Who we are:

We are high school Biology teachers who love teaching and getting our students excited about science. We believe that science is a verb and that our students learn best by rolling up their selves and actually doing science by questioning, planning, executing, explaining and evaluating. Here in this website you will find various activities that we have either modified to fit our classroom our created ourselves. We are always interested in hearing what great work other educators are doing in their classrooms! Please feel free to contact us with any questions or comments. We both love teaching and want to share what we have learned with others. Also please share any improvements you have on anything we have shared. The more we all share the better we can all be!

Patti Richardson: prichardson@fhps.net - @PattiRichards19
Kristy Butler: kbutler@fhps.net - @KButlerSCI

Access this document, our other presentation materials and our favorite resources by visiting our website below


Scaffolded SEPs with the lab activities through the unit

Students do their work on a template so it can be copied and saved.

Use these as our student growth and formative and summative.

- Investigation Plan Rubric
- Data Analysis Rubric
- Explanation Rubric

In between the labs that build the SEPs are small activities that help with each skill. Some of these include data nuggets, card sorts, and modeling. Each unit is linked to our teacher model document that has the questions and activities we use as we do our unit.

Unit 1 & 2 - Diversity of Life

- Daphnia - Observations, using observations to generate questions
- Seed Germination Lab - Investigation plan, variables and controls, Baseline data for student growth on all three
- Sporks Natural Selection - Data analysis, and interpretation, Introduction to Explanation
- Animal Dissections - Applications

Unit 3 - Cell Specialization & Organization

- Diffusion and Osmosis Lab - Observations and Data analysis, Explanations
- Membrane Permeability - Introduction to Vernier data collection, Data analysis and Explanations

Unit 4 - Energy in Ecosystems

- Leaf Disc Lab Photosynthesis - Mid year check in on Investigation Plan writing, Data analysis and Explanations, Argumentation
- Yeast Carbon Dioxide Production - Vernier data collection, Investigation Plan writing, Data analysis and Explanations

Unit 5 - Growth and Development

- Mitosis Slides Data Analysis - Data Analysis
- Cell Cycle and Cancer - Observations and Data Analysis

Unit 6 - DNA to Proteins

- Potato Catalase Lab - Check in on SEPs Design own protocol to test, Investigation Plan writing, Data analysis, Explanations, Present and Defend (Argumentation)

Unit 7 - Genetics & Meiosis

- Bloops Genetics - Observations
- Bean Genes - Observations, Explanations
Unit 8 - Independent Research Project - Final Assessment on SEPs growth

Teacher Notes on Project
Student BLABN Checklist
Student Paper Checklist
Student Poster Checklist

Unit 9 - Human Evolution and Impact

History of Life Activity - Predictions from Observations
Human Impact and Possible Solutions - Observations, Design

Seed Germination Lab
- Students are just starting to discover what it means to be alive, They are asked "What is life?"
- Students are provided with a standard protocol - 10 mL water, paper towel, same seeds, ziplock bag, room temp and room light - shown how to wrap seeds in paper towel, add water and store in ziplock.
- Half the class tests the volume of water and half the class tests the amount of light.
- Then write out own investigation plan, make a table to collect data
- After a week of observations they analyze their data and write an explanation.
- Goal is to introduce students to lab format and inquiry

Diffusion and Osmosis
- Students are given slices of cucumber and three solutions labeled A, B and C. The solutions are salt water, distilled water and tap water.
- Students mass cucumbers before putting them into the solutions and then after. Class data is collected in a Google sheet.
- Using their data they predict which solution is which based on the mass changes.

Membrane Permeability
- Students are given small cubes of beets and different concentrations of soap solutions plus water
- Students use Vernier colorimeters to measure the change in color of the solutions beets are placed in
- They use this data to write an explanation of how the membrane structure is disrupted by the change in soap solutions.

Leaf Disc Photosynthesis
- Students learn the protocol for testing for photosynthesis as the first thing in the unit. They punch out discs from spinach leaves with a hole punch, put in a baking soda solution or a water solution in a syringe and create a vacuum to remove the air from the discs so they will sink. They are placed in a cup of the same solution and put under a light. If they photosynthesize they will float as the oxygen gas is produced.
- After learning about photosynthesis students brainstorm variables that will change the rate of photosynthesis. They choose one to test and work with a group to test that variable.
- Students present and defend their findings with the class

Potato Catalase
- Students are given a piece of potato, some hydrogen peroxide, a graduated cylinder, beaker, test tubes, a scale and a ruler. They are told they have to figure out a way to measure the rate of the decomposition of the hydrogen peroxide by the catalase in the potato.
- Students then learn about enzymes and brainstorm a way to test the enzyme reaction and alter its rate using the protocol they designed.
- Students are writing their own investigation plans from the start of this lab. Hints are given as needed but they have to figure out a way to test the potato.

Independent Research
- Students review the protocols they have learned throughout the year.
- Brainstorm topics they are interested in and questions they are curious about
- From there they develop what they want to investigate further and design the question, protocol and everything else.
- The final product is a scientific poster that is shared during Student Scholars Day where the parents and community are invited in to hear the students report on their findings in a poster sharing session.
- Students also write a Journal Worthy paper, to report out on their findings.