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Enhancing Flavor in Foods

It Makes Sense

The popping of corn, the crunch of crusty bread, the sight of vibrant red strawberries, the aroma of cinnamon rolls, and the taste of juicy oranges—all five of our senses provide us with perceptions that, when collected, become "flavor." This collective flavor is the primary reason why we eat what we do. Taste is the most important influence on our food choices.

The most often mentioned obstacle to buying healthful foods is concern about food not tasting good. Your message to students should focus on flavor while delivering healthful food!

The Five *Senses*

1. Hearing
2. Sight
3. Touch
4. Smell
5. Taste

The Components of Flavor

Taste

Our sense of taste comes from our mouth's chemical receptors or taste buds.

These some 10,000 taste buds record five basic tastes:

- sweet
- salty
- sour
- bitter
- umami

Additionally, our mouths' insides feel sensations like the burn of hot chilies, the cooling effect of mint, or the fizz of carbonated beverages.

Smell

Although the sense of taste is most often given credit for the appeal or dislike of food, the sense of smell is most often the guilty party. Unlike our limited repertoire of tastes, the number of odors we can detect seems to be unlimited. When we put food in our mouth, the chewing process releases volatile compounds that pass to the olfactory receptor cells at the top of our nasal passages. Our sense of smell is thought to be 10,000 times more sensitive than our sense of taste. Think about the last time you had a cold. Did you complain about foods having no taste?

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Visual
When food is placed in front of us, sight is one of the first senses that gives us flavor clues. The intensity of the red color of strawberries can help us anticipate their sweetness. Steam rising off the vegetables indicates they are piping hot, and the golden brown of the toast hints at its crispness. It is true that "we eat with our eyes." Just by looking at a tray, your students can anticipate how the food feels and tastes, even before the first bite.

Texture
A piece of poached salmon that flakes away under the gentle prodding of a fork hints at the fish's tenderness. On the contrary, when a knife blade refuses to penetrate a piece of meat, it indicates that the meat will be tough and chewy. The velvet smoothness of a mousse, the crunchy crust of bread, and the snap of a sugar snap pea are all texture indicators that give us insight into a food's " taste."

Temperature
The temperature of our food affects our perception of its taste. Coldness suppresses sweetness. Bitterness is more intense with a cold solution, and sourness is more intense with a warm solution.

Sound
The sizzle of onions when they hit the sauté pan tells us the pan is just the right temperature. The snap of a carrot tells of its freshness. There are many sounds in our culinary world that enhance the *flavor* of foods.

What can school nutrition operators do?
The first thing you can do as a food service operator is to take a moment and note how all five senses interact in your operation and in the foods you serve. Look for ways to enhance all aspects of flavor!

The "Tastes"

- Sweet, Sour (Acid), Salty, Bitter (Alkaline), Umami

Flavor in cooking is developed through...

- the selection of quality ingredients
- the appropriate use of seasonings and flavorings
- the application of processes that capture flavor
- the proper execution of cooking techniques

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Flavor Enhancers

Herbs	Fresh, Dried, Pestos
Spices	Whole, Ground, Toasted
Aromatic ingredients	Onions, Shallots, Garlic, Leeks, Ginger
Peppers	Hot: Ancho, chipotle, jalapeño, poblano, serrano, habanero, Scotch Bonnet Sweet green, red, yellow, orange, purple
Acidic Ingredients	Vinegars: malt, cider, balsamic, fruit, herb, garlic Citrus: zest or peel, juice Tomatoes: Juice, fresh, canned
Flavorful liquids	Stocks: vegetable, chicken, beef, fish Juices: fruit or vegetable
Other Condiments	Horseradish, Wasabi, Ginger, Mustards, Pickle Relishes, Olives, Salsas (Fruit & Vegetable), Ketchup, Infused Oils
Cooking processes	Extraction Infusion Marinating Reductions
Cooking methods	Sautéing Searing Poaching Roasting Baking Toasting • Toast nuts and seeds to bring out the flavor. • Roast vegetables for unique, robust flavors.

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HERBS

Herbs: The leaves of annual and perennial low-growing shrubs
Aromatic seeds: The seeds of graceful lacy annual plants (anise, caraway, coriander)

