes in their noticing notebooks.

- 5) (30 minutes) Allow students to share out the steps in the planting process and write down these steps on anchor chart paper that will be posted by the system. Once you have completed an anchor chart, allow students to copy the anchor chart in their noticing notebooks. They should draw pictures to represent the different steps in the planting process.
- 6) (10 minutes) Wrap up the Exploration Lesson with an informal conversation with students. What are your thoughts and feelings about the planting process? Do you think you could complete the planting process without teacher support next time? How could you be most successful with the procedures when working with fellow classmates?

### Discovery Lesson (60 minutes):

- 1) (45 minutes) Students will work in pairs to read <u>"Aquaponics: Introduction and Brief History"</u> and complete the <u>guided notes</u>. Be sure to go over the notes as a whole group when all students have finished.
- 2) (15 minutes) Review the new vocabulary that students have learned over the past couple of days with a <u>Quizizz</u>. Students may want to use their copy of the Aquaponics operating procedures from Lesson 1.1 as well as their guided notes that they just completed. Be sure to review all answers, so students have a good understanding of the new vocabulary. You may want to write the new vocabulary and definitions on anchor chart paper throughout the game.

### Nutrition Lesson (60 minutes):

- 1) (5 minutes) Give students the following prompts to spark prior knowledge from the previous lesson: *What is physical health? How do we know that our bodies are working?* Allow students to discuss in pairs and then share-out responses to the group.
- 2) (5 minutes) Remind students that physical health refers to the state of your physical body and how well it's working. Eating healthy plays a huge role in determining how well a person's body is working. Ask students to share what eating healthy may look like. You may want to refer to *Mission Possible: Healthy Eating* or the Broccoli Salad recipe from the previous lesson.
- 3) (10 minutes) Present students with the question: *where in my community can I find healthy food?* Allow students to discuss in pairs and then share-out responses to the group. Brainstorm a list of possible places to find healthy food in the community on anchor chart paper or on a whiteboard.
- 4) (5 minutes) Show students the video "Foodwise Kids: What's Cool About Farmers Markets?" <u>https://www.youtube.com/watch?v=6zILRyCTMLU</u>
- 5) (5 minutes) Allow students to discuss what they saw and learned from the video in groups or pairs. Tell students that shopping at a farmer's market gives them and their families access to fresh, locally grown foods. Fruits and vegetables sold are at the peak of the growing season, and shopping at farmer's markets supports local farmers and keeps the money you spend on food closer to your neighborhood.
- 6) (5 minutes) Allow students to share the mission that they completed on their *Mission Possible: Healthy Eating* assignment and what mission they plan on completing at home that night.
- 7) (25 minutes) Introduce the <u>Spinach-Strawberry Salad recipe</u> to students (one copy per student or written on anchor chart paper). Support students in the creation of the salad and tasting.
  \*Be sure to check with families about student allergies BEFORE attempting each recipe.

# Focus 1: Balancing Ecosystems and Healthy Choices Lesson 1.3

### About the Activities:

For Focus 1, Lesson 1.3, students will run through the standard procedures and operations without being led by a teacher/facilitator. Because students will be navigating this themselves for the first time, this portion may take a little more time. Students will be thoroughly introduced to their "Noticing Notebooks" and be given a quick lesson on how scientists record observations. Allow students time to examine the greenhouse/system, and have them record their observations in their Noticing Notebooks.

During the discovery lesson, students will conduct a "mini-PBL" on ocean conservation written by Mrs. Morgan Mosher after being tasked with the questions: "*Research an endangered ocean species. Why are they endangered? What are some potential solutions to our ocean's declining health?*" Students will be allowed time to complete this. You may want to give students options for different websites to use. Students will also have a blog prompt: *Using five new vocabulary words, reflect on the general daily procedures for operating the aquaponics system.* This Discovery Lesson will continue to the next day's Discovery Lesson.

In the nutrition lesson, students will work in teams to create the perfect garden salad recipe. Using the input of others in their assigned groups, students will decide what will be used in the day's recipe. In the assigned groups and on anchor chart paper, students will create a garden salad recipe that they will present with the group. The class will then work together to share feedback and give suggestions to create their own recipe that they will create and taste.

### **Objectives:**

Students will be able to engage in a range of collaborative discussions with diverse partners, building on others' ideas and expressing their own clearly (SL.1).

Students will be able to use technology to produce and publish blog posts, as well as to interact and collaborate with others (W.6).

Students will be able to understand how organisms interact with and respond to the biotic and abiotic components of their environment (8.L.3).

Students will be able to understand the flow of energy through ecosystems and the responses of populations to the biotic and abiotic factors in their environment (6.L.2).

Students will be able to apply tools and strategies to consume a variety of nutrient dense foods to enhance their quality of life (NPA.1, NPA.2, NPA.4).

### Here's What You'll Need:

- Aquaponics system
- Anchor Chart Paper
- Markers
- Tracking Google Form
- Noticing Notebook
- Ocean Health Mini PBL
- Aquaponic Operating Procedures
- Chromebooks or Individual Student devices
- Mission Possible: Healthy Eating
- Garden Salad Ingredient Options:
  - \*Be sure to check with families about student allergies BEFORE attempting each recipe
  - Lettuce
  - Tomato
  - Onion
  - Croutons or Other Salad Topper
  - Dressing

### Directions:

### <u>Exploration Lesson (120 minutes):</u>

1) (5 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students.

Some possible questions to ask are:

-What healthy choice did you make yesterday?

-What is the last book that you read that you would recommend to a friend? -Have you ever been to the farmer's market? What do you know about the farmer's market?

2) (40 minutes) Review and run through Operating Procedures with students. At this point, the facilitator/teacher should step back and allow students to navigate the procedures and operations themselves, making themselves available for questions or direction as needed. *This may take more than 40 minutes, allowing it to take all the time needed*. If you have additional time, you may want to assign new jobs for students, or allow them to work on their blog posts from the first lesson.

- 3) (20 minutes) Once students have successfully completed the operations and procedures, ask students to take out their Noticing Notebooks.
  - a) Begin by asking students, "*why do you think it's important to pay attention to the world around you?*" Guide students through a discussion about the merits of observing, questioning, and thinking critically. Allow the conversation to flow as students need it to.
  - b) Introduce students to the idea of scientific observation. Tell students that scientific observation is when you're conducting a scientific experiment (in this case, growing different types of lettuce using the aquaponics system), and you observe what is going on using your senses. Ask students if they can identify the 5 senses (taste, touch, smell, sight, sound).
  - c) Ask students to call out things they notice about their greenhouse/system using their senses. Steer them away from obvious things, such as "it has fish," or "there are seeds." Have students write down everything in their Noticing Notebooks as you write them down on anchor paper.
  - d) Once this is done, allow students to move freely through the greenhouse/system and record any other observations.
  - e) Ask students to create a question around their observation as well as answer. You may want to model this for students. Some examples are as follows:
    - Why is the lettuce growing at a faster rate in the center of the system rather than on the outside of the system?
    - What other types of plants can be grown successfully using our system?
    - Why didn't the fish eat all 20 grams of food today? Is there an adjustment that needs to be made with the system? (student can make a hypothesis)
  - f) Tell students that good scientists organize their scientific observation notations, so they can easily locate their observations when they need it. If there is additional time, brainstorm ways that students can organize their observations in their Noticing Notebooks for future observations and model this skill on anchor chart paper.

### Discovery Lesson (60 minutes):

1) (20 minutes) Present students with today's prompt. As students write, circulate the room to monitor progress and provide encouragement. Encourage students to use any pictures that they took during their observations in the system to supplement their blogs. **<u>Blog Prompt</u>**: Using five new vocabulary words, reflect on the general daily procedures for operating the aquaponics system.

2) (45 minutes to remainder) Present students with the <u>Ocean Health Mini-PBL</u>. Be sure to give students a list of approved websites that they can use for this activity. Some great resources include Newsela, Readworks, and National Geographic Kids. Allow students time to work on completing it. Times may vary and fluctuate depending on how quickly students and facilitators completed the Exploration Lesson. Create and build time where it is needed. This lesson is expected to continue during the Discovery Lesson for Lesson 1.4.

### Nutrition Lesson (60 minutes):

- 1) (5 minutes) To begin, tell students they're going to be working in teams to create a garden salad recipe.
  - a) Divide students into even teams.
  - b) Show students the ingredients that are typically used in garden salads and talk about how there can be too much of one thing. Explain how some tastes can overpower others. Their mission is to create the perfect garden salad recipe, not using too much or too little of anything (they will use the ingredients that you have provided on the board for them).
- 2) (15 minutes) Allow students time to create their recipe with their group. They will write-out and design their recipe on anchor chart paper. Remind students of the recipes they have seen in previous lessons- their recipe should follow that outline (you may want to have examples posted on the wall).
- 3) (10 minutes) Students will present their recipes to the class. Allow students to give positive feedback and write down this feedback on chart paper or a whiteboard. For example, if a student comments about a certain ingredient being used, write that down so that you can come back to it.
- 4) (10 minutes) As a class, create a garden salad recipe using the positive feedback from the presentations. Be sure to discuss the general outline of a recipe as you are writing the class recipe on chart paper for all students to see.
- 5) (20 minutes) Use the remaining time to divy up the ingredients, bowls, and measuring and mixing tools among groups, so they can work together to create and try the garden salad.

# Focus 1: Balancing Ecosystems and Healthy Choices Lesson 1.4

#### About the Activities:

During the exploration lesson in Focus 1, Lesson 1.4, students will continue learning to run the standard operating procedures on their own with teachers observing nearby. By this point in Focus 1, students should have been assigned new jobs. Please allow them time to fully acclimate themselves to their new daily tasks.

During the discovery lesson, students will continue working on their "Ocean Health Mini-PBL" from the previous day. By the end of the lesson, students should have created a mini poster to use as a visual when presenting the information that they have found.

In the nutrition lesson, students will discuss what a healthy balanced diet looks like. They will apply this new knowledge to their own lives by beginning to create a personal food guide. At the end of the lesson, students will make and taste a Caesar Salad.

#### **Objectives:**

Students will be able to engage in a range of collaborative discussions with diverse partners, building on others' ideas and expressing their own clearly (SL.1).

Students will be able to understand how organisms interact with and respond to the biotic and abiotic components of their environment (8.L.3).

Students will be able to understand the flow of energy through ecosystems and the responses of populations to the biotic and abiotic factors in their environment (6.L.2).

Students will be able to use technology to produce and publish blog posts, as well as to interact and collaborate with others (W.6).

Students will be able to apply tools and strategies to consume a variety of nutrient dense foods to enhance their quality of life (NPA.1, NPA.2, NPA.4).

### Here's What You'll Need:

- Aquaponics system
- Aquaponic Operating Procedures
- Anchor Chart Paper
- Markers
- <u>Tracking Google Form</u>

- Noticing Notebooks
- Chromebooks or Individual Student devices
- Ocean Health Mnini-PBL from Lesson 1.3
- White Cardstock paper for mini posters
- Sticky notes
- <u>Harvard's Healthy Eating Plate</u>
- Mission Possible: Healthy Eating
- <u>Caesar Salad Recipe</u> and Ingredients (quantity will vary):

\*Be sure to check with families about student allergies BEFORE attempting each recipe

- Romaine Lettuce
- Caesar Dressing
- Croutons
- Parmesan (optional)

### <u>Directions:</u>

### Exploration Lesson (120 minutes):

1) (5 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students.

Some possible questions to ask are:

- What healthy choice did you make last night? This morning?
- Can you explain in your own words what aquaponics is?
- What has been your favorite salad this week?
- 2) (30 minutes) Begin the procedures and operations, allowing students to guide themselves. Monitor their progress and provide support and guidance as necessary. Be sure to praise students for their successes as you go.
- 3) (30 minutes) Assist students in filling out and organizing their observations in their Noticing Notebooks as needed, ensuring that every student is having success with this.
- 4) (55 minutes) Use the remaining time to allow students to share or add on to their observations from the week. You may also give students time to take pictures for their blog posts. If blogging devices are available at this time, students should spend some time editing and sharing their posts. Another option would be to play more get-to-know-you-games to continue building culture and community within your group.

### Discovery Lesson (60 minutes):

- 1) (40 minutes) Remind students of the goal of the Ocean Health Mini-PBL is to research an endangered ocean species, and answer the two important questions:
  - Why is this ocean species endangered?

