WAMC Lab Template

Math Concept(s): Scatterplots, Linear Regression, Linear Functions
Source / Text: Teacher Created Student Handouts
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Attach the following documents:

Lab Instructions

Student Handout(s)

Rubric and/or Assessment Tool

Indicate "*SPECIFIC*" relationship to Science, Technology, or Engineering:

- Students Design and Construct a Greenhouse and Garden (Engineering)
- Students will be investigating soil composition. (Science)

Short Description (Be sure to include where in your instruction this lab takes place):

- This lab takes place towards the third quarter of the school year. The design construction and maintenance of the greenhouse and garden will be a year long process. At the start of this lab, the greenhouse and garden should be constructed and ready to go.
- Students will be given 10 seeds and 10 plant starts. They will also be given two different containers of soil and the requisite materials to plant the seeds and starts. Students will track the growth of these plants using 4 different tables over the course of 6 weeks. Once the data has been collected, students will create 4 different scatter plots for the data. They will work through the process of identifying correlation within the scatter plots and they will draw a line of best fit for each. Once a line of best fit has been drawn, they will be asked to find the equation of the line using their understanding of linear functions. Finally, they will use the equations and lines to compare the growth of the plants and the different soils that they were planted in by graphing the various lines on the same coordinate grid and looking for points of intersection and identifying what these mean. The STEM science teacher will work with students on the soil composition and the STEM CTE teacher will work with students on the actual planting, growing, and maintenance of the plants. Students will work together within their groups to put together a presentation that will serve as their final assessment.

Lab Plan

Lab Title: Comparing plant growth using scatter plots and lines of best fit.

Prerequisite skills:

- Graphing data points
- Writing the equation of a line given two points.

Lab objective:

- SWBAT create scatter plots given data collected from plants that they have grown.
- SWBAT identify correlation within a scatter plot and draw a line of best fit to represent that correlation.
- SWBAT write an equation of a line of best fit and will be able to identify the different parts of the equation and explain what they mean in the context of the situation.

Standards:

Mathematics K–12 Learning Standards:

- 8.F.A.2-Define, evaluate, and compare functions: Compare properties of two functions.
- 8.F.A.3-Define, evaluate, and compare functions: Interpret the equation y=mx + b as defining a linear function.
- 8.F.B.4-Use functions to model relationships between two quantities.
- 8.SP.A.1-Investigate patterns of association in bivariate data: Construct and interpret scatter plots.
- 8.SP.A.2-Investigate patterns of association in bivariate data: Create a line of best fit
- 8.SP.A.3-Investigate patterns of association in bivariate data: Use the equation of a linear model to solve problems in the context of the bivariate measurement data.

Standards for Mathematical Practice:

- MP.1-Make sense of problems and persevere in solving them.
- MP.2-Reason abstractly and quantitatively
- MP.4-Model with mathematics
- MP.7-Look for and make use of structure

K-12 Learning Standards-ELA (Reading, Writing, Speaking & Listening):

- W.8.1-Write arguments to support claims with clear reasons and relevant evidence.
- SL.8.1-Engage effectively in a range of collaborative discussions.
- SL.8.4-Presentation of knowledge and ideas.

Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)

☐ Global Awareness ☐ Financial/Economic/Business/Entrepreneurial Literacy ☐ Civic Literacy
☐ Health/Safety Literacy ☒ Environmental Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATION
Creativity and Innovation
☒ Think Creatively
☒ Work Creatively with Others
☐ Implement Innovations
Critical Thinking and Problem Solving
☒ Reason Effectively
☒ Use Systems Thinking
☒ Make Judgments and Decisions
☒ Solve Problems
Communication and Collaboration
☒ Communicate Clearly
☒ Collaborate with Others

INFORMATION, MEDIA & TECHNOLOGY SKILLS
Information Literacy
☐ Access and Evaluate Information
☒ Use and manage Information
Media Literacy
☐ Analyze Media
☒ Create Media Products
Information, Communications and Technology (ICT Literacy)
☐ Apply Technology Effectively

LIFE & CAREER SKILLS
Flexibility and Adaptability
☒ Adapt to Change
☒ Be Flexible
Initiative and Self-Direction
☒ Manage Goals and Time
☒ Work Independently
☐ Be Self-Directed Learners
Social and Cross-Cultural
☒ Interact Effectively with Others
☒ Work Effectively in Diverse Teams

Productivity and Accountability
☒ Manage Projects
☒ Produce Results
Leadership and Responsibility
☒ Guide and Lead Others
☒ Be Responsible to Others

Teacher Preparation: (What materials and set-up are required for this lab?)

Materials

- Enough seeds for every group to get 10. Should be the same plant.
- Enough plant starts for every group to get 10. Should be the same plant.
- Two different soil composition. One will be basic topsoil and one that has been fortified with nutrients.
- Planting containers.
- Data tables for each set of plants
- Lab worksheet with reflection questions.
- Presentation rubric
- Measuring tools

Set-Up Required:

- Seeds, plant starts, soil, and containers should be separated and ready to distribute.
- STEM greenhouse should be ready to go with separate workspace for each group.

Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

- There will be opportunities for students to participate in an after school greenhouse/garden club where students will work with the care of the plants and will work with community members to take care of the garden.
- There is a TSA program that is available to students after school.

Cooperative Learning:

- Students will be working in groups of 3-4.
- Groups will have the following roles: Group facilitator, group recorder, and group presenter(s).

Expectations:

- Students will be able to create a scatter plot, draw a line of best fit, and write the equation of the line.
- Students will use the scatter plots and equations to compare the different soil and will work and will use their science learning to explain what the comparisons mean.

Timeline:

- One three period STEM block for the planting and set up.
- 6 weeks of growing time, with students collecting data once a week.
- About three days (full STEM blocks) to work with data, to analyze data, and to create a presentation.
- About one three period STEM block for presentations.

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- Agriculture
- Plant biology
- Soil chemistry

Career Applications

- Commercial Agriculture
- Engineering (green house)
- Anything involving data collection and statistics.

Optional or Extension Activities

- Students can come up with a plan to try to increase plant growth using the data collected and their understanding of the soil composition.
- Students can investigate what the equation for the growth of a healthy and unhealthy plant would look like.