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Variety	*Description*	*Peak Season*	*Uses/Affinities*
Basil	leaves are pointed green. Purple varieties, large or small-leafed varieties available, and specialty types with cinnamon, clove, and other flavors	Summer/ year-round	Flavoring for sauces, pesto sauce, dressings, infusing oils, vinegar, etc. Also available in dried-leaf form. Chicken, fish, and pasta dishes
Bay leaf	Smooth, rigid leaf	Summer	Available dried year-round. Used to flavor soups, stews, stocks, sauces and grain dishes
Chervil	Similar in shape to parsley, with finer leaves, licorice flavor	Summer	Component of "fines herbes" often used in "pouches" to garnish dishes. Egg, chicken, shellfish, dishes.
Cilantro	Similar in shape to parsley, with a pronounced, unique flavor	Mid to late summer	Component of Asian and South/Central American dishes; flavoring for salsas and other uncooked sauces.
Dill	Feathery shape with a strong aroma	Late summer	Fresh herbs are used to flavor sauces, stews, and braises (especially Central and Eastern European dishes), and seeds are used in pickles.
Marjoram	Small, rounded leaves with a flavor similar to oregano	Throughout summer	Used in Greek, Italian, and Mexican dishes. It is especially suitable for vegetable dishes.
Mint	Pointed, textured leaves. Size varies by type, as does particular flavor.	Throughout summer	Mint is used to flavor sweet dishes and beverages, as a "tisane," and in some sauces. Mint jelly is traditional with lamb.
Oregano	Small, oval leaves	Throughout summer	Used with a variety of sauces, with poultry, beef, veal, lamb and vegetables

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Parsley	Feathered leaves may be curly or flat	Year-round	Component of "fines herbs" and of bouquet garni. Flavoring for sauces, soups, dressings, and other dishes. Garnish.
Rosemary	Leaves shaped like pine needles with a pine aroma and flavor	Year-round	Large branches are used as skewers. They are popular in Middle Eastern dishes, grilled foods, and marinades. Dried is nearly as intense in flavor as fresh.
Sage	Large leaves may be furry or velvety. Sage-green color	Summer	Popular as flavoring in stuffings, sausages and some stews. Dried, rubbed sage is also available.
Savory	Summary savory has a flavor similar to thyme. Winter savory is more like rosemary.	Summer and fall	Used in salads, stuffings, and sauces.
Tarragon	Narrow leaves with pronounced licorice flavor	Summer	Another component of "fines herbs." Used with chicken, fish, veal, and egg dishes.
Thyme	Very small leaves. Varieties with special flavors (nutmeg, mint, lemon, etc.)	Summer	Dried leaves are part of the bouquet garni. They may occasionally be used in place of fresh and to flavor soups, stocks, stews, and braises.

Source: The New Professional Chef (6th edition). The Culinary Institute of America. New York: Van Nostrand Reinhold. 1996.

SPICES

Derived from the bark, root, fruit, or berry of perennial plants

Examples:

- Bark - cinnamon
- Root - ginger
- Berry - pepper
- Fruit -nutmeg

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SPICES

Name	*Uses/Affinities*
Allspice	Braises, forcemeats, fish, pickles, desserts
Anise	Desserts and other baked goods, liqueur
Caraway	Rye bread, pork, cabbage, soups, stews, some cheeses,
Cardamom	Curries, some baked goods, pickling
Cayenne	Sauces, soups, most meats, some fish, and poultry
Celery seed	Salads (including cole slaw), salad
Chili powder	Chili and other Mexican dishes, curries
Cinnamon	Desserts, some baked goods, sweet potatoes, hot beverages, curries, pickles, and preserves
Cloves	Stocks, sauces, braises, marinades, curries, pickling, desserts, some baked goods
Coriander seeds	Curries, some forcemeats, pickling, some baked goods
Cumin	Curries, chili, and other Mexican dishes
Dill seeds	Pickling, sauerkraut
Fennel seeds	Sausage, fish and shellfish, tomatoes, some baked goods, marinades
Fenugreek	Curries, meat, poultry, chutney
Ginger	Fresh: Asian dishes, curries, braises: ground dry: some desserts and baked goods
Horseradish	Sauces (for beef, chicken, fish), egg salad, potatoes, beets
Juniper	Marinades, braises (especially game), sauerkraut, gin, and liqueurs
Mace	Some forcemeats, pork, fish, spinach, other vegetables, pickles, desserts, and baked goods
Mustard	Pickling, meats, sauces, cheese and eggs, prepared mustard
Nutmeg	Sauces and soups (especially cream), veal, chicken, aspics, spinach, mushrooms, potatoes, other vegetables, desserts (especially custards), baked goods
Paprika	Braises and stews (including goulash), sauces, garnish
Pepper	Stocks, sauces, meats, vegetables, many other uses
Saffron	Poultry, seafood, rice pilafs, sauces, soups, some baked goods
Star anise	Asian dishes, especially pork and duck
Turmeric	Curries, sauces, pickling, rice

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Pepper

Black peppercorns	Available as whole berries, cracked, or ground. The Telicherry peppercorn is one of the most prized. Mignonette or shot pepper combines coarsely ground or crushed black and white peppercorns.
White peppercorn	Black peppercorns are allowed to ripen, and then the husks are removed. They may be preferred for pale or lightly colored sauces. They are available in the same form as black peppercorns.
Green peppercorns	Unripe peppercorns packed in vinegar or brine are also available freeze-dried (they must be reconstituted in water before use).
Cayenne	A special type of chili, originally grown in Cayeene in French Guiana, is dried and ground into a fine powder. The same chili is used to make hot pepper sauces.
Chili flakes	Dried, whole red chili peppers that are crushed or coarsely ground.
Paprika	A powder made from dried sweet peppers (pimientos). Available as mild, sweet, or hot. Hungarian paprikas are considered superior in flavor.