- What are some potential solutions to our ocean's declining health? Tell students that today they will be focusing on finishing their PBL Activity Page, checking over their work, and creating a mini poster that presents their information in a visually engaging way. You will need white card stock paper for students to create their mini posters. A technology option could be for students to create an infographic using google slides or Microsoft PowerPoint, that will be presented on student devices during the carousel activity. As a reminder, an infographic only involves one slide or one page.

2) (20 minutes) Allow students to tape their mini posters up around the room (or display their devices on tables throughout the room). Give students 10-15 minutes to carousel around the room and write down positive and specific feedback on sticky notes to leave at their peers' mini posters. Also, allow students to make scientific observations in their Noticing Notebooks about the different solutions to our ocean's declining health. Take the last 5-10 minutes to bring students back to share positive feedback that they received as well as some of the potential solutions. Take their solutions a step farther by asking students what little steps they can take in their everyday lives to care for our ocean's health.

### <u>Nutrition Lesson (60 minutes):</u>

- (5 minutes) Refresh students by beginning with this prompt: In a previous lesson we discussed where we would go to find healthy food in our community. Discuss with a partner where you can find healthy food in your community. Give specific examples. Allow students to share what they discussed with their partner to the whole group.
- 2) (10 minutes) Tell students that today they will be discussing what it means to eat a healthy and balanced diet. In this lesson, they are going to build on the concepts they previously learned and design a personal food guide, tailored to their dietary preferences. Explain to students that a food guide is a nutrition guide for creating healthy and balanced meals. As an example, you can share <u>Harvard University's</u> <u>Healthy Eating Plate</u>.
- 3) (15 minutes) Tell students that their *Mission Possible: Eating Healthy* take-home assignment is an example of a personal food guide because it allows students to share personal food choices. Place students into pairs and allow them to compare
and contrast their *Mission Possible: Eating Healthy* assignment. Tell students to write down any similarities and differences that they see in their personal food guides on sticky notes or a separate piece of paper.

- 4) (5 minutes) Wrap-up conversations by reviewing the principles of a balanced diet and encouraging students to refer to their food guide when making personal decisions. Remind students that everyone's "healthy and balanced diet" will be different because of their food preferences.
- 5) (30 minutes) Present the Caesar Salad Recipe for the day. Give students time to make and taste the recipe.

# Focus 1: Balancing Ecosystems and Healthy Choices Lesson 1.5

#### About the Activities:

In Focus 1, Lesson 1.5, students will be participating in a hands-on activity involving tracking the fish growth. This will take place during the Exploration Lesson after going over standard procedures and running the system. Depending on your program, students will be tracking the growth of the fish once a month to determine the daily amount of feed to give the fish based on body weight, so you can fit this lesson in where necessary.

During the Discovery Lesson, students will add another blog entry that discusses their reactions to tracking the fish growth activity. Students will also take a look at the data collected from the week in their Noticing Notebooks and on their tracking sheets. With this information, students will look at the trends from the week.

During the nutrition lesson, students will analyze the quality of their lunch at school and share suggestions for improvement. Students will then create and taste a fruit salad as a celebratory wrap-up of Focus 1. Students will be able to take some fresh produce home to share or try a new recipe with their family.

#### **Objectives:**

Students will be able to engage in a range of collaborative discussions with diverse partners, building on others' ideas and expressing their own clearly (SL.1).

Students will be able to understand how organisms interact with and respond to the biotic and abiotic components of their environment (8.L.3).

Students will be able to understand the flow of energy through ecosystems and the responses of populations to the biotic and abiotic factors in their environment (6.L.2).

Students will be able to use technology to produce and publish blog posts, as well as to interact and collaborate with others (W.6).

Students will be able to apply tools and strategies to consume a variety of nutrient dense foods to enhance their quality of life (NPA.1, NPA.2, NPA.4).

#### Here's What You'll Need:

- Aquaponics system
- Tracking Google Doc

- Noticing Notebooks
- Chromebooks or Individual Student devices
- Individual student devices for blogging
- Tracking Fish Growth in the Aquaponics System Lesson
- Nitrogen Cycle YouTube Resource
- Mission Possible: Healthy Eating
- Loose leaf or white paper folded into 3 columns (1 per student)
- <u>Fruit Salad Recipe</u> and Ingredients (quantity and options will vary):
  - \*Be sure to check with families about student allergies BEFORE attempting each recipe
  - Pineapple
  - Apples
  - Grapes
  - Oranges
  - yogurt or cool whip

#### **Directions:**

## <u>Exploration Lesson (120 minutes):</u>

1) (5 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students.

Some possible questions to ask are:

- How are you feeling today?
- What has been your favorite activity this week?
- Does fruit belong in a salad? Why or why not?
- 2) (30 minutes) Begin the procedures and operations, allowing students to guide themselves. Monitor their progress and provide support and guidance as necessary. Be sure to praise students for their successes as you go. Assist students in filling out their tracking google document and Noticing Notebooks as needed, ensuring that every student is having success and staying organized with this.
- 3) (80 minutes) Begin the tracking of the fish growth lesson. See "Tracking Fish Growth in the Aquaponics System" for detailed directions and steps.

## Discovery Lesson (60 minutes):

1) (30 minutes) Allow students some time to work on their blogs/edit their blogs from the week. If time permits, encourage students to share their blog posts from the week in a group.

**Blog Prompt:** Fish growth lesson reactions! Using three of the following words, describe what was the best part of the activity. What was something new that you have learned?

Word List: Feed Conversion Ratio (FCR), ruler, scale, net, container, weight, mean, median, mode, estimate

- 2) (30 minutes) Tell students that water temperature affects all of the other water quality parameters. Warmer water temperature increases biological activity, which has an impact on pH, ammonia, nitrite, and nitrate levels. Tilapia also need a minimum temperature of 70 degrees Fahrenheit to grow fast. They will stop feeding at 60 degrees Fahrenheit and will die at 55 degrees Fahrenheit. Lead students into a discussion in which they analyze the data from the week. You may need to reference the information submitted by the google docs or the information recorded in Noticing Notebooks.
  - a) Analyze the temperature data for the week. Is it increasing, stable, or decreasing? Allow students to graph the temperate data in their notiving notebooks- you may want to model this on the board or anchor chart paper. As students, what factors might contribute to the changes in water temperature?
  - b) Tell students that nitrification is optimal when water temperature is between 70 degrees Fahrenheit and 85 degrees Fahrenheit. Explain to students that nitrification is the process by which ammonia is converted to nitrites and then nitrates. This is an important part of the nitrogen cycle because for most plants, nitrate is the preferred chemical form of nitrogen. The upper limits of the range of 70-85 degrees Farenheit will increase the rate of nitrification. Is the water temperature within the optimum range for nitrification?

This video can be used as an additional resource for students to explain the nitrogen cycle: <u>https://www.youtube.com/watch?v=HOpRT8BRGtk</u>

## <u>Nutrition Lesson (60 minutes):</u>

- 1) (5 minutes) Ask students to discuss the following: *What does it mean to eat a healthy and balanced diet?* Be sure to note that a balanced diet is unique to each person based on their food preferences.
- 2) (5 minutes) Refresh students on the definition of Physical Health a.k.a My Body. Physical health refers to the state of your physical body and how well it's working. Also, remind students that one of the elements of physical health is focusing on

nutrition and eating healthy. Tell students that in this lesson they will apply their learning from the previous lessons and analyze the quality of their school lunch.

- 3) (10 minutes) Students can either analyze the food in their lunch box or you can post a picture of a lunch tray on the board. After deciding what food students are going to be analyzing, explain how they are going to be analyzing their food. Students will need a loose leaf or white sheet of paper that is folded to create 3 columns.
  - a) Fill in the left column with the contents of their lunch.
  - b) Rate each food item and explain your rating.
  - c) Describe how you could make each part of your lunch healthier.

You may want to create a model of the food report that looks like this:

Content of Lunch	Food Rating	Healthier Options

Give students time to fill out their food reports on their own.

- 4) (5 minutes) When students are finished, they will share their food reports with each other. As they review each other's reports, they should be comparing their rationales for each rating and their suggestions on how to make the meal healthier.
- 5) (5 minutes) Wrap up this lesson by reviewing what it means to be physically healthy and to eat a balanced diet. If there is extra time, allow students to share what healthy choices they made at home while filling out the *Mission Possible: Healthy Eating*. Remind students that you will be collecting their assignments at the start of Focus 2, so that you can post them in the room as a reminder of their Healthy Eating choices. Tell students that they will be receiving a new mission in Focus 2.
- 6) (30 minutes) Creation and tasting of the Fruit Salad and celebration of the end of Focus 1. Allow students some time to talk in groups or aloud about their takeaways from the lessons in Focus 1.

## Focus 2: Plant Genetics Lesson 2.1

#### About the Activities:

In Focus 2, Lesson 2.1, students will be focusing on plant genetics. On day 1 in the exploration lesson, students will be assigned jobs and will continue to go over the standard procedures and running the system. Students should be assigned a job that they have not experienced yet, so that they are continuing to learn about the different tasks needed to run an aquaponics system. Students will review facts about plants before they start discussing evolution of plants. During the exploration lessons, students will paste the interactive notebook pages into their composition notebooks.

During the discovery lesson, students will continue working on their blogging website with a new blog prompt. In order to incorporate clear and purposeful speaking, students will be introduced to Ted Talks by watching an example. There will be two options for the remainder of the discovery lesson depending on how you are running your program:

<u>Option 1:</u> If you plan on running your program for 4-weeks, you will choose option 1 in which students will present their blog posts to their classmates.

<u>Option 2:</u> If you plan on running your program for 2-weeks, you will choose option 2 in which students will begin planning an outline for their own TedTalk.

During the nutrition lesson for the next two lessons, students will use a free online tool from Nourish Interactive called Kevin's Build-A-Meal Game. The interactive tool is based on the USDA guidelines for a healthy diet. Students will need to select their gender, age and activity level, and the interactive will automatically compute the calories and number of servings from each food group required for each student to have a balanced diet. Once a student has entered the required information, they will be taken to a meal planning screen with squares designated for breakfast, lunch, dinner and two snacks. The student will then begin to select food items from three virtual scenes: a kitchen, a school cafeteria and a grocery store. Using their mouse, they can click and drag food items onto their tray. The student will see a horizontal bar at the bottom of their screen that represents the energy or calories their body needs for one full day. As they select their food items, the associated servings and calories will automatically be filled in for them. If the student selects too many high calorie foods and goes over their calorie needs, the bar will begin to turn red.

There are no calculations required to use the interactive. Food groups servings are color coded and each box represents one serving of that particular food group. By scrolling over selected food items shown at the bottom of the screen, students can learn the amount, food group(s) and calories of a particular food item. The challenge is to find the right combination of foods that meets their calorie requirement and gives them enough servings from each of the food groups. Once a student has created his or her meal plan for the day, the game will evaluate the choices and give advice on how to make it a balanced healthy meal if needed. There are over 160 food choices for the student to choose from. There is an optional "HELP" audio feature to guide students. You will need the latest Flash Player installed on each student device in order to complete this game. Students will also be introduced to their new *Mission Possible: Exploring New Foods* tasks to complete during Focus 2, and they will be creating a Cucumber Bites recipe.

#### **Objectives:**

RH.7 Students will be able to integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.

RI.7 Students will be able to use information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.

RST.9 Students will be able to compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

SL.2 Students will be able to summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

## Here's What You'll Need:

- Aquaponics system
- Aquaponic Operating Procedures
- Anchor Chart Paper
- Markers
- Tracking Google Doc
- Noticing Notebooks
- Interactive notebook page 1 (one copy per student)
- <u>"Seeing the Invisible: Mutualism and Plant Reproduction"</u> text
- Glue sticks (to glue interactive notebook page into notebook)
- Chromebooks and/or Individual Student devices
- Student brought devices (for blogging and nutrition lesson)
- Index cards
- <u>Blog Presentation Rubric</u>
- <u>What is a TED Talk</u> printable (one copy for each student)
- <u>TED Talk Rubric</u>

- <u>Chinampas: The Floating Gardens of the Aztecs</u>
- <u>Mission Possible: Exploring New Foods</u>
- Kevin's Build-A-Meal Game: <u>http://www.nourishinteractive.com/kids/healthy-games/6-kevins-build-a-meal-game-balanced-meals</u>
- <u>Ranch Cucumber Bites Recipe</u> and Ingredients (amounts may vary)
- Cream cheese, softened
- Dried parsley
- Dried dill
- Garlic powder
- Onion powder
- Salt
- Pepper
- Sliced cucumbers
- Halved cherry tomatoes
  \*Check about student allergies BEFORE attempting each recipe

#### **Directions:**

## **Exploration Lesson (120 minutes):**

 (10 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students. This informal time is a great opportunity to connect with students while you are waiting for everyone to arrive.

