

Food Technology: Ideas for Curriculum & Labs

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My background...

My first food class at Clear Lake High School in 1992-93 with Ray Pieniazek as my teacher - a life-changing experience!

B.S. in Food Science from TAMU; M.Ed. in Curriculum & Instruction from TAMU

19 years teaching experience; currently at College Station High School

I teach/have taught:

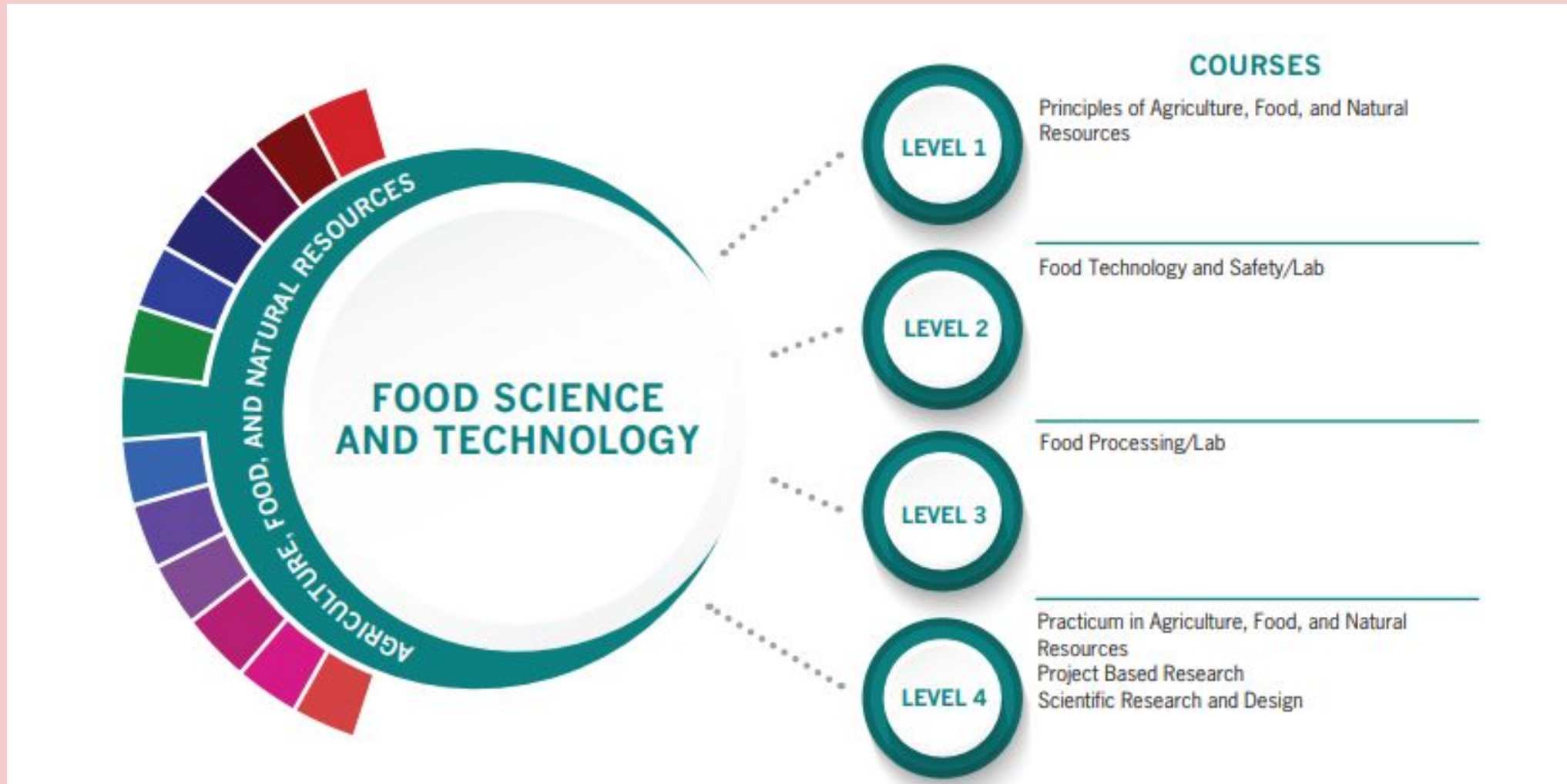
- The FCS course Lifetime Nutrition and Wellness (Foods 101)
- Food Technology & Safety (Foods of Texas)
- Food Processing
- Practicum in Food Processing
-

best
job
ever!

My beliefs

- 1) Food is the most important subject students will learn – it's life and death!
- 2) Food LINKS production agriculture to the consumer
- 3) The content of Food Technology must be MORE than just cooking. We are teaching future food scientists who will feed the world!!
- 5) Students are really bad at measuring, reading & following directions, and they take F O R E V E R to do those tasks...unless we help them!

Texas Education Agency - The Program of Study



Texas Education Agency - Industry Based Certification

[ServSafe Manager](#) (it's under the Hospitality & Tourism cluster)

In the food industry, generally it happens like this:

- 1) earn Texas Food Handler Certification (a variety of companies offer this)
 - a) [link](#) to Texas Department of State Health Services accredited online programs

- 2) earn Food Manager Certification - a variety of companies offer this ([link](#)) but TEA specifies the ServSafe program through National Restaurant Association

