



Aquaponics Lesson

AUTHOR

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GRADE LEVEL

6
7
8

CONTENT TOPICS

Engineering
Math
Science

DESCRIPTION

This lesson plan includes objectives, standards, procedures, and assessment strategies to support students with a multi-day aquaponics project.

SUGGESTED STANDARDS CONNECTIONS

Common Core ELA	CCSS.ELA-LITERACY.SL Speaking and Listening CCSS.ELA-LITERACY.W Writing
NGSS	MS-ETS1 Engineering Design

Unit Title: Aquaponics Unit Date Developed/Last Revised: 1/8/15 Unit Author(s): Monica Nonaka, John Constantinou, Eliza Akana, Hope Espinda, Eric Kam Edited and Revised by Randall Shinn	Grade Level: 7/8 Time Frame: 21 - 75-minute sessions + on-going investigations over an extended period of time Primary Content Area: STEM
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Planning (Steps 1, 2, & 3)	
1. Standards/Benchmarks and Process Skills assessed in this Lesson:	
HCPS III CTE Standard 1: TECHNOLOGICAL DESIGN: Design, modify, and apply technology to effectively and efficiently solve problems	
<ul style="list-style-type: none"> MS-ETS-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. 	
GLO #6: Effective and Ethical User of Technology: the ability to use a variety of technologies effectively and ethically	
<u>RST.6-8.7</u>	<u>Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).</u> (MS-ETS1-3)
<u>SL.8.5</u>	<u>Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.</u> (MS-ETS1-4)
2A. Criteria – What Students Should Know and Be Able to Do:	
<ul style="list-style-type: none"> Students will be able to identify the criteria and constraints of the design problem, potential impacts on the people and environment (classroom) that may limit their design, and evaluate competing design solutions to see how well they meet the criteria and constraints of the problem. 	
2B. Assessment Tools/Evidence:	
Formative:	
<ul style="list-style-type: none"> Thumbs Up, Thumbs Down – After going over the instructions for the Aquaponic Design Evaluation 	

- Checking for Understanding
 - Questioning and feedback provided between groups
 - Writing down questions in notebook

Summative:

- Using feedback from evaluation to redesign aquaponic unit

3. Learning Experiences (Lesson Plan)

Materials:

- Technology (computers)
- Notebook (individual)

Handouts/Other Resources:

- Check for Understanding Sentence Starters (hanging around room)
- Aquaponic Unit Designs (in notebook)
- Criteria and Constraints (in notebook)
- Design Requirements (in notebook)

Procedure:

1. Do Now – Students will take 10 minutes to copy homework, place assessment in binder, look through PowerPoint
 2. Go of FIL, Standards
 3. Do a 3 minute quick review on the criteria and constraints of the aquaponic design in small groups. After the small groups, each group will share and I will write down on promethean board.
 4. Go over instructions for aquaponic evaluation (mini lesson) and check for understanding with thumbs up and down.
 5. Each member will construct their table in notebook (p.40) for their questions on their design.
 6. When groups are ready to go, divide the class in half.
 7. Let students (in groups) begin explaining and asking questions about their designs. Students will take on their own discussion and lead it themselves.
 - They will use the sentence starter prompts to help them ask questions to each other.
 - Students will engage with each other as I float around to make sure they are on task.
- After 5-10 minutes, switch roles and have other group share.
 - After 5-10 minutes of that, groups will rotate once more to another group and do the same thing.
 - When rotation is completed, groups will go back into their seats and look at the questions that other members came up with.
 - As a closing, groups will use that feedback to construct one final aquaponic unit design and keep in mind of the criteria, constraints, and requirements.

Homework Activity (Optional):

1. Use Feedback to redesign Aquaponic unit by next period