Some possible questions to ask are:

- What healthy choice do you plan on making today?
- How did you stay active over the weekend?
- Did you try a new healthy recipe at home? What did you try?
- 2) (30 minutes) Review the rules and expectations while using the space by referring to the anchor chart created during Focus 1. Allow students to turn to their <u>Aquaponic Systems: Student Copy</u> and review the different procedures and jobs students may have while working in the system. Some students will be very confident with some of the different jobs, so allow them to share out with the group.
- 3) (30 minutes) Provide new job assignments for students. Then step back and allow students to navigate the procedures and operations themselves, making yourself available for questions or direction as needed. *This may take more than 30 minutes, allowing it to take all the time needed.*

4) (60 minutes) Pass out the first page for the interactive notebook: "Reproduction of Plants." Each page can be cut in half and pasted in student composition notebooks. Students will use the Readworks passage "Seeing the Invisible: Mutualism and Plant Reproduction" to answer the questions. An answer key is provided with the interactive notebook file. Allow students to work in pairs or in groups, highlighting the information found in the passage. Be sure to go over the activity page when students are finished. Allow students to work on their blog posts if there is additional time.

Additional Resource: https://www.youtube.com/watch?v=W9OiGA5\_mVs

## Discovery Lesson (60 minutes):

**Option 1:** If you are following the 4-week program, students will share their blog posts at the end of the week, and you will follow these plans for the first 30 minutes of the Discovery Lesson.

- 1) (5 minutes) Begin by explaining to students that they will share their blog posts at the end of the week. This week, during their discovery lessons, they will be adding to their blogs and creating a presentation. <u>Pass out the Blog Presentation Rubric</u>.
- 2) (25 minutes) Give students the remaining time to work on another blog post. Students may use their personal devices to take pictures of the system to add to their blog post. Students may also begin brainstorming their presentation using notebook paper or index cards. Walk around and monitor students for questions and support while they are blogging.

**Blog Prompt**: Think about the recipes that you created last week. What was your favorite? What new healthy ideas can you bring home to your family?

**Option 2:** If you are following the 2-week program, students will be sharing a Ted talk at the end of the week, and you will follow these plans for the first 30 minutes of the Discovery Lesson.

 (10 minutes) Begin by explaining to students that they will be creating a Ted Talk at the end of the week. The goal of the Ted Talk is to build critical public speaking skills. Pass out the Ted Talk Presentation Rubric. Show students a Ted Talk Example given by a kid: <u>https://www.youtube.com/watch?v=px9CzSZsa0Y</u> You can also search: *The Mindset of a Champion by Carson Byblow* on Youtube to have access to this video. \*While students are watching the Ted Talk, ask them to record any wonderings or observations on an index card.

- 2) (5 minutes) After watching the video, ask students these questions:
  - What is the presenter's main message/idea?
  - What are some of the things that the presenter does to engage the audience?
- 3) (10 minutes) Read the article: "What is a Ted Talk" with students. Tell students that they will be creating a Ted Talk that discusses one of the following big ideas:
  - -Healthy Eating
  - Benefits of an Aquaponics System
  - -Nutrition in schools
  - -The History of Aquaponics
  - -Plant Genetics

Allow for students to ask any questions at this point. Tell students that their at-home task will be to figure out what big idea they will focus on. Allow students to take their rubrics home to discuss with their families.

**Both Option 1 and Option 2:** For the remaining 30 minutes of the Discovery lesson, both option 1 and option 2 will teach the next portion of the lesson.

1) (30 minutes) Students will read and complete the guided notes for the passage <u>"Chinampas: The Floating Gardens of the Aztecs."</u> An answer key is provided. Be sure to allow time for students to ask questions and go over the questions.

## Nutrition Lesson (60 minutes):

1. (15 minutes) Project Kevin's Build-A-Meal Game for students to see. Model how to use the interactive before releasing students to play on their own. Demonstrate how to use the mouse to pick your age, picture of boy or girl, and the picture that best describes how active you are. Draw students' attention to the empty calorie bar with a goal number of calories, and an empty plate for breakfast, lunch and dinner. You may want to repeat this part of the interactive a few times, selecting different genders, ages, and activity levels. Talk with students about how these factors affect the amount of calories children need.

- Explain that students will create three meals (breakfast, lunch and dinner), and will also be able to store food in a backpack for two snack times. Allow students to volunteer to select which meal to plan first.

-As you begin the interactive, you will enter a virtual place where food is stored. Show students how to use the mouse to click and drag food items to the plate. You will see the different colored boxes begin to fill up depending on the foods you chose. The orange boxes represent the grains group, the green boxes represent the vegetable group, the red boxes represent the fruit group, the blue boxes represent the dairy group, and the purple box represents the protein group. You will also see your calorie bar begin to fill up. Experiment with different combinations and talk with students about how the calorie bar changes according to which foods are selected.

-Click on the green arrow on the right bottom of the screen to go back to your meal page and select another meal to create. Be sure students understand that if they need help, they can simply click on the help button in the upper left hand corner.

-Once you are done, click on the green box at the top to indicate you're ready to show the meal you have created. Facilitate a class discussion around the results.

- 2. (10 minutes) Allow a few student volunteers to take a turn building meals. Have them explain their choices as they select each food, and encourage the rest of the class to provide constructive comments about how balanced the meals are, how they could be improved, and why.
- 3. (25 minutes) Students will make and taste the <u>Ranch Cucumber Bites</u>. Be sure to check for student allergies before attempting this recipe.
- 4. (5 minutes) Introduce students to the tasks for <u>Mission Possible: Exploring New</u> <u>Foods</u>. Tell students that just like the Ranch Cucumber recipe that they tried, their goal is to try new healthy food options and explore new recipes this week while they are at home.

## Focus 2: Plant Genetics Lesson 2.2

#### About the Activities:

In Focus 2, Lesson 2.2, students will continue to focus on plant genetics. Students will first run through the standard procedures and running the system. At this point, the seeds that had been planted the week before should be ready or almost ready to place in the system. You may have to spend some time harvesting as well. Be sure to make ample time for this during the exploration lessons during the week. You can always save the additional genetics activities for later lessons depending on the growth in your system. In today's additional lesson, students will read about orchids and their degree of evolutionary specialization. Along with this reading is the next page to place in their interactive notebook.

In the Discovery Lesson, students will participate in a vocabulary review activity based on the past two plant genetic readings thus far. Then students will be separated by the duration of their program length.

- Those who are participating in the four week program will continue to work on their blog posts and presentations.
- The group of students in the two week option, will complete a TedTalk Project preparation activity about presenting to a group before having time to work on their presentation. This group of students will have been introduced to the TedTalk Presentation Project in the previous Discovery Lesson.

In the nutrition lesson, students will continue working with the interactive Kevin's Build-A-Meal Game for the first 30 minutes. Students will then work together to create a Mexican Street Corn Dip Recipe, and they will be introduced to Task #2 on their Mission Possible: Exploring New Foods take-home activity page.

#### **Objectives:**

Students will be able to cite textual evidence to support the analysis of what the text says explicitly as well as make inferences using the text (RI.1).

Students will be able to determine a central idea of a text and how it is conveyed through particular details (RI.2).

Students will be able to acquire and use accurately grade-appropriate general academic and domain-specific words and phrases (L.6).

Students will be able to summarize the basic structures and functions of flowering plants required for survival, reproduction, and defense (L.1.1).

#### Here's What You'll Need:

- Aquaponics system
- Aquaponic Operating Procedures
- Anchor Chart Paper
- Markers
- Tracking Google Form
- Noticing Notebooks
- Interactive notebook page 3 (one copy per student)
- <u>"The Orchid's Secret"</u>text
- Glue sticks (to glue interactive notebook page into notebook)
- Chromebooks and/or Individual Student devices
- Individual student devices for blogging
- Index cards
- <u>How Do People Prepare for a TED Talk? printable (one copy for each student)</u>
- <u>TED Talk Rubric</u>
- Kevin's Build-A-Meal Interactive Game: <u>http://www.nourishinteractive.com/kids/healthy-games/6-kevins-build-a-meal-game-balanced-meals</u>
- <u>Plant Genetics Vocabulary Quizizz Activity</u>
- Mission Possible: Exploring New Foods
- <u>Mexican Street Corn Dip Recipe</u> and Ingredients \*This recipe will need to be refrigerated before enjoying it, so you may want to make it at the beginning of the lesson or let students know that they will be trying the recipe the following day.
- ears of corn
- mayo
- cream cheese softened
- cayenne pepper
- cotija cheese crumbled
- cilantro chopped
- Lime wedges for garnish (optional)
- Tortilla Chips
  - \*Check about student allergies BEFORE attempting each recipe

#### **Directions:**

## **Exploration Lesson (120 minutes):**

 (5 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students. This informal time is a great opportunity to connect with students while you are waiting for everyone to arrive.

Some possible questions to ask are:

-How are you feeling today?

-What are you most looking forward to about being in the greenhouse today? -What was your favorite part about yesterday?

- 2) (45 minutes) Allow time for students to run through the operating procedures, transferring plants to the system, or harvesting the lettuce. The timeline that these tasks are performed all depend on your system.
- 3) (60 minutes) Pass out the second page for the interactive notebook: "Orchids and Co-evolution." Each page can be cut in half and pasted in student composition notebooks. Students will use the Readworks passage "The Orchid's Secret" to answer the questions. An answer key is provided with the interactive notebook file. Allow students to work in pairs or in groups, highlighting the information found in the passage. Be sure to go over the activity page when students are finished. Allow students to work on their blog posts if there is additional time.
- 4) (10 minutes) Use this additional time to catch-up on exploration lessons, play community building games, or allow students to work on their blog posts.

Additional Resource: <u>https://www.youtube.com/watch?v=iyvXZcWUbIo</u>

## **Discovery Lesson (60 minutes):**

- 1) (30 minutes) Begin the Discovery Lesson with a vocabulary Quizizz (<u>link here</u>).
- 2) (30 minutes) Students will be divided up again, based on whether they are participating in the four week (option 1) or two week (option 2) program.

**Option 1:** If you are following the 4-week program, students will share their blog posts at the end of the week, and you will follow these plans for 30 minutes of the Discovery Lesson.

3) (10 minutes) Review the <u>Blog Presentation Rubric</u>. Allow students to share out the expectations for the project.

4) (20 minutes) Give students the remaining time to work on their next blog post or to edit their past blog posts. Students may use their personal devices to take pictures of the system to add to their blog post. Students may also begin brainstorming their presentation using notebook paper or index cards. Walk around and monitor students for questions and support while they are blogging.

**Blog Prompt**: If a younger sibling or friend asked you how plants came to be, what would you tell them? OR How would you explain plant reproduction to an elementary school student?

**Option 2:** If you are following the 2-week program, students will be sharing a Ted talk at the end of the week, and you will follow these plans for the 30 minutes of the Discovery Lesson.

- 1) (20 minutes) To begin, show students the TedTalk: <u>Your Body Language May</u> <u>Shape Who You Are</u>. Lead a discussion on body language, these questions can be a good starting place:
- What does body language tell us?
- Are you always aware of your nonverbals?
- What are you going to take away from this TedTalk?
- How are you going to apply what you've learned to your own presentation?
- 2) (10 minutes) Pass out <u>How Do People Prepare for a TED Talk? printable (one copy for each student</u>). Allow students to read the passage with a partner or in a small group and reflect on the question provided: How do you feel about public speaking? Lead an open discussion about the topic and allow students to share their feelings. Assure students that every speaker feels nervous before giving a presentation, but the key is to be prepared. Students will use the next few days to really prepare for their TED Talk that they will give on the 5th lesson of the Focus.