More on ServSafe Manager

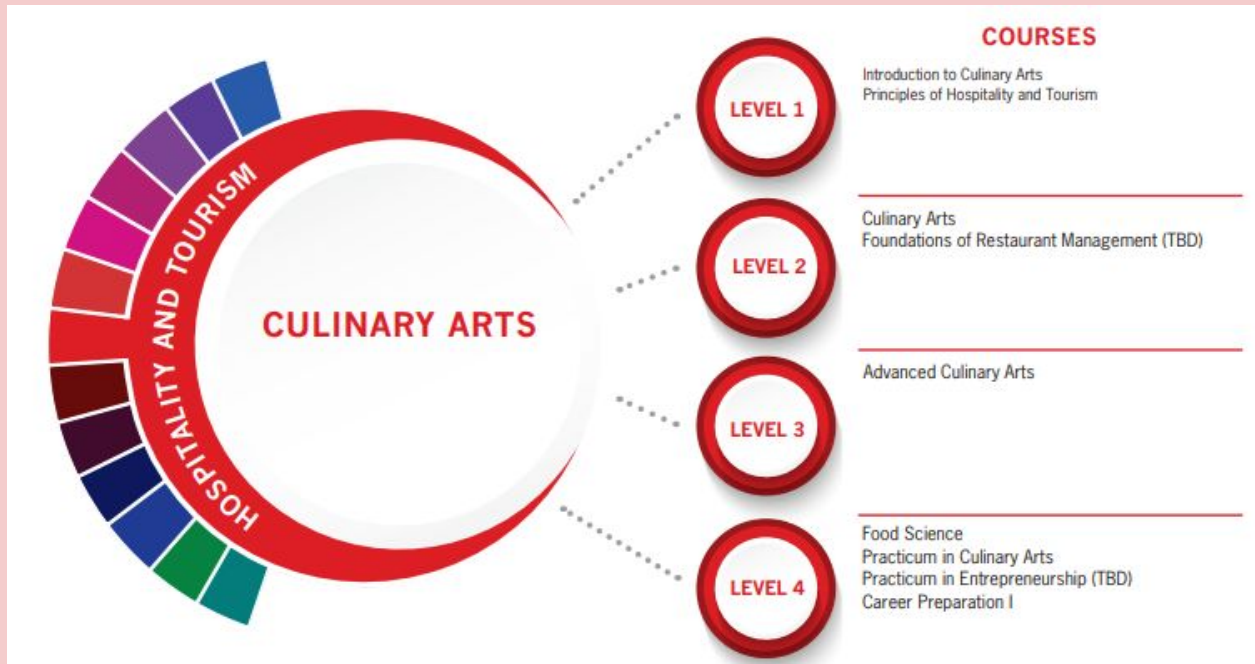
For the instructor:

- 1) Take the ServSafe course online
- 2) READ the 7th edition book
- 3) Schedule your test (your County Extension Agent can probably proctor it)
- 4) Become a ServSafe Registered Instructor and Certified Proctor
 - a) [link to information](#)
 - b) this way, you can proctor the tests for your students

Note: The test is not easy

FYI: Texas Education Agency's Food Science Problem

The course called Food Science is actually in the [Hospitality & Tourism cluster](#), not AFNR. This is contrary to what is done in other states, at the university level, and with the National FFA Organization Food Science CDE.



A note about food labs - what's the point?

Food labs should serve a **deep instructional purpose** related to the TEKS, not just be for fun

example: let's cook steaks!

better example: let's cook three types of steaks to compare tenderness of three different muscles

example: let's can strawberry jam!

better example: let's use a refractometer to measure the sugar content of two different brands of strawberries, make jam, and then perform a sensory analysis

IT'S NOT JUST ABOUT THE EATING

ASK FOLLOW UP QUESTIONS!

This is for my Science of Melting Cheese lab

14) Taste each of the sauces. Record your observations:

	appearance	smell	mouthfeel	taste
American				
Monterey Jack				
Queso Fresco				

Conclusion questions:

1) Which cheese sauce did you prefer? Why?

2) Which cheese sauce was your least favorite? Why?

3) Queso Fresco is made with acid (like the fromage facile we made). Monterey Jack cheese is made with rennet. Based on your experiment, what can you conclude about rennet vs. acid and the melting characteristics of the cheese?

4) Read this:

<http://www.serious-eats.com/2016/07/whats-really-in-american-cheese.html> How is American cheese made? How does that impact the melting characteristics?

5) What questions or observations do you have? DO NOT write *none*, *IDK* or something similar.

College Station HS - The Problem.

CSHS has 7 different food-related courses. There are 60+ CTE courses all fighting for the same kids

Food Technology & Safety Food Processing

Foods 101 (Nutrition & cooking)

Introduction to Culinary

Culinary 1

Culinary 2

Practicum in Culinary

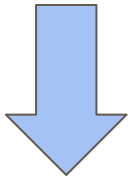


Historically, 1 section of this class... 12 to 24 students.

Is the name a problem?

CASE Food Science & Safety Curriculum - is it right for our school? For our Ag program?

Renaming, Rebranding, Refocusing Food Technology & Safety



Foods of Texas

TRIPLED ENROLLMENT!!!

Note: It's still Food Technology & Safety TEKS
On transcript: Food Technology & Safety
PIEMS code: Food Technology & Safety

Guiding question for Foods of Texas:

How does **TEXAS*** influence the innovation, processing, preservation, marketing, and preparation of foods?

TEXAS is defined as the unique agriculture, climate, economy, cultures, topography, tourism, and immigration found in the state.

Foods of Texas - what does this mean?

Some examples:

Chili Powder - developed by a German immigrant in San Antonio in 1896 based on Mexican chili. He used a coffee grinder to grind chiles and other spices and focused sales on tourists

Boudin Kolaches - first offered at Cambodian-owned donut shops. Boudin (a pork/rice sausage from Cajun country in SE Texas and Louisiana) inside a Kolache (a Texas-Czech breakfast pastry *yes, I know it's technically a klobasniky*)

(Speaking of Cambodian donut shops, watch this mini-documentary on Houston-area donut shops produced by Robb Walsh: [Donut People on](#) [Vimeo](#))

What are the foods you miss when you travel outside of Texas?