Source: The New Professional Chef (6th edition). The Culinary Institute of America. New York: Van Nostrand Reinhold. 1996.

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SEASONINGS BLENDS

Yield: 1 quart

Mexican *adapted from USDA Recipe, Mexican Seasoning Mix, G-01A*	Onion powder Garlic, granulated Paprika, smoked Cumin, ground Chili powder	1/3 cup 1/3 cup 1/3 cup 1 ¼ cup 1 ¾ cup
Buffalo	Onion powder Garlic, granulated Paprika Chili pepper Red pepper	1 cup 1 ¼ cup ¼ cup 1 ¼ cup ¼ cup
Italian *adapted from USDA recipe, Italian Seasoning Mix, G-01*	Basil, dried Oregano, dried Marjoram dried Thyme dried	1 1/3 cup 1/3 cup 1 cup 1/3 cup
Caribbean Spice	Ginger, ground Black pepper, ground Orange peel, dried, ground Mace, ground Cloves, ground Brown sugar	1 cup 1 cup 7/8 cup 1 tablespoon 1 tablespoon 1 cup
Garlic & Herb	Granulated onion Garlic, granulated Paprika Oregano leaves Thyme leaves	1/3 cup 2/3 cup 1 cup 1 cup 1 cup

Barbecue	Onion powder Garlic, granulated Paprika, smoked Cumin, ground Black pepper	1 cup 1 cup 7/8 cup 7/8 cup ¼ cup
Ranch	Garlic, granulated Onion powder Dill weed Black pepper	1 ¼ cup 1 ¼ cup 1 ¼ cup ¼ cup
Parmesan-Rosemary	Garlic, granulated Rosemary, crushed Parmesan cheese	½ cup ¾ cup 2 ¾ cups
Spice Rub	Onion powder Garlic, granulated Paprika Cumin, ground Chili powder Black pepper Brown sugar	5/8 cup 5/8 cup 5/8 cup 5/8 cup 5/8 cup 2 tablespoons ¾ cup
Tandoori	Paprika Cumin, ground Coriander Cayenne Pepper Ginger, ground Turmeric	2/3 cup 2/3 cup 2/3 cup 2/3 cup 2/3 cup 2/3 cup

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ADDING SALT	Salt may be added to these seasoning blends according to your flexibility. Using 1 teaspoon of salt for 50 portions adds about 45 mg of sodium per portion. Using 1 tablespoon of salt for 100 portions adds about 70 mg of sodium per portion.

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VINEGAR

"vinegar" comes from the French vin aigre, or sour wine. Vinegar is an acidic liquid produced through fermentation. Souring is a natural process when an alcoholic liquid is exposed to the air. Bacteria present in the air convert the alcohol into a natural acetic acid, and it is this acid that gives vinegar its characteristic sharpness.

Vinegar is an essential ingredient in the kitchen and a highly versatile flavoring. It should be kept in a cool place away from light; it does not need to be refrigerated. If stored correctly, most vinegars can be kept almost indefinitely.

TYPES OF VINEGAR

Vinegar	Acetic Acid	Flavor	Uses
Wine vinegar *France, Italy, Spain* Champagne Sherry Balsamic	At least 6 % acetic acid	Produced from red and white wines, the quality of the vinegar depends on the quality. There are almost as many types of wine vinegar as there are wines.	Wine vinegars are ideal for mayonnaise and all kinds of salad dressings. They are also used in many classic butter sauces, such as béarnaise.
Malt vinegar *England*	4-8 %	Malt vinegar is made from grain (malted barley) and is strongly flavored.	It is often used as a pickling vinegar for onions and other vegetables. It is also used in the manufacture of sauces and chutneys. It is best with straightforward food such as fish and chips, cold meats, or when preparing relishes and chutneys.
Cider vinegar *North America*	5-6 %	It has a strong, sharp flavor and should only be used where it complements the other ingredients.	Apple cider vinegar is best for salads, dressings, marinades, condiments, and most general vinegar needs. Cider vinegar is the best choice for deglazing pork chops accompanied by sautéed apples. Used in fruit pickling.
Rice wine vinegar *Far East*	2-4 %	Japanese rice vinegars are mellow and mild, while vinegar from China is sharp and sometimes slightly sour.	Rice vinegar is popular in Asian cooking and is great sprinkled on salads and stir-fry dishes. Its gentle flavor is perfect for fruits and tender vegetables.

