AgLIT (Agricultural Literacy through Innovative Technology): A Fully STEM-Integrated, Project-Based, Upper-Elementary Agricultural Literacy Curriculum Module

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Alignment of Curriculum Module to the *Framework* and *NGSS*

SCIENTIFIC & ENGINEERING PRACTICES	AgLIT EXAMPLES
1. Asking questions (science) and defining problems (engineering)	After reading the Pennsylvania Produce Guide, think of other fruits or vegetables that may be good choices for your garden that you may not have included already. Why would you pick them? (Design a Garden) Once you have chosen a good location on the farm, describe why you selected the area you chose. (Design a Garden)
2. Developing and using models	Identify the path your favorite pizza ingredients take from the farm to your door. (Pizza Party with Augmented Reality)
3. Planning and carrying out investigations	Investigate the properties of different types of soils and construct and test each soil to withstand erosion and water filtration capabilities (Water and Soil Investigation)
4. Analyzing and interpreting data	Plot the data for the number of farms in Pennsylvania in the chart below, and then connect the points to draw a line representing the trend. (U.S. Farm Data)
5. Using mathematics and computational thinking	Identify appropriate agricultural outputs needed in order to generate sustainable profits. (Producing a Sustainable Marketing Plan I)
6. Constructing explanations (science) and designing solutions (engineering)	Design and then test a method of transporting eggs to the market using inexpensive, yet sanitary, materials you may find around the farm – straw, wood shavings, grain, etc. (Design an Egg Transport System)
7. Engaging in argument from evidence	Determine the best type of soil for growing indigenous plants. (Water and Soil Investigation)
8. Obtaining, evaluating, and communicating information	Present your group's final sustainable marketing plan to the class. (Producing a Sustainable Marketing Plan II)

CROSS-CUTTING CONCEPTS	AgLIT EXAMPLES
1. Patterns	Exploring U.S. Farm Data
2. Cause and effect: Mechanism and explanation	Design an Egg Transport System
3. Scale, proportion, and quantity	Design a Garden
4. Systems and system models	Pizza Party with Augmented Reality
5. Energy and matter: Flows, cycles, and conservation	Water and Soil Investigation
6. Structure and function	Manipulating Plant and Animal Fibers
7. Stability and change	Producing a Sustainable Marketing Plan

DISCIPLINARY CORE IDEAS	AgLIT EXAMPLES
Physical Sciences	
PS1: Matter and its interactions	Mix ingredients to make mozzarella from milk (From Milk to Mozzarella) Create by-products like paper and felt from raw or recycled materials (Manipulating Plant and Animal Fibers)
Life Sciences	
LS1: From molecules to organisms: Structures and processes	Describe the steps to prepare a garden for planting and growing crops (Design a Garden)
LS2: Ecosystems: Interactions, energy, and dynamics	Analyze a simulation involving the cycle of life among plants, animals, decomposers, and the environment (simulation)
Earth and Space Sciences	
ESS2: Earth's systems	Use an interactive map to determine number of farms, average acres per farm, percentage of farmland, and dollars of output over time in U.S. (U.S. Farm Data) Use Google Earth to locate an appropriate location for a garden on a real farm (Design a Garden)
ESS3: Earth and human activity	Investigate the properties of different types of soils and construct and test each soil to withstand erosion and water filtration capabilities (Water and Soil Investigation) Learn to conserve resources (simulation/activity)
Engineering, Technology, and Applications of Science	
ETS1: Engineering design	Finding a new method of transporting eggs to the market using inexpensive, yet sanitary, materials found around the farm (Design an Egg Transport System)
ETS2: Links among engineering, technology, science, and society	Create a sustainable marketing plan that combines all of the previous days' activities to generate a profit for the farm (Producing a Sustainable Marketing Plan II)

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Four Main Goals Found in STEM and Agricultural Education Standards and Frameworks and Examples of Each.

NALO	FFSL	CCSS	NGSS	STATE
Gain Awareness of Global Interconnectedness:				
Culture, Society, Economy & Geography.1. Provide examples of agricultural products available, but not produced in their local area and state.	4.5.IV.D.1. Students will explain why nations trade products and services.	---	5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	3.4.4.D3. Investigate and assess the influence of a specific technology or system on the individual, family, community, and environment.
Acquire Conscientiousness of the Future:				
Agriculture and the Environment.4. Identify land and water conservation methods used in farming systems.	4-5.III.D.1. Students will explain how technological advancements enhance Food and Fiber Systems' efficiency.	---	4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.	3.4.4.B3. Explain why new technologies are developed and old ones are improved in terms of needs and wants.
Identify Applications of the Subject(s) in Practice:				
Science, Technology, Engineering & Mathematics.4. Provide examples of science being applied in farming for food, clothing, and shelter products.	4-5.I.E.1. Students will examine the changes in Food and Fiber Systems due to technological advances, and subsequent changes in occupational opportunities. They will identify agricultural careers and how they have changed.	4.MD.A.3. Apply the area and perimeter formulas for rectangles in real world and mathematical problems.	4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.	3.4.4.C2. Describe the engineering design process: Define a problem. Generate ideas. Select a solution and test it. Make the item. Evaluate the item. Communicate the solution with others. Present the results.
Design Models, Diagrams, and Drawings:				
Food, Health, and Lifestyle.2. Diagram the path of production for a processed product, from farm to table.	4-5.V.B.1. Students will identify the six basic food nutrients: carbohydrates, protein, water, vitamins, minerals, and fats. They will categorize foods based on nutritional content.	4.NF.B.3.D. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.	5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.	3.1.4 B5. PATTERNS. Identify observable patterns in the physical characteristics of plants or groups of animals.

Performance Task Matrix and Implementation Schedule

Day	Agricultural Topic	Type of Learning Activity			
		Science	**Technology**	**Engineering**	**Mathematics**
Weeks Prior	Pretests				--
Day 1	General Agriculture & Life Cycles	--	Exploring U.S. Farm Data w/Web GIS	--	--
Day 2	Food & Nutrition	--	Pizza Party w/AR	--	--
Day 3	Plants, Agronomy, & Horticulture	--	--	Design a Garden w/Google Earth	--
Day 4	Livestock, Meat, & Poultry	--	--	Design an Egg Transport System	--
Day 5	Dairy	--	--	--	Making Mozzarella
Day 6	Fiber	Plant & Animal Fibers	--	--	--
Day 7	Land & Natural Resources	Water & Soil Investigation	--	--	--
Day 8	Environment & Sustainability	--	--	--	Sustainable Marketing Plan – Part I
Day 9	Agriscience & Biotechnology	Sustainable Marketing Plan – Part II	Sustainable Marketing Plan – Part II	Sustainable Marketing Plan – Part II	Sustainable Marketing Plan – Part II
Day 10	Conclusion & Presentations	*(What to Grow & Sell)*	*(Virtual Brochure)*	*(Farm Stand Model)*	*(Trends & Pricing)*
Day 11	Posttests				
Day 12	Farm Tour				