Stutts

Queso

Chicken Fried Steak

Huevos Rancheros

Crawfish

Shrimp/Oysters

Tamales

Fajitas

Smoked Brisket

Peach Cobbler

Pecan Pie

Breakfast tacos

Dewberry anything

Pico de Gallo

Charro beans

Blue Bell Ice Cream

Alllll the Tex-Mex

Big Red

How can I incorporate the food science principles behind what makes these things work?

Course Outline

Unit 1: Food Processing lab basics

★ 1 week

Unit 2: Marketing, Nutrition & Consumer Issues

★ 3 weeks

Unit 3: Safe Food Supply

★ 4 weeks

Unit 4: Meat

★ 8 weeks

Unit 5: Dairy

★ 3.5 weeks

Unit 6: Poultry

★ 3 weeks

Unit 7: Seafood

★ 2 weeks

Unit 8: Grains

★ 3 weeks

Unit 9: Fruits, Vegetables, and Nuts

★ 4 weeks

Unit 10: Food Innovation

★ 4 weeks

Basics...1 week

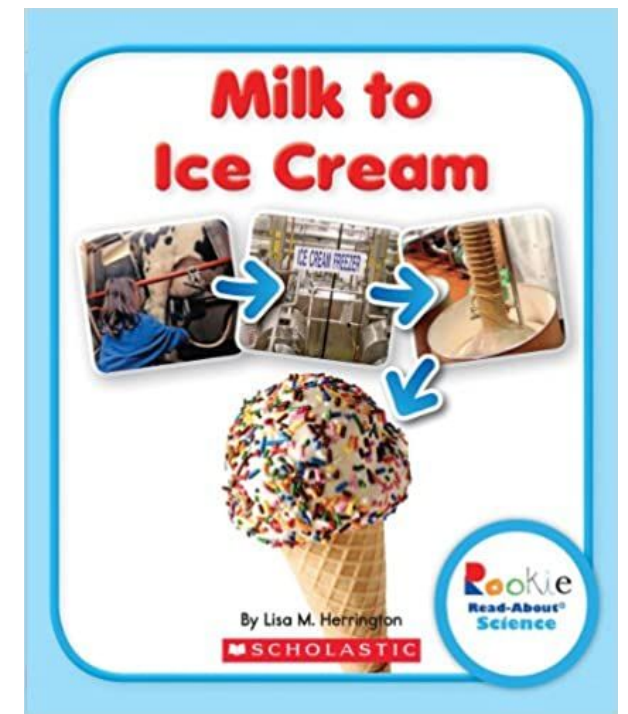
Teamwork & orientation to the lab space

Knife & kitchen safety

Measuring skills (I cannot emphasize this enough!!!)

What is Food Science?

[The Science Behind Your Food brought to you by Cargill & AgExplorer](#) (There's an educator



Marketing, Nutrition, & Consumers...3 weeks

Consumer sensory panels (duo-trio testing, triangle testing, etc.)

Nutrition basics: MyPlate. Using USDA Nutrient Database to find nutrition values

Food Insecurity: local food bank, Feeding America (Map the Meal Gap - county specific information). Cook a meal meeting MyPlate for \$2 per person.

Labeling: USDA/FDA regulations governing terms, Nutrition Facts label (use online generator to create one)

Marketing basics: Popular Texas brands...what do they do to market? Package designs, etc.

Nutritional claim vs. marketing term

Safe Food Supply for Texas (4 weeks)

Earn Texas Food Handler's License

Preventing contaminants in food (with info specific to Texas-based companies/outbreaks/recalls, etc.)

HACCP project: create a Chicken Salad Sandwich company and create HACCP plan

Allergens (examine popular food packages, etc.)

MEAT (my favorite) 8 weeks

Physiology/Cuts/Cooking Methods:

Dry cooking methods (and why?): Grilling 101 w/ TBC, skirt steak

Moist cooking methods (and why?): carne guisada, pulled pork

Smoking/BBQ

Marinades and how/why they work (3 days on fajitas)

Preservation methods:

Curing: Sausage, particularly Texas regional varieties

Dehydrating: Jerky

Lowering pH: [parisa](#) (hey Medina county!)

Humane & Safe Production of Meat

Harvest process; HACCP plans, etc.

Yield & Quality Grading

Branded programs, focusing on Texas brands

Dairy...4 weeks

Stutts

Dairy Industry “tour” from grain to bottle (emphasize homogenization and pasteurization)

Lactose lab!

Make: “fromage facile” - an acidified cheese. Make a rennet-based cheese using cheese press. Make yogurt. Make ice cream. Make butter.

Dairy vs. Non-dairy (in groups; each group presents “what is it/how is it made” and a dairy & non-dairy sample)

Science of Melting Cheese - a 3-4 day lab beginning with melting cheese squares and ending with making the ultimate queso...along the way, learning the principles behind why cheese melts

Dairy...4 weeks

Stutts



Grains...3 weeks

corn: growing & harvesting. Processing into hominy, grits, masa...making tamales

Rice: growing & harvesting (Farm Bureau video) organic vs. non-organic. Water rights esp. on lower Colorado River. Brown rice vs. parboiled vs. white. Sweet rices in various Texas cultures: German-style, Mexican-style, Thai-style

Wheat: Gluten and its properties. Make a traditional Texas quick bread--Tortillas? Biscuits? with various wheat flours and with non-wheat flours. Host a biscuit/tortilla throw-down competition.