\*By the end of the Focus 2.2 lesson, students should have shared their topic for the TED Talk with the teacher. The topics of choice include:

-Healthy Eating - Benefits of an Aquaponics System -Nutrition in schools -The History of Aquaponics -Plant Genetics

## Nutrition Lesson (60 minutes):

- 1) (5 minutes) Ask students to share a smoothie recipe from their Mission Possible: Exploring New Foods Task #1.
- 2) (20 minutes) Allow students to explore the interactive on their own or with a partner and select their meals for the day. You may want to have students take screenshots of their completed meal selections to share with the class later on.
- 3) (5 minutes) Talk with students about the meals they created. Did they notice any foods that significantly moved the calorie bar? Why do they think that is? What foods could be added to make a meal more substantial and filling without excessively moving the calorie bar? Do all meals have to have a perfectly precise balance of nutrients, or can they be spaced out throughout the day? Why? What were the biggest challenges in creating a balanced diet in Build a Meal? What are the biggest challenges in real life?
- 4) (25 minutes) Create the <u>Mexican Street Corn Dip Recipe</u> with students. You may want to refrigerate this recipe and enjoy the following day, or start the day with the nutrition lesson.
- 5) (5 minutes) Introduce students to Task #2 for *Mission Possible: Exploring New Foods*. Tell students that just like the Mexican Street Corn Dip recipe that they tried, their goal is to try new healthy food options and explore new recipes this week while they are at home.

# Focus 2: Plant Genetics Lesson 2.3

#### About the Activities:

For Focus 2, Lesson 2.3, students will continue to run through the standard procedures and operations without being led by a teacher/facilitator. Allow an ample amount of time for students to be independent in completing the tasks, planting and harvesting if needed. Students will participate in a short lesson on pollen and will complete another page in their interactive notebook.

In the first 30 minutes of the Discovery Lesson, students will watch a short YouTube clip about Genetically Modified Food and complete a WebQuest. For the last 30 minutes of the discovery lesson, students will either work on their blog or TED Talk presentation.

In today's nutrition lesson, students will continue to play with Kevin's Build-A-Meal Game and explore different food options. They will then create an easy Strawberry Banana smoothie bowl. Allow more time to create the recipe if only one blender is available.

#### **Objectives:**

Students will be able to cite textual evidence to support the analysis of what the text says explicitly as well as make inferences using the text (RI.1).

Students will be able to determine a central idea of a text and how it is conveyed through particular details (RI.2).

Students will be able to acquire and use accurately grade-appropriate general academic and domain-specific words and phrases (L.6).

Students will be able to summarize the basic structures and functions of flowering plants required for survival, reproduction, and defense (L.1.1).

#### Here's What You'll Need:

- Aquaponics system
- Aquaponic Operating Procedures
- Anchor Chart Paper
- Markers
- Tracking Google Doc
- Noticing Notebooks
- Interactive notebook page 5 (one copy per student)

- "Pollen Facts for Kids": <u>https://kids.kiddle.co/Pollen</u> \*share link with students
- Glue sticks (to glue interactive notebook page into notebook)
- Chromebooks and/or Individual Student devices
- YouTube Link: "What is Genetically Modified Food?" <u>https://www.youtube.com/watch?v=JMPE5wlB3Zk</u>
- <u>Genetically Modified Foods Webquest</u> (one copy for each student)
- Individual student devices for blogging
- Index cards
- <u>TED Talk Rubric</u>
- Kevin's Build-A-Meal Interactive Game: <u>http://www.nourishinteractive.com/kids/healthy-games/6-kevins-build-a-meal-game-balanced-meals</u>
- Mission Possible: Exploring New Foods
- <u>Strawberry Banana Smoothie Bowl Recipe</u> and Ingredients \*You may need to allow more time for students to create this recipe if you only have access to one blender.
- blender
- small bowls (one per student)
- frozen bananas
- strawberries
- almond milk

**Optional Toppings:** 

- chopped strawberries
- crunch granola

\*Check about student allergies BEFORE attempting each recipe

#### **Directions:**

## **Exploration Lesson (120 minutes):**

1) (5 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students.

Some possible questions to ask are:

-Have you tried out any new recipes at home lately? -What book are you reading or what show are you watching at the moment? -What is something that you have learned about plant genetics this week?

2) (45 minutes) Allow time for students to run through the operating procedures, transferring plants to the system, or harvesting the lettuce. The timeline that these tasks are performed all depend on your system.

- 3) (60 minutes) Pass out the third page for the interactive notebook: "Pollen." Each page can be cut in half and pasted in student composition notebooks. Students will go to the link that you have shared in order to complete this interactive notebook page. An answer key is provided with the interactive notebook file. Allow students to work in pairs or in groups, taking notes on crucial information found in the passage. You may want to model reading and taking notes on anchor chart paper with one paragraph of the article before students begin. Be sure to go over the activity page when students are finished. Allow students to work on their blog posts if there is additional time.
- 4) (10 minutes) Use this additional time to catch-up on exploration lessons, play community building games, or allow students to work on their blog posts.

#### Additional Resource: <u>https://www.youtube.com/watch?v=Ak5zXO2ZqhY</u>

### **Discovery Lesson (60 minutes):**

- (10 minutes) Begin the Discovery Lesson by showing the Youtube video: What Is a Genetically Modified Food? <u>https://www.youtube.com/watch?v=JMPE5wlB3Zk</u> After watching the video, allow students to share their reactions or to ask questions.
- 2) (20 minutes) Tell students that they will be exploring more about genetically modified foods through a webquest. Pass out a copy of the <u>webquest</u> to each student and allow them to use the time to work through it. Students may need additional time to complete the webquest (a suggestion would be to allow students to use time during their Focus 2.4 Exploration Lesson).
- 3) (30 minutes) Students will be divided up again, based on whether they are participating in the four week (option 1) or two week (option 2) program.

**Option 1:** If you are following the 4-week program, students will share their blog posts at the end of the week, and you will follow these plans for 30 minutes of the Discovery Lesson.

- 5) (5 minutes) Review the <u>Blog Presentation Rubric</u>. Allow students to share out the expectations for the project.
- 6) (20 minutes) Give students the remaining time to work on their next blog post or to edit their past blog posts. Students may use their personal devices to take pictures of the system to add to their blog post. Students may also begin

brainstorming their presentation using notebook paper or index cards. Walk around and monitor students for questions and support while they are blogging.

**Blog Prompt**: Let's check-in! We're halfway through week two. How are you feeling? What's been the BEST part so far? Write a silly summary of your experience so far using 7 new words that you have learned this week.

**Option 2:** If you are following the 2-week program, students will be sharing a Ted talk at the end of the week, and you will follow these plans for the 30 minutes of the Discovery Lesson.

- 1) (5 minutes) Review the <u>TED Talk Rubric</u>. Allow students to share out the expectations for the project.
- 2) (25 minutes) Allow students time to work on their TED Talk- Walk around and monitor students for questions and support.

By the end of the time allotted today, students should complete:

- Approximately 5 index cards with script or talking points for TedTalk presentation.
- The start of a picture slideshow for their TedTalk presentation.

## Nutrition Lesson (60 minutes):

- 1) (5 minutes) Ask students to share some of the fruits and vegetables that they included on their Mission Possible: Exploring New Foods Task #2.
- 1) (20 minutes) Allow students to explore the interactive on their own or with a partner and select their meals for the day. You may want to have students take screenshots of their completed meal selections to share with the class later on.
- 2) (5 minutes) Talk with students about the meals they created. Did they notice any foods that significantly moved the calorie bar? Why do they think that is? What foods could be added to make a meal more substantial and filling without excessively moving the calorie bar? Do all meals have to have a perfectly precise balance of nutrients, or can they be spaced out throughout the day? Why? What were the biggest challenges in creating a balanced diet in Build a Meal? What are the biggest challenges in real life?
- 3) (25 minutes) Create the <u>Strawberry Banana Smoothie Bowl Recipe</u> with students.
- 4) (5 minutes) Introduce students to Task #2 for <u>Mission Possible: Exploring New</u> <u>Foods</u>. Tell students that just like the Strawberry Banana Smoothie Bowl recipe

that they tried, their goal is to try new healthy food options and explore new recipes this week while they are at home.

## Focus 2: Plant Genetics Lesson 2.4

#### About the Activities:

For Focus 2, Lesson 2.4, students will continue to run through the standard procedures and operations without being led by a teacher/facilitator. Allow an ample amount of time for students to be independent in completing the tasks, planting and harvesting if needed. Students will participate in a short lesson on seedless plants and complete the next page in their interactive notebook.

In the Discovery Lesson, students will use the full 60 minutes to make sure that they are fully prepared for their Blog Presentation or TED Talk Presentation. Allow students to spread out in the available space to practice their public speaking.

In today's nutrition lesson, students will read a passage and complete an activity about pickling cucumbers. Students will then participate in a pickling activity as a way to preserve food. In this lesson, students will be distributing mixtures into jars, and they can taste their mixtures the following week. If you are running a two-week program, you may want students to take home a mixture that they have created to try with their families.

#### **Objectives:**

Students will be able to cite textual evidence to support their analysis of what the text says explicitly as well as make inferences about seedless plants. (RI.1.)

Students will determine the meaning of words and phrases as they are used in a text, including technical meanings (RI.4).

Students will be able to gather relevant information from multiple print and digital sources, and quote or paraphrase the data presented (W.8).

Students will be able to adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. (SL.6)

Students will be able to summarize the basic structures and functions of plants required for survival, reproduction, and defense (6L.1).

Students will learn and report on the process of food preservation by pickling (RST.6).

#### Here's What You'll Need:

- Aquaponics system
- Aquaponic Operating Procedures
- Anchor Chart Paper
- Markers
- Tracking Google Doc
- Noticing Notebooks
- Interactive notebook page 7 (one copy per student)
- "Seedless Plant Types": <u>https://mocomi.com/what-are-seedless-plants/</u> \*share link with students
- Glue sticks (to glue interactive notebook page into notebook)
- Chromebooks and/or Individual Student devices
- Individual student devices for blogging
- Index cards
- <u>Blog Presentation Rubric</u>
- <u>TED Talk Rubric</u>
- Mission Possible: Exploring New Foods
- <u>Refrigerator Pickles Activity</u> and Ingredients \*You may want each student to create their own jar of pickles for this activity.
  - -cutting board
  - -bowl
  - -knife
  - -jars with lids
  - -labels
  - -marker
  - -measuring cup and teaspoon
  - -vinegar
  - -water
  - -mustard seed
  - -peppercorns
  - -kosher salt
  - -fresh or dried dill
  - -cucumbers

#### **Directions:**

#### **Exploration Lesson (120 minutes):**

1) (5 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students.

Some possible questions to ask are: -What are some ways to preserve food? -How are pickles made? -What is something that you have learned about plant genetics this week?

- 2) (45 minutes) Allow time for students to run through the operating procedures, transferring plants to the system, or harvesting the lettuce. The timeline that these tasks are performed all depend on your system.
- 3) (60 minutes) Pass out the 4th page for student interactive notebooks (page 7): "Seedless Plants." Each page can be cut in half and pasted in student composition notebooks. Students will go to the link that you have shared in order to complete this interactive notebook page. An answer key is provided with the interactive notebook file. Allow students to work in pairs or in groups, taking notes on crucial information found in the passage. You may want to model reading and taking notes on anchor chart paper with one paragraph of the article before students begin. Be sure to go over the activity page when students are finished. Allow students to work on their blog posts or the Genetically Modified Foods WebQuest from Lesson 2.3 if there is additional time.
- 5) (10 minutes) Use this additional time to catch-up on exploration lessons, play community building games, work on the Genetically Modified Foods WebQuest, or allow students to work on their blog posts.

Additional Resource: https://www.youtube.com/watch?v=LSNGTSVXJto

#### **Discovery Lesson (60 minutes):**

(60 minutes) Give students the full amount of time to work on their Blog Presentations or TED Talk.

**Option 1:** If you are following the 4-week program, students will share their blog posts during the next lesson, and you will follow these plans for the entirety of the Discovery Lesson.

- 1) (5 minutes) Review the <u>Blog Presentation Rubric</u>. Allow students to share out the expectations for the project.
- 2) (55 minutes) Give students the remaining time to work on their blog post presentations. Students may use their personal devices to take pictures of the system to add to their blog post. At some point, students should have a complete script or brainstormed talking points and should have practiced their

presentation in front of the teacher or a peer. Walk around and monitor students for questions and support during this time.

**Option 2:** If you are following the 2-week program, students will be sharing a TED talk in the next lesson, and you will follow these plans for the entirety of the Discovery Lesson.

