Lesson 6.5: Sustainable Food Methods and the Food Systems Quiz

Unit: Unit 6, From Farm to Table (Food Systems and Production) **Topic:** 6.1 Where Food Comes From **Grade:** 6 to 8 (written at grade 7; see Differentiation for the grade 6 support and grade 8 stretch) **Days:** 2 class periods of 40 minutes (Day 1 growing, composting, and packaging; Day 2 the packaging redesign and the Food Systems Quiz in the last 15 minutes) **Room:** Either (classroom or FACS lab; the planting needs a sink and a windowsill)

Standards

- NYS module line: NYS FSP 4. Future of Food in a Global Society a) Understand the components of sustainable food systems
- NYS module line: NYS FSP 4. Future of Food in a Global Society c) Evaluate the quality of foods produced through sustainable methods
- NYS module line: NYS FSP 4. Future of Food in a Global Society e) Explore technological advances that affect the global food supply
- CTE theme line: CTE SUS 1. Resources a) Define “sustainability” as it applies to resource use
- CTE theme line: CTE PSI 2. Design Process (Proactive) a) f. Developing and constructing a prototype or model of the selected design
- NYS FACS Learning Standard 3 (Intermediate), Key Idea: Students will understand and be able to manage personal resources of talent, time, energy, and money and make effective decisions in order to balance their obligations to work, family, and self.; Performance Indicator B: Students understand the resources available to them, make informed decisions about the use of those resources, and know some ways to expand resources.
- CDOS Standard 3a Universal Foundation Skills: Systems
- National FCS 3.0: 8.5.13 Build sustainability into food work, from menu planning and buying through preparation, service, storage, recycling, and waste.
- National FCS 3.0: 2.2.3 Practice habits that conserve, reuse, and recycle so resources and the environment last.
- National FCS 3.0: 14.5.1 Look into how advances in science and technology change the nutrients, availability, and safety of food.

(This is the topic’s closing lesson, so it carries three module lines and the quiz for all five lessons in Topic 6.1. The design process sub-line is cited as the state prints it, with the letter and the sub-letter.)

Enduring understanding and essential question

Big idea: Sustainable means the way we get food can keep going without using up the soil, the water, or the people. Every choice has a trade-off, including the good ones. Packaging protects food and creates trash at the same time. **Essential question:** When protecting the food and protecting the planet pull in opposite directions, how do you decide?

Objectives

By the end of this lesson, students will be able to:

1. (Low: understand) Define sustainability in their own words, sort ten items into compost and not compost, and name the three farm methods with one purpose each (crop rotation, drip irrigation, integrated pest management).
2. (Mid: apply) Plant and label a seed or cutting, write a care plan for it, and explain what the plant needs that the class has to supply.
3. (High: create) Redesign an over-packaged product using the design process from Unit 4, and justify the redesign against both criteria: the food still gets protected, and the waste goes down.

Vocabulary

Tier 2 (general academic): sustain, trade-off, criteria, justify, redesign Tier 3 (FACS): sustainability, compost, crop rotation, drip irrigation, integrated pest management, packaging, single use, recyclable, shelf life. See the unit vocabulary list (Vocabulary 06.md) for Turkish, Portuguese, and Spanish.

Materials and setup

- Day 1, planting, per student: one clear plastic cup or a paper cup with a hole punched in the bottom, about a half cup of potting mix, one seed (bean, radish, basil, or scallion) or one scallion root end saved from a lab, one popsicle stick label, one marker. Per class: one bag of potting mix, one seed packet or two bunches of scallions, a tray to catch water, a watering cup.
- Day 1, Handout 06.05 - Compost Sort and Packaging Redesign.md, one per student, plus one set of the ten compost sort cards per group of four
- Day 1, three over-packaged products for the redesign, collected empty and rinsed: examples that work well are a single-serve yogurt in a box inside a sleeve, a multipack of chips, a plastic produce clamshell, a boxed frozen meal with an inner tray and a plastic film, or a bottle of water in a shrink-wrapped case. Six to nine items total so every group of four has a choice of three.
- Day 2, plain paper, scissors, tape, markers, and any scrap cardboard for the redesign model. One roll of tape per group.
- Day 2, Assessment 06.1 - Food Systems Quiz.md, one per student, and the class's wall paths from Lessons 6.1 to 6.3 covered or turned around during the quiz
- Slides: Slides 06.05 - Sustainable Food Methods and the Food Systems Quiz (Day 1 and Day 2 marked)
- Setup notes: Day 1, fill the potting mix into a bin students can scoop from, and put the tray on the windowsill before class so the plants have a home the moment they exist. Day 2, cover the wall paths before the quiz. Allergy check: potting mix goes on hands, so students wash after planting, and any student with a mold or dust sensitivity plants with gloves or does the seed-in-a-damp-paper-towel version instead. No food is eaten in this lesson. Costs: potting mix about $5, seeds about $3, cups about $3, total about