Farm tours...Barton Springs Mill tour...processing plant tours

Fruits, Vegetables, Nuts (and sugar!)...4 weeks

Where in the year do I put this? Seasonal? What's in season in the school year?

Preservation: Canning, pickling, fermenting, drying, freezing, freeze-drying

Teach by commodity groups depending on student interest/location: apples, peaches, cantaloupe, watermelon, peas, pecans, tomatoes, sugar, etc.

Canning for local fair; canning for SAE projects

Tours at local farms & orchards

Enzymatic browning experiments with apples (and teach GMOs - Arctic Apples)

Texas Farm Bureau Videos (I LOVE THESE!)



Seafood...2 weeks (Timed to coincide with crawfish season!) ^{Statts}

Study farmed seafood (both freshwater & saltwater), harvest, processing and wild-caught seafood

Filleting fish, deveining shrimp, shucking oysters, etc.

Texas seafood project: students research & present about a Texas seafood species. Utilize Texas Commercial Fishing Guide.

[LSU Crawfish Production Manual](#) study & crawfish boil

Visit seafood markets (I'd love to take students to [Prestige Oysters](#) in San Leon)

Poultry & Eggs...3 weeks

Production methods, terms, misconceptions

Fabricating a whole chicken

Dark meat vs. light meat study/experiments

Value-added poultry products

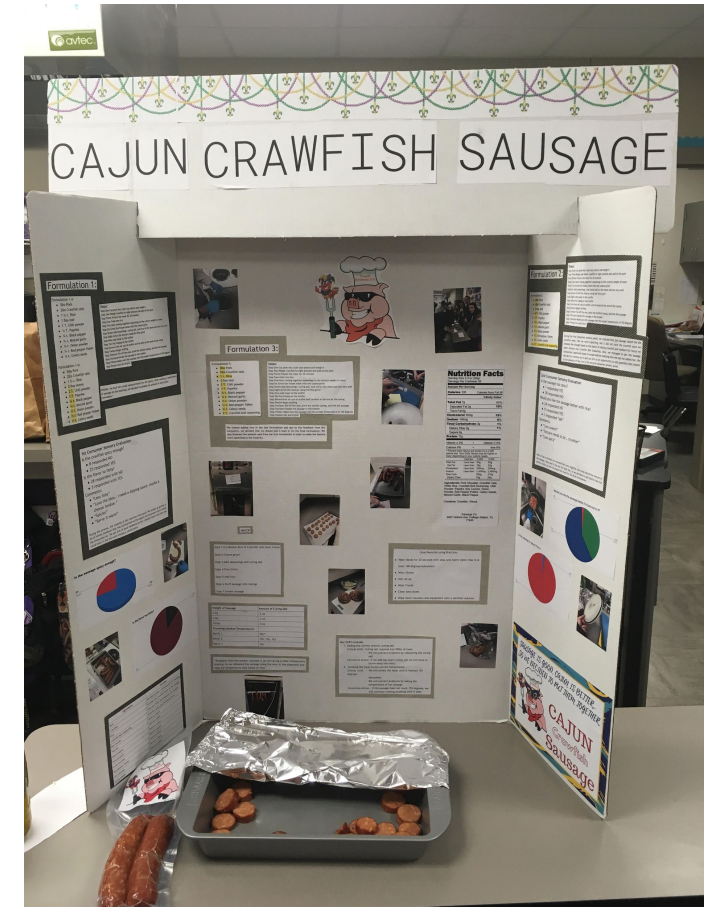
Eggs & their function in foods (binding agents in meatballs; thickening agents in sauces like hollandaise sauce)

Food Innovation...4 weeks

A final culminating project: creating a food product, testing it, revising it, packaging, creating nutrition label, product label, etc.

Depending on the class, I'll narrow the focus: ice cream or canned product

FFA Food Science & Technology CDE & FCCLA Food Innovations



Food Technology & Safety - my favorite labs

Food Safety - HACCP - chicken salad sandwich inquiry

Meats - testing marinade ingredients for tenderness; marinade throwdown

Dairy - make cheeses (acid and rennet), melting cheese; how does type of cheese impact oil separation and meltability? Queso throwdown

Grains - impact of gluten on biscuit texture

Fruits & veggies - using refractometer to determine sugar concentration

Food Insecurity – dinner meal meeting MyPlate on a \$2/person budget



Meat Tenderization Labs

*TEKS: The student describes the processing, packaging, quality analysis, and marketing of red meats and their by-products. The student is expected to:
(E) identify methods of fabricating and marketing processed meats.*

TEK related objective: Students will execute an experiment to understand methods of tenderizing tough cuts of beef. Students will identify & explain ingredients in pre-marinated beef products and explain how those ingredients impact the sensory characteristics of the meat.

- 1) Teach the structure of meat & ways to make meat tender
 - a) [presentation](#) & [handout](#)
 - b) I use a model I made with uncooked spaghetti noodles to represent muscle fibers and plastic wrap to represent connective tissue surrounding muscle bundles
 - c) Look at several different cuts under a stereoscope (so cool!!!)
- 2) Assign each group a different single ingredient
 - a) use beef eye of round steaks cut (pretty thin) from a single eye of round roast
 - b) marinate overnight
 - c) cook the next day (electric skillets work well for this)
 - d) complete [sensory analysis chart](#)
- 3) Read & learn about marinades ([article](#) & [chart](#) & [recipe](#))
- 4) Fajita throwdown - who can apply their learning and make the best fajitas? ([fajitas lesson ideas](#) & [student worksheet](#))
- 5) Analyze ingredients in pre-marinated meat products & perform sensory analysis on those products

Lab procedures

Organizing:

The Space

The Students

The Materials

Organizing the space

- 1) Separate lab preparation spaces for each group
- 2) Long “ingredient buffet” table
- 3) Backpacks out of the way (hooks at front of room, piled in a corner, etc.)