- 1) (5 minutes) Review the <u>TED Talk Rubric</u>. Allow students to share out the expectations for the project.
- 2) (30 minutes) Allow students the remaining time to work on their TED Talk. Walk around and monitor students for questions and support.
  - By the end of the time allotted, students should:
    - Have a completed script or talking points on index cards.
    - Have a completed picture slideshow that they will use for their presentation.
    - Practiced their presentation in front of a teacher or peer.

## Nutrition Lesson (60 minutes):

- 1) (5 minutes) Ask students to share some of the healthy proteins that they included or tried on their Mission Possible: Exploring New Foods Task #3.
- 2) (20 minutes) Pass out the text "<u>Pickling Cucumbers</u>" by the California Foundation for Agriculture in the Classroom. Read through the text with students or have students read in partners or groups. Tell students that after reading the text, they will complete the following activity with the remaining time:
  - Create a visual timeline of the history of cucumbers using the article "Pickling Cucumbers" and research (for specific years).

Students will create their visual timeline with a partner or in a small group using anchor chart paper. Give students the opportunity to share their work with the whole group through presentations or a carousel viewing around the room. You may need to extend this activity to the following day if there is not enough time.

3) (30 minutes) Complete the <u>Refrigerator Pickles Activity</u> with students. Be sure that students know that they will have to wait a week to try the pickles (if they are completing the 4-week program), or they may take a jar home to enjoy with family in a week (either program).

4) (5 minutes) Introduce students to Task #4 for <u>Mission Possible: Exploring New</u> <u>Foods</u> allowing students to ask questions if needed.

# Focus 2: Plant Genetics Lesson 2.5

#### About the Activities:

In Focus 2, Lesson 2.5, students will continue to run through the standard procedures and operations without being led by a teacher/facilitator. Allow an ample amount of time for students to be independent in completing the tasks, planting and harvesting if needed. Students will use their interactive notebook pages from the week to complete a Quizizz and test their knowledge of the new vocabulary that they have learned while involved in the lessons based on plant genetics.

In the Discovery Lesson, students will be presenting their Blog Presentations or their TED Talk Presentations. This would be a great opportunity to allow students to invite family members or other teachers to come watch their presentation if it fits well with your program.

In the nutrition lesson, students will start the lesson by creating a lettuce wrap for themself that includes quinoa and black beans. At this point in your program, lettuce has most likely been harvested from your system. This lesson involves heads of lettuce, so you may want to find a way to incorporate that into your recipe. Depending on the program you are running, your group will either be receiving their Awards for completing the program or blogging about some of their experiences from the week.

#### **Objectives:**

Students will be able to cite textual evidence to support their analysis of what the text says explicitly as well as make inferences about seedless plants. (RI.1.)

Students will determine the meaning of words and phrases as they are used in a text, including technical meanings (RI.4).

Students will be able to gather relevant information from multiple print and digital sources, and quote or paraphrase the data presented (W.8).

Students will be able to adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. (SL.6)

Students will be able to summarize the basic structures and functions of plants required for survival, reproduction, and defense (6L.1).

#### Here's What You'll Need:

- Aquaponics system
- Aquaponic Operating Procedures
- Anchor Chart Paper
- Markers
- Tracking Google Form
- Noticing Notebooks
- Chromebooks and/or Individual Student devices
- Index cards
- <u>Quizizz</u>
- <u>Blog Presentation Rubric</u> (for feedback from teacher- one per student)\*4-week program
- <u>TED Talk Rubric</u> (for feedback from teacher- one per student)\*2-week program
- Mission Possible: Exploring New Foods
- <u>Certificate of Achievement</u> Award \*Be sure to print out on cardstock or laminate for students who are completing the 2-week program
- <u>Lettuce Wraps Recipe</u> and ingredients \*You may want to divide students into groups of 4 and have them work together to make the lettuce wraps. You will need a pan or a microwave to make the black bean portion of the recipe. You may also decide to make that ingredient beforehand depending on the availability of your materials.
- lettuce leaves
- quinoa
- salt and pepper
- black beans
- Red onions
- Garlic cloves
- Tomato puree
- Cumin
- Paprika powder
- Canned tomatoes- pureed or crushed
- Large tomatoes
- Lime juice
- Spring onion
- Tahini
- Maple syrup or other liquid sweetener
- Lemon juice

#### **Directions:**

## **Exploration Lesson (120 minutes):**

 (5 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students. This informal time is a great opportunity to connect with students while you are waiting for everyone to arrive.

Some possible questions to ask are: -What has been your favorite activity this week? -If you were to go home and teach one thing that you have learned to your family, what would it be? -What healthy recipe would you try at home?

- 2) (45 minutes) Allow time for students to run through the operating procedures, transferring plants to the system, or harvesting the lettuce. The timeline that these tasks are performed all depend on your system.
- 3) (70 minutes) Open the <u>Quizizz</u> for an interactive game with the entire group. Students should use their interactive notebook pages to complete the Quizizz. Stop and go over the information throughout the game. If there is additional time, allow students to work on the Genetically Modified Foods WebQuest from Lesson 2.3 or prepare for their TED Talk or Blog Post Presentation.

## Discovery Lesson (60 minutes):

**Option 1:** If you are following the 4-week program, students will be presenting their blog posts to the entire group. Be sure to have a Blog Presentation Rubric to fill out during each presentation to give feedback.

**Option 2:** If you are following the 2-week program, students will be presenting their TED Talks to the entire group. Be sure to have a TED Talk Rubric to fill out during each presentation to give feedback.

\*Depending on the size of your group, you may need to extend into the exploration and nutrition lessons to complete the presentations, or you may have additional time to spare. Feel free to work on any unfinished weekly activities, begin the recipe for the day, or allow students to play Kevin's Build-A-Meal Game.

## Nutrition Lesson (60 minutes):

- 1) (5 minutes) Ask students to share some of the whole grains that they included or tried on their Mission Possible: Exploring New Foods Task #4.
- 2) (30 minutes) Complete the Lettuce Wrap Recipe with students.
- 3) (20 minutes) Follow the option that coincides with your program (Option 1: 4-week, Option 2: 2-week)

**Option 1:** If you are following the 4-week program, students will take some time to blog about their experiences this week.

4) (15 minutes) Give students the following blog prompt. If there is additional time, allow students to share their experiences with the group.

**Blog Prompt:** Share your favorite activity or experience from the week! Why was it your favorite? What is something that you have taken away from that experience that you will incorporate into your life?

5) (5 minutes) Introduce students to Task #5 for <u>Mission Possible: Exploring New</u> <u>Foods</u> allowing students to ask questions if needed.

**Option 2:** If you are following the 2-week program, students will be receiving their Certificate of Achievement. If you would like to edit the certificate based on the program that your site is offering, please make a copy of the document.

4) (15 minutes) Call students up one-by-one to present them with their award. You may want to plan a few words about each student based on your observations on them throughout the program. If there is additional time, allow students to share the highlights of the program.

5) (5 minutes) Introduce students to Task #5 for <u>*Mission Possible: Exploring New</u></u> <u><i>Foods*</u> allowing students to ask questions if needed.</u>

## Focus 3: Business Extension and Design Lesson 3.1

#### About the Activities:

In Focus 3, Lesson 3.1, students will be focusing on a business extension and design through a 2-week PBL (Project Based Learning) that will take place during the discovery lesson. On day 1 in the exploration lesson, students will be assigned new jobs and will continue to go over the standard procedures and running the system. Students should be assigned a job that they have not experienced yet, so that they are continuing to learn about the different tasks needed to run an aquaponics system. For the remaining time in the exploration lesson for lessons 3.1-3.4, students will be listening to Podcasts featuring young entrepreneurs. Each day, students will reflect on the Podcast that they have listened to with a Podcast Response Activity Sheet. At the end of the week (Lesson 3.5), students will be creating their own Podcast.

During the discovery lesson, students will be working through Days 1/2 of the Aquaponics PBL written by Mrs. Linda Autry.

During the nutrition lesson, students will explain the four parts of food safety by working through guided notes. Students will be creating the same salad recipes from Focus 1. At this point, students should be comfortable calculating the amount of ingredients used, measuring and chopping, and preparing the meal. Allow students to have the freedom to work through these steps on their own with each other's support with the recipes during this Focus. Students will also be introduced to their new *Mission Possible: Feedback from Home* enrichment tasks to complete during Focus 3. For this week's *Mission Possible*, students will be asked to create the recipe of the day at home with their family or bring part of the day's recipe home to enjoy with their family. Be sure to provide ingredients for students to bring home OR ask students to bring in containers that can be used to transfer the recipe from your site to home. As always, the enrichment activity of the day is optional, so you may choose to opt out *Mission Possible* this week depending on your site's needs.

#### **Objectives:**

RI.7 Students will be able to integrate information presented through a podcast to develop a coherent understanding of the topic or issue.

SL.4 Students will be able to present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to articulate the ideas presented in the PBL.

EE.B.7 Students will be able to solve real-world mathematical problems by calculating the amount of ingredients needed for a recipe.

1.6.N Students will be able to explain how to keep food safe through proper purchasing, preparation, and storage practices.

#### Here's What You'll Need:

- Aquaponics system
- Aquaponic Operating Procedures
- Anchor Chart Paper
- Markers
- Tracking Google Form
- Noticing Notebooks
- Chromebooks or Individual Student devices
- <u>Podcast Response Sheet</u>
- Aquaponics PBL by Mrs. Linda Autry
- Podcast: Gabby's Bows: Gabby Goodwin by *YoungTrep with Benjamin Wong* \*accessed through Spotify or Apple Podcasts
- <u>Food Safety Article and Guided Notes</u>
- <u>Mission Possible: Feedback from Home</u> (one copy per student)
- <u>Broccoli Salad Recipe</u> and ingredients (quantity will vary):
  - \*Be sure to check with families about student allergies BEFORE attempting each recipe.
    - Broccoli florets
    - Shredded cheddar cheese
    - Chopped onion
    - Mayonnaise
    - White vinegar
    - sugar
    - Extra ingredients or a container to allow for students to share this recipe at home with their families

#### **Directions:**

## **Exploration Lesson (120 minutes):**

1) (10 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students.

Some possible questions to ask are:

- What healthy choice did you make from home recently?
- What has been your favorite recipe that we have created so far?

- What are you most excited about this week?
- 2) (10 minutes) Take 10-15 minutes to allow students to play a community building game or participate in an ice-breaker activity. For some ideas, go to <u>https://www.signupgenius.com/school/icebreaker-activities-middle-school-high -school.cfm</u>.
- 3) (40 minutes) Since this is a new Focus, review the rules and expectations while using the space by referring to the anchor chart created during Focus 1. Provide new job assignments for students. Then step back and allow students to navigate the procedures and operations themselves, making yourself available for questions or direction as needed. *This may take more than 30 minutes, but allow it to take all the time needed*.
- 4) (60 minutes) Tell students that this week they will be listening to a Podcast called YoungTrep by Benjamin Wong which focuses on some of the world's greatest entrepreneurs from 14-year old Benjamin Wong's perspective. Tell students that this focus on entrepreneurs will lead into their Discovery Lesson each day in which they will focus on creating a business through aquaponics through a PBL. This Podcast can be accessed through Spotify or Apple Podcasts. Each day, students will reflect on the Podcast through a response sheet and discussion. Play the Podcast for students or allow them to listen on their individual devices and reflect independently before leading students into a discussion about the topic. Today's Podcast: Gabby's Bows: Gabby Goodwin by *YoungTrep with Benjamin Wong*.

## Discovery Lesson (60 minutes):

(60 minutes) Work through the first 2 days of the PBL with students. As a reminder, the first two days of lessons should be taught during the Discovery Lesson portion of Lessons 3.1 and 3.2, so manage your time effectively.

#### Nutrition Lesson (60 minutes):

 (30 minutes) Pass out the Food Safety Article and Guided Notes and allow students to read the article together, highlight pertinent information, and complete the guided notes. Allow time to go over the guided notes, answer questions, and have a discussion around food safety before moving on to the creation of the Broccoli Salad.

- 2) (25 minutes) Give students the freedom to create the Broccoli Salad recipe from Focus 1 on their own. Allow them to ask their peers questions and for help when needed.
- 3) Pass out the *Mission Possible: Feedback from Home* activity sheet and go over Task #1. Tell students that this week they will be sharing the recipes that they create during the nutrition lessons with their families and recording feedback to share with the group the next day.