$11 for the class, one time. The packaging items cost nothing if they are collected empty.

Pre-assessment

Day 1 do now defines sustainability before it is taught. Day 2 opens by pointing at the three class changes from Lesson 6.3 that went on the wall and asking whether any of them actually happened, which tells you whether the whole topic landed as ideas or as habits.

Do now and hook (Time: Day 1, 4 min; Day 2, 3 min)

Day 1, on the board: "Something is sustainable if you can keep doing it forever without running out. Name one thing you do that is sustainable and one thing that is not. They can be small."

Debrief: take four pairs of answers. Then the hook: hold up a scallion root end from the last lab. "This is trash from Tuesday. It will be a plant by next week. Today you each get one, and you keep it alive until the end of this unit."

Day 2, on the board: "Look at the three changes on the wall from the waste audit. Which one actually happened? Be honest."

Debrief: sixty seconds. Then the hook: hold up the most over-packaged item in the pile. "Four layers to protect one yogurt. Your job today is to do it in two and prove the yogurt still survives."

Procedure

Step	Teacher will	Students will	Time
Day 1, 1. Direct instruction: sustainability and three farm methods	Define sustainability using CTE SUS 1. a) in plain words. Show the three farm methods, one slide each: crop rotation (change what you plant in a field each year so the soil keeps its nutrients and pests lose their host), drip irrigation (water dripped at the root instead of sprayed over the field, so far less evaporates), integrated pest management (watch	Write the definition and the three methods with one purpose each on the handout. Mark which of the three surprised them.	9 min

	for pests, use the smallest response that works, and spray last instead of first). Tie each back to a step on the wall path.		
Day 1, 2. Plant it	Run the planting in a line: scoop mix, poke a hole, seed or root end in, cover, water once, label with name and date, place on the tray. Then assign the watering schedule: four students per week, named on the chart, from now to the end of Unit 6.	Plant, label, water once, and write the care plan on the handout: how much water, how often, how much light, and who waters when I am absent.	9 min
Day 1, 3. Compost sort	Hand each group of four the ten sort cards. Rules: two piles, compost and not compost, and a reason for every card in the not pile. Reveal the answers with the why: fruit and vegetable scraps, coffee grounds, eggshells, and plain paper go in; meat, dairy, oils, and anything treated do not, because they draw animals and turn sour instead of breaking down.	Sort the ten cards in the group, write the two lists on the handout, and write the one card the group argued about.	7 min
Day 1, 4. Packaging: protection against waste	Put the trade-off on the board with two real items: a cucumber wrapped in plastic and one	Examine the three packages, count the layers on each, and circle the one their group will redesign	7 min

	loose. The wrap triples the shelf life and it is a piece of plastic. Ask for the trade-off out loud. Then hand each group three collected packages and give the task: pick one for tomorrow.	tomorrow. Write the two criteria on the handout: protect the food, cut the waste.	
Day 2, 1. The design process, applied	Post the design process from Unit 4 on the board in the state's order: define the problem, set criteria and constraints, brainstorm, select, prototype, test, optimize, evaluate. Run the first three steps out loud with the class's chosen packages: the problem is stated, the criteria are the two from yesterday, the constraints are printed on the handout (the food must survive shipping, stacking, and two weeks on a shelf, and the package must still say what is inside).	Write the problem, the two criteria, and the three constraints on the redesign page. Brainstorm four ideas in the group, then select one.	7 min
Day 2, 2. Prototype and justify	Release the build: paper, tape, cardboard, markers. Ten minutes, one model per group, with the label drawn on. Circulate and ask one test question	Build the model. Write the justification on the handout: what protects the food now, how much waste was removed, and what got worse.	10 min