Organizing the students - jobs

FCS job title	AG job title	description
Head Chef	Manager	Directs all tasks; primary decision maker
Assistant Chef	Quality Control Supervisor	Gathers ingredients
Equipment Manager	Equipment Manager	Gets out & puts away equipment
Dishwasher	Sanitation	Washes equipment
Special Duty Assistant	Production	Other needed tasks



Organizing the students - jobs

An alternate way:

Assign the students numbers, shapes, letters, animals, etc.

You direct the job they are to perform:

- “If you are Student A, whisk the dry ingredients”
- “Student B, pour the milk into the dry ingredients”



Organizing the materials – level of difficulty

Determine the purpose of the lab and eliminate barriers to success

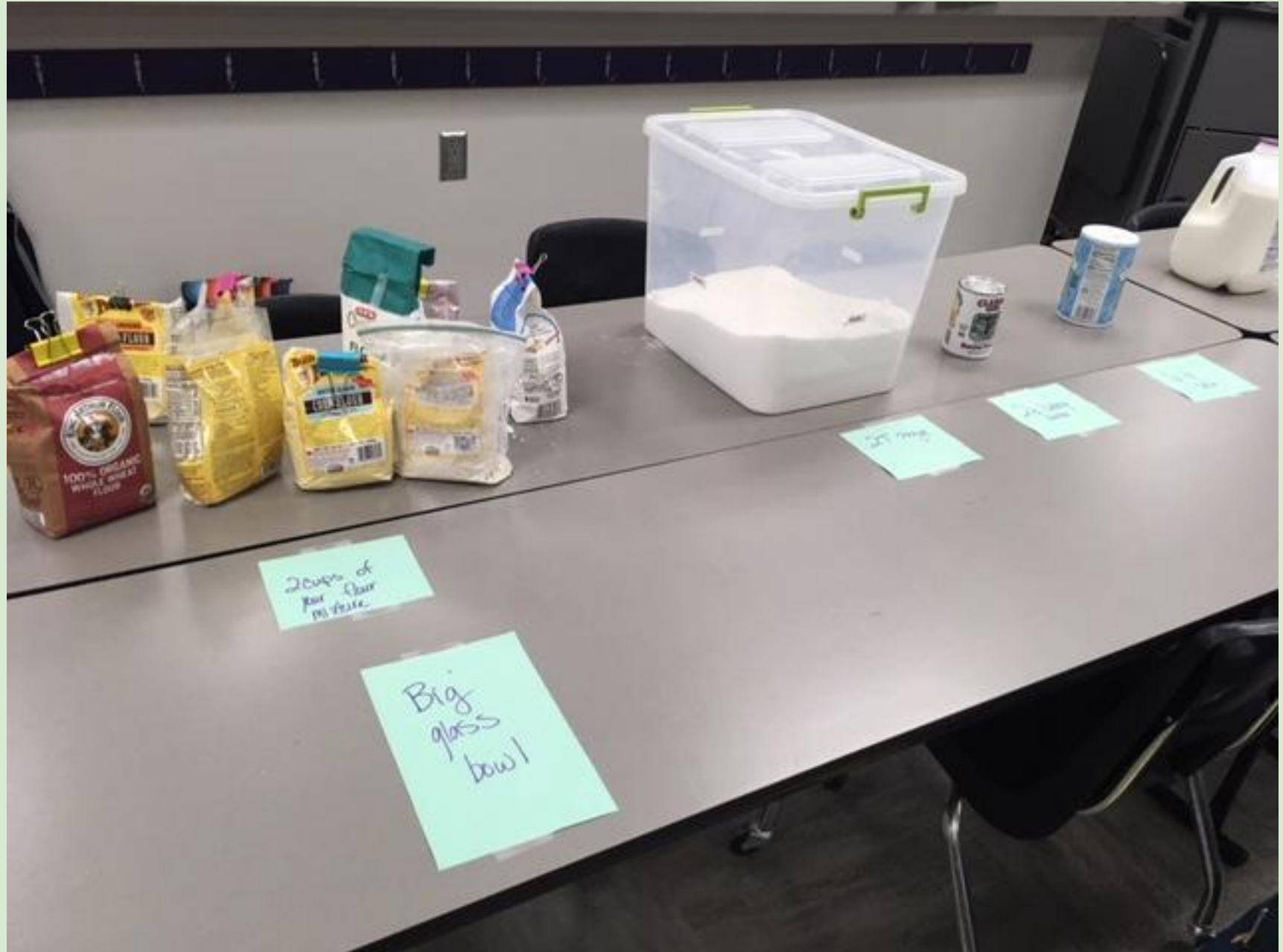
- Measuring - scale up or down
 - Premeasured
 - Teacher lays out the measuring equipment for each ingredient
 - Students determine measuring equipment but teacher has each ingredient labeled with amount
 - Students read the recipe/directions and determine equipment
 - WHERE WILL THEY PUT IT?
- Reading and following directions
 - Scale up or down the difficulty