# Focus 3: Business Extension and Design Lesson 3.2

#### About the Activities:

In Focus 3, Lesson 3.2, students will continue to go over the standard procedures and running the system. Be sure to take time for students to plant or harvest, fill out observations in their noticing notebooks, and interpret data if necessary. For the remaining time in the exploration lesson, students will listen to another *YoungTrep with Benjamin Wong* episode and complete a Podcast Response Activity Page.

During the discovery lesson, students will be working through Days 1/2 of the Aquaponics PBL written by Mrs. Linda Autry.

During the nutrition lesson, students will share their experiences with *Mission Possible: Feedback from Home* Task #1. They will then work on a blog post about their experiences. For the remaining time, students will work together to create another Strawberry and Spinach Salad recipe that they will share with their families for Task #2 on their Mission Possible.

#### **Objectives:**

RI.7 Students will be able to integrate information presented through a podcast to develop a coherent understanding of the topic or issue.

SL.4 Students will be able to present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to articulate the ideas presented in the PBL.

EE.B.7 Students will be able to solve real-world mathematical problems by calculating the amount of ingredients needed for a recipe.

1.6.N Students will be able to explain how to keep food safe through proper purchasing, preparation, and storage practices.

#### Here's What You'll Need:

- Aquaponics system
- Aquaponic Operating Procedures
- Anchor Chart Paper
- Markers
- Tracking Google Form
- Noticing Notebooks

- Chromebooks or Individual Student devices
- <u>Podcast Response Sheet</u>
- Aquaponics PBL by Mrs. Linda Autry
- Podcast: Aspiring Kidpreneurs: Sammie Vance and Justin Sather by *YoungTrep* with Benjamin Wong \*accessed through Spotify or Apple Podcasts
- Mission Possible: Feedback from Home
- <u>Strawberry and Spinach Salad</u> Recipe and ingredients (quantity will vary):
  \*Be sure to check with families about student allergies BEFORE attempting each recipe.
  - Spinach
  - Strawberries
  - Crumbled Feta Cheese
  - red onion
  - Pecans
  - Dressing (optional: provide choices for students)
  - Extra ingredients or a container to allow for students to share this recipe at home with their families

#### **Directions:**

## Exploration Lesson (120 minutes):

1) (10 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students.

Some possible questions to ask are:

- How did your family respond to the broccoli salad?
- What is something new that you have learned about food safety?
- If you were to create your own Podcast, what would it be about? Why?
- 2) (45 minutes) Step back and allow students to navigate the procedures and operations of the system themselves, making yourself available for questions or direction as needed. Plant and harvest if necessary. Be sure that students are filling out observations in their Noticing Notebooks, and if you have extra time, discuss some of the trends in data that you may be noticing.
- 3) (65 minutes) Give students the remaining time of the exploration lesson to listen to the day's Podcast: Aspiring Kidpreneurs: Sammie Vance and Justin Sather by *YoungTrep with Benjamin Wong* and complete the Podcast Response Activity Page. Allow students to share their thoughts with the group and how these podcasts tie in with the Aquaponics PBL in the Discovery Lesson.
## Discovery Lesson (60 minutes):

(60 minutes) Work through the first 2 days of the PBL with students. As a reminder, the first two days of lessons should be taught during the Discovery Lesson portion of Lessons 3.1 and 3.2, so manage your time effectively.

#### Nutrition Lesson (60 minutes):

- 1) (10 minutes) Allow students to share their experiences sharing the Broccoli Salad recipe with their families during Task #1 of the Mission Possible.
- 2) (20 minutes) Allow students to blog about their experiences.

**Blog Prompt:** Share some fun moments, a highlight from the experience, or reactions to the tasting of the Broccoli Salad when you shared the recipe with your family. Do you think your family would make this recipe again? Why or why not?

- 3) (25 minutes) Give students time to work together to create the Strawberry and Spinach Recipe from Focus 1.
- 4) (5 minutes) Go over Task #2 on the *Mission Possible: Feedback from Home* activity sheet.

# Focus 3: Business Extension and Design Lesson 3.3

#### About the Activities:

In Focus 3, Lesson 3.3, students will continue to go over the standard procedures and running the system. Be sure to take time for students to plant or harvest, fill out observations in their noticing notebooks, and interpret data if necessary. For the remaining time in the exploration lesson, students will listen to another *YoungTrep with Benjamin Wong* episode and complete a Podcast Response Activity Page.

During the discovery lesson, students will be working through Days 3/4 of the Aquaponics PBL written by Mrs. Linda Autry.

During the nutrition lesson, students will share their experiences with *Mission Possible: Feedback from Home* Task #2. They will then work in teams to create the perfect garden salad recipe (also seen in Lesson 1.3). Using the input of others in their assigned groups, students will decide what will be used in the day's recipe. In the assigned groups and on anchor chart paper, students will create a garden salad recipe that they will present with the group. The class will then work together to share feedback and give suggestions to create their own recipe that they will create and taste.

#### **Objectives:**

RI.7 Students will be able to integrate information presented through a podcast to develop a coherent understanding of the topic or issue.

SL.4 Students will be able to present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to articulate the ideas presented in the PBL.

EE.B.7 Students will be able to solve real-world mathematical problems by calculating the amount of ingredients needed for a recipe.

1.6.N Students will be able to explain how to keep food safe through proper purchasing, preparation, and storage practices.

- Aquaponics system
- Aquaponic Operating Procedures
- Anchor Chart Paper

- Markers
- Tracking Google Form
- Noticing Notebooks
- Chromebooks or Individual Student devices
- Podcast Response Sheet
- <u>Aquaponics PBL</u> by Mrs. Linda Autry
- Podcast: Evan Carmichael: #Believe by *YoungTrep with Benjamin Wong* \*accessed through Spotify or Apple Podcasts
- <u>Mission Possible: Feedback from Home</u> (one copy per student)
- Garden Salad Ingredient Options:
  - \*Be sure to check with families about student allergies BEFORE attempting each recipe
  - Lettuce
  - Tomato
  - Onion
  - Croutons or Other Salad Topper
  - Dressing

## Exploration Lesson (120 minutes):

1) (10 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students.

- How did your family respond to the strawberry-spinach salad?
- What is something new that you have learned or taken away from the podcasts that we have listened to?
- What are you most looking forward to in today's lesson?
- 2) (45 minutes) Step back and allow students to navigate the procedures and operations of the system themselves, making yourself available for questions or direction as needed. Plant and harvest if necessary. Be sure that students are filling out observations in their Noticing Notebooks, and if you have extra time, discuss some of the trends in data that you may be noticing or allow students to work on their blog posts.
- 3) (65 minutes) Give students the remaining time of the exploration lesson to listen to the day's Podcast: Evan Carmichael: #Believe by *YoungTrep with Benjamin Wong* and complete the Podcast Response Activity Page. Allow students to share

their thoughts with the group and how these podcasts tie in with the Aquaponics PBL in the Discovery Lesson.

## Discovery Lesson (60 minutes):

(60 minutes) Work through days 3 and 4 of the PBL with students. As a reminder, days 3 and 4 should be taught during the Discovery Lesson portion of Lessons 3.3 and 3.4, so manage your time effectively.

## Nutrition Lesson (60 minutes):

- (10 minutes) Allow students to share their experiences sharing the Strawberry-Spinach Salad recipe with their families during Task #2 of the Mission Possible.
- 2) (5 minutes) To begin, tell students they're going to be working in teams to create a garden salad recipe.
  - a) Divide students into even teams.
  - b) Tell students that their mission is to create the perfect garden salad recipe, not using too much or too little of anything (they will use the ingredients that you have provided on the board for them).
- 3) (10 minutes) Allow students time to create their recipe with their group. They will write-out and design their recipe on anchor chart paper. Remind students of the recipes they have seen in previous lessons- their recipe should follow that outline (you may want to have examples posted on the wall).
- 4) (10 minutes) Students will present their recipes to the class. Allow students to give positive feedback and write down this feedback on chart paper or a whiteboard. For example, if a student comments about a certain ingredient being used, write that down so that you can come back to it.
- 5) (10 minutes) As a class, create a garden salad recipe using the positive feedback from the presentations. Be sure to discuss the general outline of a recipe as you are writing the class recipe on chart paper for all students to see.
- 6) (10 minutes) Use the remaining time to divy up the ingredients, bowls, and measuring and mixing tools among groups, so they can work together to create and try the garden salad.
- 7) (5 minutes) Go over Task #3 on the *Mission Possible: Feedback from Home* activity sheet.

# Focus 3: Business Extension and Design Lesson 3.4

#### About the Activities:

In Focus 3, Lesson 3.4, students will continue to go over the standard procedures and running the system. Be sure to take time for students to plant or harvest, fill out observations in their noticing notebooks, and interpret data if necessary. For the remaining time in the exploration lesson, students will listen to another *YoungTrep with Benjamin Wong* episode and complete a Podcast Response Activity Page.

During the discovery lesson, students will be working through Days 3/4 of the Aquaponics PBL written by Mrs. Linda Autry.

During the nutrition lesson, students will share their experiences with *Mission Possible: Feedback from Home* Task #3. They will then use the remaining time to complete their next blog post and make and taste a Caesar Salad.

#### **Objectives:**

RI.7 Students will be able to integrate information presented through a podcast to develop a coherent understanding of the topic or issue.

SL.4 Students will be able to present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to articulate the ideas presented in the PBL.

EE.B.7 Students will be able to solve real-world mathematical problems by calculating the amount of ingredients needed for a recipe.

1.6.N Students will be able to explain how to keep food safe through proper purchasing, preparation, and storage practices.

- Aquaponics system
- Aquaponic Operating Procedures
- Anchor Chart Paper
- Markers
- Tracking Google Form
- Noticing Notebooks
- Chromebooks or Individual Student devices

- <u>Podcast Response Sheet</u>
- <u>Aquaponics PBL</u> by Mrs. Linda Autry
- Podcast: Devin Burke: Sleeping to Success by *YoungTrep with Benjamin Wong* \*accessed through Spotify or Apple Podcasts
- <u>Mission Possible: Feedback from Home</u>
- <u>Caesar Salad Recipe</u> and Ingredients
  - Romaine lettuce
  - Parmesan cheese
  - Croutons
  - Caesar Dressing

## Exploration Lesson (120 minutes):

1) (10 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students.

- Did your family enjoy the Garden Salad Recipe?
- What is a book or show that you are enjoying lately?
- Have you learned anything useful from the podcasts that we have been listening to?
- 2) (45 minutes) Step back and allow students to navigate the procedures and operations of the system themselves, making yourself available for questions or direction as needed. Plant and harvest if necessary. Be sure that students are filling out observations in their Noticing Notebooks, and if you have extra time, discuss some of the trends in data that you may be noticing or allow students to work on their blog posts.
- 3) (65 minutes) Give students the remaining time of the exploration lesson to listen to the day's Podcast: Devin Burke: Sleeping to Success by *YoungTrep with Benjamin Wong* and complete the Podcast Response Activity Page. Allow students to share their thoughts with the group and how these podcasts tie in with the Aquaponics PBL in the Discovery Lesson.

## Discovery Lesson (60 minutes):

(60 minutes) Work through days 3 and 4 of the PBL with students. As a reminder, days 3 and 4 should be taught during the Discovery Lesson portion of Lessons 3.3 and 3.4, so manage your time effectively.

#### Nutrition Lesson (60 minutes):

- 1) (10 minutes) Allow students to share their experiences sharing the Garden Salad recipe with their families during Task #3 of the Mission Possible.
- 2) (20 minutes) Give students the following prompt and allow them time to work on their blogs.

**Blog Prompt** If you were to create your own podcast, what would it be about? What would you incorporate into your podcast based on the podcasts that we have been listening to, to ensure that your podcast is successful?

- 3) (25 minutes) Allow students to make and taste the Caesar Salad Recipe.
- 4) (5 minutes) Go over Task #4 on the *Mission Possible: Feedback from Home* activity sheet.

# Focus 3: Business Extension and Design Lesson 3.5

#### About the Activities:

In Focus 3, Lesson 3.5, students will continue to go over the standard procedures and running the system. Be sure to take time for students to plant or harvest, fill out observations in their noticing notebooks, and interpret data if necessary. For the remaining time in the exploration lesson, students will be creating their own podcast about a specific topic that they have learned about in Focus 1-3.

During the discovery lesson, students will be working through Days 4/5 of the Aquaponics PBL written by Mrs. Linda Autry.