	per group: “Drop it. Stack three. Does the food still make it?”		
Day 2, 3. Thirty-second pitches	Call pitches. One sentence per group: what we cut, and how the food is still protected. Hold the models up and take one challenge question from the class per group. Then collect and clear desks for the quiz.	One presenter per group pitches in thirty seconds. Everyone else writes one number on the handout: how many layers the class removed in total.	5 min
Day 2, 4. Food Systems Quiz	Hand out Assessment 06.1 - Food Systems Quiz.md. Twelve items, fifteen minutes, wall paths covered. Read the directions aloud once. Collect at the bell.	Take the quiz silently. Anyone finished early rereads the packaging short answer.	15 min

Questions to ask

Monitor understanding:

- Why does crop rotation help with pests and not only with soil?
- Eggshells go in the compost and cheese does not. What is the difference?
- Your model has two layers instead of four. Which layer did you decide to keep, and what is it protecting against?

Deepen learning:

- Drip irrigation costs a farmer money up front and saves water every year. What would make a farmer say yes to that?
- The plastic wrap on the cucumber cuts food waste and adds plastic waste. Which waste is worse, and what would you need to know to answer?
- Your plant needs water for six weeks and nobody is here in July. What does that tell you about a school garden as a plan?
- Integrated pest management says spray last. Why would a farmer want to spray at all if it costs money?

Check for understanding

Day 1: the compost sort reveal is the check. Every group holds up its not-compost pile and names a reason for one card; a “got it” is a reason about animals or about how the material breaks down, not “it is gross.” Day 1 planting check: every cup labeled with a name and a date and a care plan with four answers. Day 2: the one test question per group during the build (“drop it, stack three”) and the thirty-second pitch, which has to name both criteria.

Closure (Time: Day 1, 4 min; Day 2, the quiz is the closure)

Day 1: one line on the exit card: “Sustainable means ***. One thing that makes food production more sustainable is*** .” Two students read. Sort into “got it” and “needs more”; the “needs more” pile sets whether Day 2 opens with a thirty-second recap of the definition.

Day 2: the quiz is the closure. Post the answers and a two-line review at the start of Lesson 6.6, since the quiz is the topic’s formal check and retakes are allowed once after a review per the Grading Plan.

Differentiation and supports

- ELL: the three farm methods each get one photo and one six-word caption; the compost sort cards are pictures with the word underneath; sustainability, compost, packaging, waste, and soil are on the vocabulary card in Turkish, Portuguese, and Spanish (see Vocabulary 06.md); the quiz allows the vocabulary card, for every student, not just ELL students.
- IEP and 504 (general): the care plan is a four-blank frame; the redesign is a group build, so a student can contribute by cutting, taping, drawing the label, or presenting; extended time on the quiz per the plan, taken in the room with a second copy; the sort can be done by moving cards rather than writing lists; gloves or the damp-paper-towel seed method for any student who cannot handle soil.
- Grade 6 support: plant the scallion root end rather than a seed, since it visibly grows in four days and rewards the care plan fast. Sort eight cards instead of ten. Redesign by drawing the new package rather than building it, with the same justification questions.
- Grade 8 stretch: add a cost line to the redesign. Estimate whether the new package costs the company more or less and say how you would find out. Stretch students also answer the harder version of the trade-off question in writing: name one case where more packaging is the sustainable choice.
- UDL checkpoint used: multiple means of action and expression (the redesign can be built, drawn, or described, and the pitch is spoken rather than written) and multiple means of engagement (each group picks its own package from three, and the plant belongs to the student who planted it).
- No-kitchen alternative: not needed. No cooking in this lesson. If there is no sink or windowsill, plant the seeds in a damp paper towel inside a sealed zip bag taped to a window, which sprouts in three to five days and needs no soil.