KEY CONCEPT

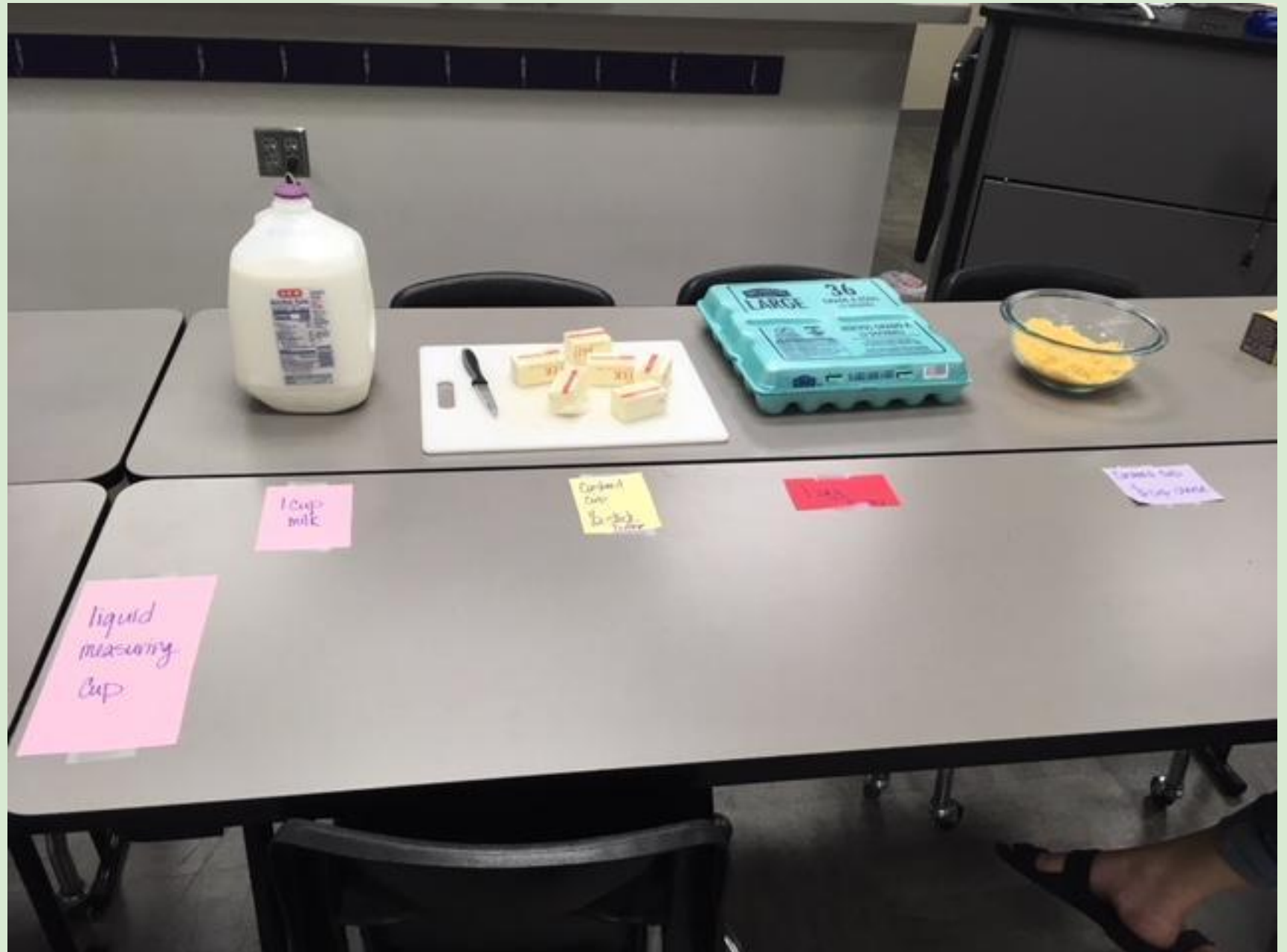
- Ingredients stay in place
- Students move