During the nutrition lesson, students will share their experiences with *Mission Possible: Feedback from Home* Task #4. They will then use the remaining time to complete and/or share their podcasts and make and taste a fruit salad.

#### **Objectives:**

RI.7 Students will be able to integrate information presented through a podcast to develop a coherent understanding of the topic or issue.

SL.4 Students will be able to present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to articulate the ideas presented in the PBL.

EE.B.7 Students will be able to solve real-world mathematical problems by calculating the amount of ingredients needed for a recipe.

1.6.N Students will be able to explain how to keep food safe through proper purchasing, preparation, and storage practices.

- Aquaponics system
- Aquaponic Operating Procedures
- Anchor Chart Paper
- Markers
- Tracking Google Form
- Noticing Notebooks
- Chromebooks or Individual Student devices

- <u>Create a Podcast</u> Activity Sheet by Mrs. Morgan Mosher (one per student)
- Aquaponics PBL by Mrs. Linda Autry
- Mission Possible: Feedback from Home
- Fruit Salad Recipe and Ingredients
  - Pineapple
  - Orange
  - red apple
  - seedless red grapes
  - seedless green grapes
  - Strawberry yogurt or cool whip

## **Exploration Lesson (120 minutes):**

1) (10 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students.

- What has been your favorite activity during this Focus week?
- What recipe has been your family's favorite so far?
- What is something new and exciting that is happening in your life?
- 2) (45 minutes) Step back and allow students to navigate the procedures and operations of the system themselves, making yourself available for questions or direction as needed. Plant and harvest if necessary. Be sure that students are filling out observations in their Noticing Notebooks, and if you have extra time, discuss some of the trends in data that you may be noticing or allow students to work on their blog posts.
- 3) (65 minutes) Pass out the Create a Podcast Activity Sheet and allow students to work while you walk around and answer questions or provide assistance when necessary. If students do not have enough time to complete the activity, they will have part of the nutrition lesson to finish and to listen to and provide feedback for the podcasts of their peers.

## Discovery Lesson (60 minutes):

(60 minutes) Work through days 5 and 6 of the PBL with students. As a reminder, days 5 and 6 should be taught during the Discovery Lesson portion of Lessons 3.5 and 4.1, so manage your time effectively.

#### Nutrition Lesson (60 minutes):

- 1) (10 minutes) Allow students to share their experiences sharing the Caesar Salad recipe with their families during Task #4 of the Mission Possible.
- 2) (20 minutes) Allow students to finish their "Create a Podcast" activity as well as view and provide positive feedback to the podcasts of their peers.
- 3) (25 minutes) Allow students to make and taste the Fruit Salad Recipe.
- 4) (5 minutes) Go over Task #5 on the *Mission Possible: Feedback from Home* activity sheet.

## Focus 4: Business Extension and Design Continued... Lesson 4.1

#### About the Activities:

In Focus 4, Lesson 4.1, students will continue to go over the standard procedures and running the system. Be sure to take time for students to plant or harvest, fill out observations in their noticing notebooks, and interpret data if necessary. This week, students will track the fish growth as well as analyze the trends over the past week. For the remaining time in the exploration lesson, students will be participating in the TED Talk lessons from Focus 2 (Option 2: 2-week program). These lessons should be new for this group of students if the curriculum was followed using the Option 1: 4-week program outline.

During the discovery lesson, students will be working through Days 4/5 of the Aquaponics PBL written by Mrs. Linda Autry.

During the nutrition lesson, students will have time building meals through Kevin's Build-A-Meal Game, and will participate in the making and tasting of Ranch Cucumber Bites. Students will also be introduced to their *Mission Possible: Feedback from Home* for the week.

#### **Objectives:**

RI.7 Students will be able to integrate information presented through a podcast to develop a coherent understanding of the topic or issue.

SL.4 Students will be able to present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to articulate the ideas presented in the PBL.

EE.B.7 Students will be able to solve real-world mathematical problems by calculating the amount of ingredients needed for a recipe.

1.6.N Students will be able to explain how to keep food safe through proper purchasing, preparation, and storage practices.

- Aquaponics system
- Aquaponic Operating Procedures
- Anchor Chart Paper
- Markers

- Tracking Google Form
- Noticing Notebooks
- Chromebooks or Individual Student devices
- <u>What is a TED Talk</u> printable (one copy for each student)
- <u>TED Talk Rubric</u>
- <u>Aquaponics PBL</u> by Mrs. Linda Autry
- <u>Mission Possible: Feedback from Home 2</u> (one copy per student)
- Kevin's Build-A-Meal Game: <u>http://www.nourishinteractive.com/kids/healthy-games/6-kevins-build-a-meal-game-balanced-meals</u>
- Ranch Cucumber Bites Recipe and Ingredients
- Cream cheese, softened
- Dried parsley
- Dried dill
- Garlic powder
- Onion powder
- Salt
- Pepper
- Sliced cucumbers
- Halved cherry tomatoes

## Exploration Lesson (120 minutes):

1) (10 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students.

- What healthy choice did you make over the weekend?
- What are you most looking forward to during this Focus?
- What did you enjoy most about the Podcast activity?
- 2) (45 minutes) Step back and allow students to navigate the procedures and operations of the system themselves, making yourself available for questions or direction as needed. Plant and harvest if necessary. Be sure that students are filling out observations in their Noticing Notebooks, and if you have extra time, discuss some of the trends in data that you may be noticing or allow students to work on their blog posts.
- 3) (20 minutes) Begin by explaining to students that they will be creating a Ted Talk at the end of the week. The goal of the Ted Talk is to build critical public speaking

skills. Pass out the Ted Talk Presentation Rubric. Show students a Ted Talk Example given by a kid: <u>https://www.youtube.com/watch?v=px9CzSZsa0Y</u> You can also search: *The Mindset of a Champion by Carson Byblow* on Youtube to have access to this video.

\*While students are watching the Ted Talk, ask them to record any wonderings or observations on an index card.

- 4) (10 minutes) After watching the video, ask students these questions:
  - What is the presenter's main message/idea?
  - What are some of the things that the presenter does to engage the audience?
- 5) (35 minutes) Read the article: "What is a Ted Talk" with students. Tell students that they will be creating a Ted Talk that discusses one of the following big ideas:
  - -Healthy Eating
  - Benefits of an Aquaponics System
  - -Nutrition in schools
  - -The History of Aquaponics
  - -Plant Genetics

Allow for students to ask any questions at this point. Tell students that their at-home task will be to figure out what big idea they will focus on. Allow students to take their rubrics home to discuss with their families.

## Discovery Lesson (60 minutes):

(60 minutes) Work through days 5 and 6 of the PBL with students. As a reminder, days 5 and 6 should be taught during the Discovery Lesson portion of Lessons 3.5 and 4.1, so manage your time effectively.

## Nutrition Lesson (60 minutes):

- (30 minutes) Allow students to have time to build meals on Kevin's Build-A-Meal Game. You may choose for students to work with partners and explain their choices as they select each food. Model for students how to make positive constructive comments about their partners food choices such as how balanced the meals are and how they can be improved.
- 2) (25 minutes) Allow students to make and taste the Cucumber Bites Recipe.
- 3) (5 minutes) Pass out the Mission Possible Activity Sheet for the week. Tell students that they will once again be making and tasting the recipes created

during their nutrition lessons with their families. Go over Task #1 on the *Mission Possible: Feedback from Home* activity sheet.

# Focus 4: Business Extension and Design Continued... Lesson 4.2

#### About the Activities:

In Focus 4, Lesson 4.2, students will continue to go over the standard procedures and running the system. Be sure to take time for students to plant or harvest, fill out observations in their noticing notebooks, and interpret data if necessary. For the remaining time in the exploration lesson, students will be participating in the TED Talk lessons from Focus 2 (Option 2: 2-week program). These lessons should be new for this group of students if the curriculum was followed using the Option 1: 4-week program outline.

During the discovery lesson, students will be working through Days 7/8 of the Aquaponics PBL written by Mrs. Linda Autry.

During the nutrition lesson, students will reflect on how healthy they are eating with a true/false quiz. They will use this information to create a wellness goal that they will work to accomplish even after finishing the program. Students will then make and taste the Mexican Street Corn Dip Recipe that they will share with families at home for Task #2 of their *Mission Possible: Feedback from Home*.

#### **Objectives:**

RI.7 Students will be able to integrate information presented through a podcast to develop a coherent understanding of the topic or issue.

SL.4 Students will be able to present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to articulate the ideas presented in the PBL.

EE.B.7 Students will be able to solve real-world mathematical problems by calculating the amount of ingredients needed for a recipe.

1.6.N Students will be able to explain how to keep food safe through proper purchasing, preparation, and storage practices.

- Aquaponics system
- Aquaponic Operating Procedures
- Anchor Chart Paper
- Markers

- Tracking Google Form
- Noticing Notebooks
- Chromebooks or Individual Student devices
- How Do People Prepare for a TED Talk? printable (one copy for each student)
- <u>TED Talk Rubric</u>
- <u>Aquaponics PBL</u> by Mrs. Linda Autry
- <u>How Healthy Are You Eating? Survey (one copy per student)</u>
- Mission Possible: Feedback from Home 2
- <u>Mexican Street Corn Dip Recipe</u> and Ingredients \*This recipe will need to be refrigerated before enjoying it, so you may want to make it at the beginning of the lesson or let students know that they will be trying the recipe the following day.
- ears of grilled or cooked corn
- mayo
- cream cheese softened
- cayenne pepper
- cotija cheese crumbled
- cilantro chopped
- Lime wedges for garnish (optional)
- Tortilla Chips
  \*Check about student allergies BEFORE attempting each recipe

## <u>Directions:</u> <u>Exploration Lesson (120 minutes):</u>

1) (10 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students.

- Did your family enjoy the ranch cucumber bites? What was a highlight from the experience?
- On a scale from 1-10, rate how healthy you think you are. Why do you give yourself that rating?
- What is a good book/tv show that you are reading/watching at the moment?
- 2) (45 minutes) Step back and allow students to navigate the procedures and operations of the system themselves, making yourself available for questions or direction as needed. Plant and harvest if necessary. Be sure that students are filling out observations in their Noticing Notebooks, and if you have extra time,

discuss some of the trends in data that you may be noticing or allow students to work on their blog posts.

- 3) (30 minutes) To begin, show students the TedTalk: <u>Your Body Language May</u> <u>Shape Who You Are</u>. Lead a discussion on body language, these questions can be a good starting place:
- What does body language tell us?
- Are you always aware of your nonverbals?
- What are you going to take away from this TedTalk?
- How are you going to apply what you've learned to your own presentation?
- 4) (35 minutes) Pass out <u>How do People Prepare for a TED Talk? printable (one copy for each student)</u>. Allow students to read the passage with a partner or in a small group and reflect on the question provided: How do you feel about public speaking? Lead an open discussion about the topic and allow students to share their feelings. Assure students that every speaker feels nervous before giving a presentation, but the key is to be prepared. Students will use the next few days to really prepare for their TED Talk that they will give on the 5th lesson of the Focus.

\*By the end of the Focus 4.2 lesson, students should have shared their topic for the TED Talk with the teacher. The topics of choice include:

-Healthy Eating

- Benefits of an Aquaponics System
- -Nutrition in schools

-The History of Aquaponics

-Plant Genetics

#### Discovery Lesson (60 minutes):

(60 minutes) Work through days 7 and 8 of the PBL with students. As a reminder, days 7 and 8 should be taught during the Discovery Lesson portion of Lessons 4.2 and 4.3, so manage your time effectively.

## Nutrition Lesson (60 minutes):

1) (30 minutes) Pass out the "How Healthy Are You Eating? Survey" to students and allow them to independently work through the true/false questions. Students will then calculate their score and create a wellness goal that they would like to work on reaching even as the program comes to an end. Tell students that it is important to set goals (both short-term and long-term), and it takes small efforts every day to reach those goals. Model for students how to create a goal on anchor

chart paper and outline some of the small efforts that you would take each day to reach that goal.

Example: I will exercise for at least 30 minutes, 3 times a week, and do this consistently for one month.

Small Efforts:

- On Mondays, Wednesdays, and Fridays I will plan a 45 minute block into my day to get ready and get a 30 minute workout in.
- I will research fun exercise activities that I can participate in throughout my community.
- I will set aside workout clothes and sneakers on Mondays, Wednesday, and Fridays, so I am better prepared for my workout.