Assessment

Objective	Standards met	Learning task	Assessment (formative or summative; tool)
1. Define sustainability, sort compost, name three farm methods	FSP 4. a); SUS 1. a); National FCS 2.2.3	Steps 1 and 3, Day 1	Formative; compost sort checked in the group reveal; exit card sorted. Assessed summatively on the Food Systems Quiz, items 8 to 10 (sustainable methods matching)
2. Plant, label, and write a care plan	FSP 4. c); Std 3 PI B; National FCS 8.5.13	Planting and care plan, Step 2, Day 1	Formative; every cup labeled, care plan with four answers, watering chart signed. Checked again in Lesson 6.11 (is the plant alive?)
3. Redesign the packaging and justify it against both criteria	FSP 4. e); PSI 2. a) f.; CDOS 3a Systems; National FCS 14.5.1	Redesign and pitch, Day 2 Steps 1 to 3	Formative; the justification needs both criteria answered. Assessed summatively on the Food Systems Quiz, item 11 (packaging trade-off short answer)

All of Topic 6.1 is assessed summatively on the Food Systems Quiz in the last fifteen minutes of Day 2 (Assessment 06.1 - Food Systems Quiz.md, twelve items, fifteen minutes).

Homework

None. The watering schedule is a duty, not homework, and it is on the chart with names.

Connections

Science: seed germination, decomposition, and the water cycle all sit in this lesson, and the plants can live in the science room if that room has better light. Technology or engineering, if the school has it: the packaging redesign is a prototype in the same design process, so

both teachers can use the same eight words. Community: a garden center or a local farm can donate seeds or a flat of starts for the cost of asking. *[Sal: a school garden is a real option but it needs a summer plan before it needs a plot. Ask the building about who waters in July before you promise students a garden.]*

Sources

- NYS Middle Level CTE FACS Content Module 06, Food Systems and Production (nyctecenter.org, June 2018), lines 4. a), 4. c), and 4. e). Copy in 02 Standards/NYS Module PDFs/.
- NYS Middle Level CTE Theme Module 06, Sustainability, line 1. a); Theme Module 05, Problem Solving and Innovation, line 2. a) f. Same folder. The Sustainability module's FACS illustrative activity on product lifecycles and the FSP module's Classroom Herb Garden activity are both behind this lesson's shape.
- NYS Learning Standards for Health, Physical Education, and Family and Consumer Sciences (1996), Standard 3, Intermediate, FACS strand, Performance Indicator B. Wording per 02 Standards/STANDARDS SOURCES - web research.md, section 2. *[Sal: confirm against the NYSED PDF.]*
- CDOS Intermediate Standard 3a Universal Foundation Skills, Systems. Same file, section 3.
- National Standards for Family and Consumer Sciences Education 3.0 (LEAD FCS Education, 2018), competencies 8.5.13, 2.2.3, and 14.5.1.
- Unit 4, Lessons 4.11 to 4.15, for the design process language used on Day 2. The eight words are the state's own from PSI 2. a).

Teacher notes

- Day 2 is tight. The quiz takes fifteen minutes and the clock does not negotiate. If the build runs long, cut the pitches to three groups and collect the rest of the models unpitched.
- If the whole of Day 2 is short (an assembly, a late start), move the quiz to the first fifteen minutes of Lesson 6.6 and say so out loud at the end of Day 2 so nobody studies twice.
- Common mistake: groups remove the layer that is doing the work. The drop-and-stack question fixes it faster than any explanation.
- Collect the packaging for a week before you need it. Ask the class to bring in the worst package they find; they compete to win that, which costs nothing.
- Label the plants with names and dates in permanent marker. Unlabeled cups on a windowsill become a mystery in three days.
- A dead plant is a teaching moment, not a failure. Ask what it needed that it did not get, and put the answer on the wall next to the care plan.
- *[Sal: your Skittles trading game taught trade-offs with candy. The packaging trade-off is the same move with trash, and students who liked that game will argue about this one.]*