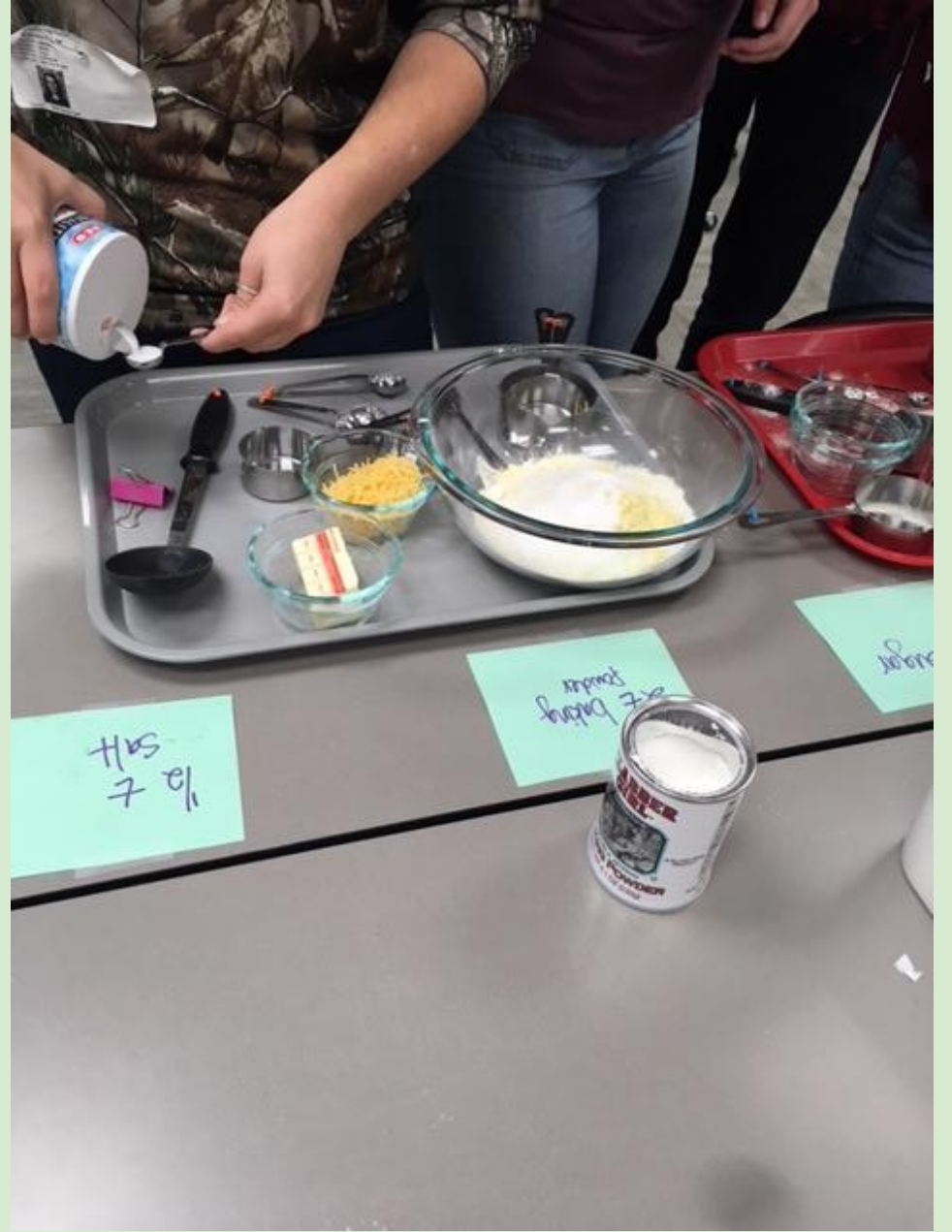
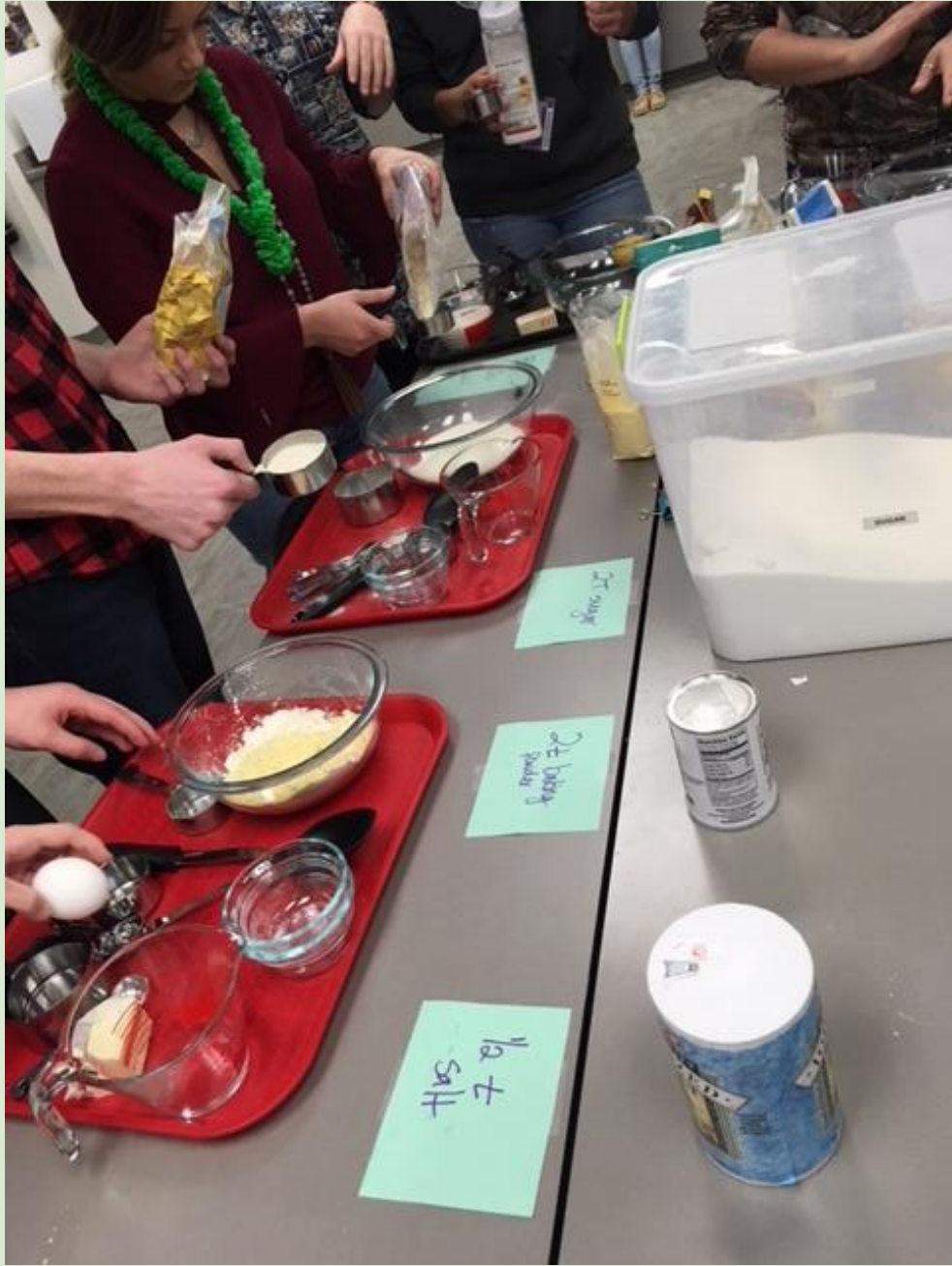
Color coded by where they put the ingredient



More color coding

Ingredients are in vessels that are easy to scoop out of (cheese in bowl, not in bag)