Tell students that once they have achieved their goal, they can always build upon it. For example, after one month of consistently working out for 3 days for 30 minutes, the goal setter may decide to try one month of 5 day, 30 minute workouts. Have students outline their goals and small efforts in their noticing notebooks.

- 2) (25 minutes) Allow students to make and taste the Mexican Street Corn Dip Recipe. You may want to refrigerate this recipe and enjoy the following day, or start the day with the nutrition lesson.
- 3) (5 minutes) Go over Task #2 on the *Mission Possible: Feedback from Home* activity sheet and allow students to share family reactions to the cucumber ranch bites from Task #1.

# Focus 4: Business Extension and Design Continued... Lesson 4.3

#### About the Activities:

In Focus 4, Lesson 4.3, students will continue to go over the standard procedures and running the system. Be sure to take time for students to plant or harvest, fill out observations in their noticing notebooks, and interpret data if necessary. For the remaining time in the exploration lesson, students will be participating in a hands-on activity involving tracking the fish growth. This will take place during the Exploration Lesson after going over standard procedures and running the system. Depending on your program, students will be tracking the growth of the fish once a month to determine the daily amount of feed to give the fish based on body weight, so you can fit this lesson in where necessary.

During the discovery lesson, students will be working through Days 7/8 of the Aquaponics PBL written by Mrs. Linda Autry.

During the nutrition lesson, students will blog about their wellness goal and the small efforts that they will take in order to achieve this goal (from Lesson 4.2). Students will then make and taste the Strawberry Banana Smoothie Bowl Recipe that they will share with families at home for Task #3 of their *Mission Possible: Feedback from Home*.

#### **Objectives:**

RI.7 Students will be able to integrate information presented through a podcast to develop a coherent understanding of the topic or issue.

SL.4 Students will be able to present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to articulate the ideas presented in the PBL.

EE.B.7 Students will be able to solve real-world mathematical problems by calculating the amount of ingredients needed for a recipe.

1.6.N Students will be able to explain how to keep food safe through proper purchasing, preparation, and storage practices.

- Aquaponics system
- Aquaponic Operating Procedures
- Anchor Chart Paper

- Markers
- Tracking Google Form
- Noticing Notebooks
- Tracking Fish Growth in the Aquaponics System Lesson
- Chromebooks or Individual Student devices
- Aquaponics PBL by Mrs. Linda Autry
- Mission Possible: Feedback from Home 2
- <u>Strawberry Banana Smoothie Bowl Recipe</u> and Ingredients \*You may need to allow more time for students to create this recipe if you only have access to one blender.
- blender
- small bowls (one per student)
- frozen bananas
- strawberries
- almond milk

**Optional Toppings:** 

- chopped strawberries
- crunch granola

\*Check about student allergies BEFORE attempting each recipe

#### **Directions:**

### **Exploration Lesson (120 minutes):**

1) (10 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students.

- Did your family enjoy the Mexican Street Corn Dip? What was a highlight from the experience?
- What wellness goal did you create for yourself yesterday? How are you going to be successful?
- What is a good book/tv show that you are reading/watching at the moment?
- 2) (45 minutes) Step back and allow students to navigate the procedures and operations of the system themselves, making yourself available for questions or direction as needed. Plant and harvest if necessary. Be sure that students are filling out observations in their Noticing Notebooks, and if you have extra time, discuss some of the trends in data that you may be noticing or allow students to work on their blog posts.

3) (65 minutes) Begin the tracking of the fish growth lesson. See "Tracking Fish Growth in the Aquaponics System" for detailed directions and steps.

### **Discovery Lesson (60 minutes):**

(60 minutes) Work through days 7 and 8 of the PBL with students. As a reminder, days 7 and 8 should be taught during the Discovery Lesson portion of Lessons 4.2 and 4.3, so manage your time effectively.

## Nutrition Lesson (60 minutes):

1) (30 minutes) Allow students to blog about the wellness goal that they created in Lesson 4.2.

**Blog Prompt** After completing the "How Healthy Are You? Survey" yesterday, what did you determine? What wellness goal did you create based on what you discovered? What small efforts will you take in order to reach your goal?

- 2) (25 minutes) Allow students to make and taste the Strawberry Banana Smoothie Bowl Recipe.
- 3) (5 minutes) Go over Task #3 on the *Mission Possible: Feedback from Home* activity sheet and allow students to share family reactions to the Mexican Street Corn Dip Recipe from Task #2.

# Focus 4: Business Extension and Design Continued... Lesson 4.4

#### About the Activities:

In Focus 4, Lesson 4.4, students will continue to go over the standard procedures and running the system. Be sure to take time for students to plant or harvest, fill out observations in their noticing notebooks, and interpret data if necessary. For the remaining time in the exploration lesson, students will work on the TED Talk Presentation that they will give in the next Lesson.

During the discovery lesson, students will be working through Days 9/10 of the Aquaponics PBL written by Mrs. Linda Autry.

During the nutrition lesson, students will be participating in the pickling activity and sharing the steps on their blogs. In this lesson, students will be distributing mixtures into jars, and they can taste their mixtures the following week. You may want to ensure that each student has an extra jar and ingredients to bring home to try with their families for Mission Possible Task #4.

#### **Objectives:**

RI.7 Students will be able to integrate information presented through a podcast to develop a coherent understanding of the topic or issue.

SL.4 Students will be able to present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to articulate the ideas presented in the PBL.

EE.B.7 Students will be able to solve real-world mathematical problems by calculating the amount of ingredients needed for a recipe.

1.6.N Students will be able to explain how to keep food safe through proper purchasing, preparation, and storage practices.

- Aquaponics system
- Aquaponic Operating Procedures
- Anchor Chart Paper
- Markers
- Tracking Google Form
- Noticing Notebooks

- Chromebooks or Individual Student devices
- <u>TED Talk Rubric</u>
- Aquaponics PBL by Mrs. Linda Autry
- Mission Possible: Feedback from Home 2
- <u>Refrigerator Pickles Activity</u> and Ingredients \*You may want each student to create their own jar of pickles for this activity.
  - -cutting board
  - -bowl
  - -knife
  - -jars with lids
  - -labels
  - -marker
  - -measuring cup and teaspoon
  - -vinegar
  - -water
  - -mustard seed
  - -peppercorns
  - -kosher salt
  - -fresh or dried dill
  - -cucumbers

## <u>Exploration Lesson (120 minutes):</u>

1) (10 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students.

- Did your family enjoy the Strawberry Banana Smoothie? What was a highlight from the experience?
- Can you describe how pickles are made? Hint: We learned about this in Focus 2.
- Tell me about your TED Talk.
- 2) (45 minutes) Step back and allow students to navigate the procedures and operations of the system themselves, making yourself available for questions or direction as needed. Plant and harvest if necessary. Be sure that students are filling out observations in their Noticing Notebooks, and if you have extra time, discuss some of the trends in data that you may be noticing or allow students to work on their blog posts.

- 3) (5 minutes) Review the <u>TED Talk Rubric</u>. Allow students to share out the expectations for the project.
- 4) (60 minutes) Allow students the remaining time to work on their TED Talk. Walk around and monitor students for questions and support.
  - By the end of the time allotted, students should:
    - Have a completed script or talking points on index cards.
    - Have a completed picture slideshow that they will use for their presentation.
    - Practiced their presentation in front of a teacher or peer.

## Discovery Lesson (60 minutes):

(60 minutes) Work through days 9 and 10 of the PBL with students. As a reminder, days 9 and 10 should be taught during the Discovery Lesson portion of Lessons 4.4 and 4.5, so manage your time effectively.

## Nutrition Lesson (60 minutes):

 (55 minutes) Complete the <u>Refrigerator Pickles Activity</u> with students. Be sure to give students more independence when completing the activity this time through. Tell students to write down the steps that they are completing in their Noticing Notebooks. With the remaining time, allow students to blog about the pickling activity. Tell students that they can use their blog posts steps when completing the activity at home with their families.

**Blog Post** How are pickles made? Describe the steps that you took to pickle cucumbers. Be sure to add pictures to your blog post.

2) (5 minutes) Go over Task #4 on the *Mission Possible: Feedback from Home* activity sheet and allow students to share family reactions to the Strawberry Banana Smoothie from Task #3.

# Focus 4: Business Extension and Design Continued... Lesson 4.5

#### About the Activities:

In Focus 4, Lesson 4.5, students will continue to go over the standard procedures and running the system. Be sure to take time for students to plant or harvest, fill out observations in their noticing notebooks, and interpret data if necessary. For the remaining time in the exploration lesson, students will give their TED Talk Presentations. This would be a great opportunity to allow students to invite family members or other teachers to come watch their presentation if it fits well with your program.

During the discovery lesson, students will be working through Days 9/10 of the Aquaponics PBL written by Mrs. Linda Autry.

In the nutrition lesson, students will start the lesson by creating a lettuce wrap for themself that includes quinoa and black beans. At this point in your program, lettuce has most likely been harvested from your system. This lesson involves heads of lettuce, so you may want to find a way to incorporate that into your recipe. You will then be running an Awards Ceremony where students receive an Awards for completing the program. If there is additional time, you may want students to share some of their blog posts with their peers.

#### **Objectives:**

RI.7 Students will be able to integrate information presented through a podcast to develop a coherent understanding of the topic or issue.

SL.4 Students will be able to present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to articulate the ideas presented in the PBL.

EE.B.7 Students will be able to solve real-world mathematical problems by calculating the amount of ingredients needed for a recipe.

1.6.N Students will be able to explain how to keep food safe through proper purchasing, preparation, and storage practices.

- Aquaponics system
- Aquaponic Operating Procedures
- Anchor Chart Paper

- Markers
- Tracking Google Form
- Noticing Notebooks
- Chromebooks or Individual Student devices
- <u>TED Talk Rubric</u> (for feedback from teacher- one per student)
- <u>Aquaponics PBL</u> by Mrs. Linda Autry
- Mission Possible: Feedback from Home 2
- <u>Lettuce Wraps Recipe</u> and ingredients \*You may want to divide students into groups of 4 and have them work together to make the lettuce wraps. You will need a pan or a microwave to make the black bean portion of the recipe. You may also decide to make that ingredient beforehand depending on the availability of your materials.
- lettuce leaves
- quinoa
- salt and pepper
- black beans
- Red onions
- Garlic cloves
- Tomato puree
- Cumin
- Paprika powder
- Canned tomatoes- pureed or crushed
- Large tomatoes
- Lime juice
- Spring onion
- Tahini
- Maple syrup or other liquid sweetener
- Lemon juice
- <u>Certificate of Achievement</u> Award \*Be sure to print out on cardstock or laminate for students

## Exploration Lesson (120 minutes):

1) (10 minutes) While waiting to begin the first activity, use some time to observe what is going on by asking questions and engaging in conversations with your students.

- Did your family enjoy the pickling cucumbers activity? What was a highlight from the experience?
- What has been your favorite activity from this entire experience?

- How are you feeling about presenting your TED Talk today?
- 2) (45 minutes) Step back and allow students to navigate the procedures and operations of the system themselves, making yourself available for questions or direction as needed. Plant and harvest if necessary. Be sure that students are filling out observations in their Noticing Notebooks, and if you have extra time, discuss some of the trends in data that you may be noticing or allow students to work on their blog posts.
- 3) (65 minutes) Students will be presenting their TED Talks to the entire group. Be sure to have a TED Talk Rubric to fill out during each presentation to give feedback.

\*Depending on the size of your group, you may need to extend into the exploration and nutrition lessons to complete the presentations.

### Discovery Lesson (60 minutes):

(60 minutes) Work through days 9 and 10 of the PBL with students. As a reminder, days 9 and 10 should be taught during the Discovery Lesson portion of Lessons 4.4 and 4.5, so manage your time effectively.

#### Nutrition Lesson (60 minutes):

- 1) (30 minutes) Complete the <u>Lettuce Wrap Recipe</u> with students.
- 2) (25 minutes) Students will be receiving their Certificate of Achievement. If you would like to edit the certificate based on the program that your site is offering, please make a copy of the document. Call students up one-by-one to present them with their award. You may want to plan a few words about each student based on your observations on them throughout the program. If there is additional time, allow students to share the highlights of the program.
- 3) (5 minutes) Introduce students to Task #5 on their Mission Possible: Feedback from Home 2 and allow them to share their highlights from the program.