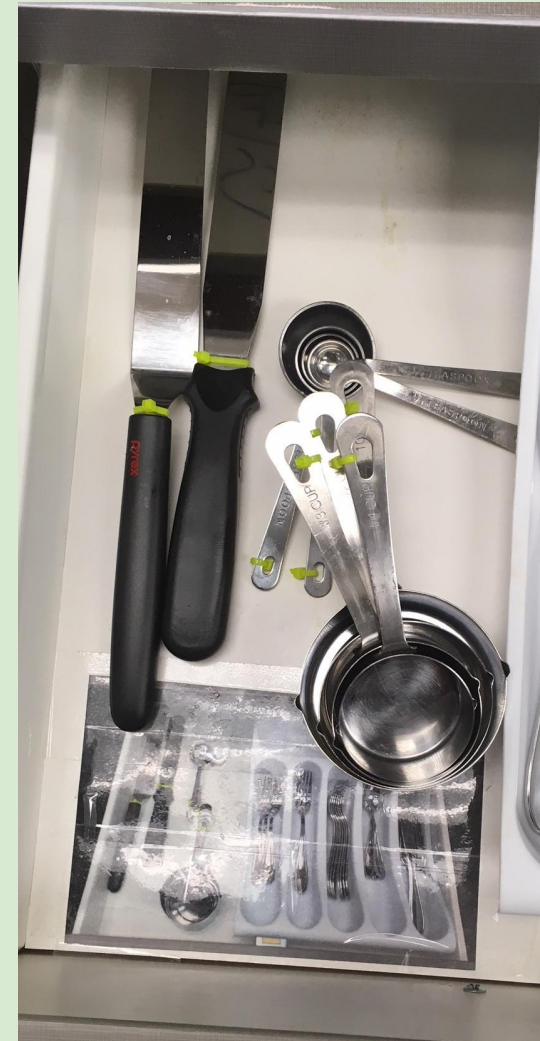
Organizing the materials – color coding

Color zip ties for each lab group – everything is zip-tied

Model airplane paint also works

Use plastic bins for each set if you don't have drawers for storage

Store knives separate/secure, but also color code



I don't have a food lab. Now what?



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Lab ideas – curriculum resources

Curriculum for Agricultural Science Education
(CASE4Learning.org) Food Science & Safety

Subscribe (for free!) to Food Quality & Safety magazine

Alton Brown – Good Eats episodes

Books:

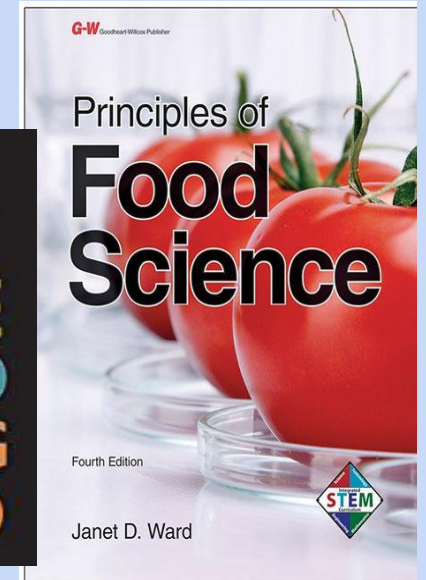
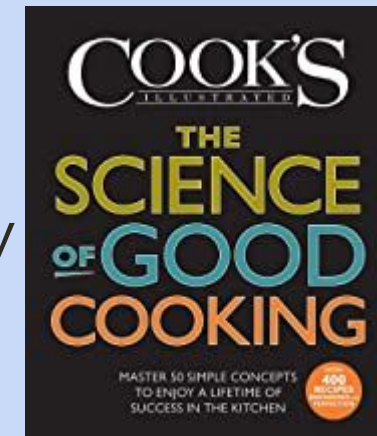
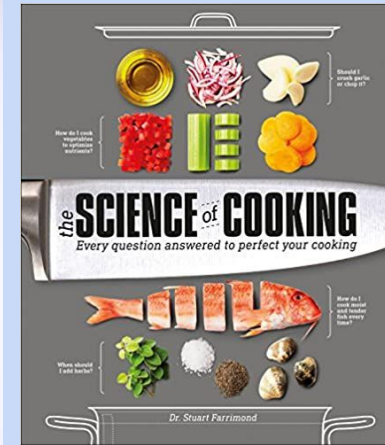
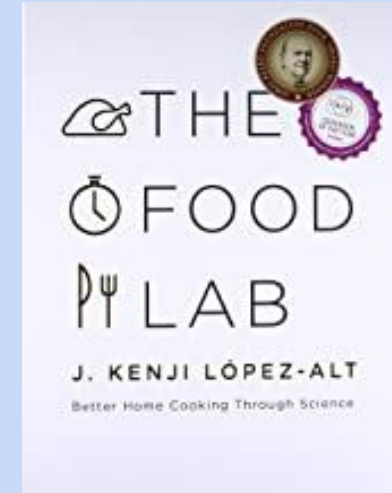
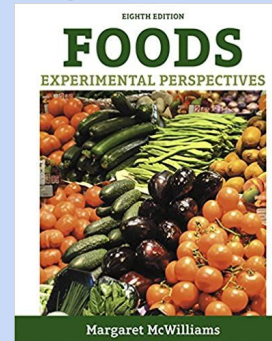
Principles of Food Science by Janet D. Ward

Foods: Experimental Perspectives by Margaret McWilliams

The Science of Good Cooking by Cooks Illustrated

The Food Lab: Better Home Cooking Through Science by J. Kenji Lopez-Alt

The Science of Cooking by Stuart Farrimond



CASE - Curriculum for Agricultural Science Education

Case4Learning.org

A complete curriculum designed by teachers for teachers--it's what you would design if you had all the time in the world!

Food Science & Safety

2 week institutes in the summer to train the teacher...leave with access to curriculum

My contact information

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