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CITRUS

- Lemon
- Lime
- Orange
- Grapefruit
- Kumquat
- Tangerine

Zest	Use	Tool
Fine Zest	Dressings, sauces, cookies	Microplane
Coarse zest	Muffins or salads	Zester
Citrus peel	Flavoring soups, water Lemon extract powder	Vegetable peeler

Zesting citrus:

- Wash and dry fruit thoroughly before zesting.
- Remove zest from the fruit BEFORE cutting or juicing the fruit.
- Remove ONLY the outer part of the peel; do not include the bitter white pith.

Citrus Salt

Kosher salt	1/4 cup
Lemon zest	1 tablespoon finely grated
Lime zest	1 tablespoon finely grated
Orange zest	1 tablespoon finely grated

adapted from: www.chow.com

Citrus Sugar

Lemon zest	1 teaspoon
Lime zest	1 teaspoon
Grapefruit zest	1 teaspoon
Orange zest	1 teaspoon
Granulated sugar	1 cup

adapted from: www.marthastewart.com

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REDUCE THE SODIUM

What is sodium?

Sodium is a mineral that everyone needs to regulate body fluids. It also helps nerves and muscles function properly. Sodium is abundant in our food supply.

Salt or sodium

- Sodium chloride is the chemical name for salt.
- 90 % of the sodium we consume is in the form of salt. Most of this is found in processed food and food service operations.
- Salt (NaCl) is 40% sodium (Na) and 60% chloride (CL).

The problem with too much sodium

- Too much sodium is the leading risk factor for high blood pressure.
- High blood pressure is the major risk factor for heart disease and stroke; both are leading causes of death in the US.
- Americans consume substantially more than recommended, more than 3400 mg daily.

Recommendations

- The 2020-2025 Dietary Guidelines for Americans recommend limiting sodium to less than 2300 mg daily (roughly equivalent to one teaspoon of table salt) for the general public.
- Recommend 1500 mg per day for certain populations, such as people with hypertension, prehypertension, or other risk factors for cardiovascular disease.

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Final Rule for Sodium in School Meals

Age/Grade Group	Current Sodium Limit: In place through June 30, 2027	Sodium Limit: Must be implemented by July 1, 2027 (approximate 15% reduction for lunch and approximate 10% reduction for breakfast from current limits)
School Breakfast Program		
K-5	≤ 540 mg	≤ 485 mg
6-8	≤ 600 mg	≤ 535 mg
9-12	≤ 640 mg	≤ 570 mg
National School Lunch Program		
K-5	≤ 1,110 mg	≤ 935 mg
6-8	≤ 1,225 mg	≤ 1,035 mg
9-12	≤ 1,280 mg	≤ 1,080 mg

Source: https://www.fns.usda.gov/cn/school-nutrition-standards-updates/sodium.
Limits apply to the average amount of sodium in lunch and breakfast menus offered during a school week.

Where is it found

- Salt, or sodium chloride, is the diet's primary sodium source.
- Processed foods

Sodium-Rich Ingredients
Sodium is found in a variety of compounds used as food ingredients. It both preserves food and enhances flavor. Look for added sodium in ingredient lists and check labels for sodium content.

Ingredient	Function
Monosodium glutamate (MSG)	Flavor enhancer
Sodium benzoate	Preservative
Sodium caseinate	Thickener and binder
Sodium citrate	Buffer is used to control acidity in soft drinks.
Sodium nitrite	Curing agent in meat.
Sodium phosphate	Emulsifier and stabilizer
Sodium propionate	Mold inhibitor
Sodium saccharin	Artificial sweetener

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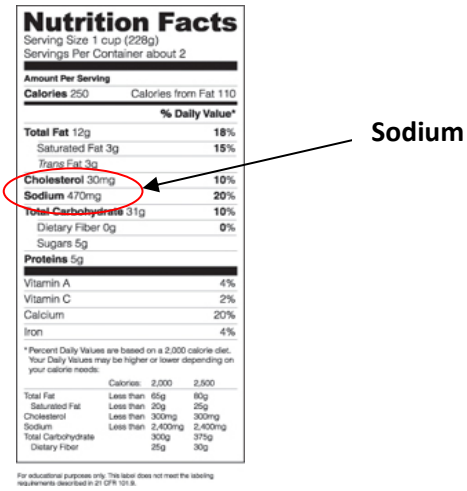
Sodium labeling

Label term	Definition
Sodium free	Less than 5 mg per serving.
Very low sodium	35 mg or less per serving and, if the serving is 30 g or less or 2 tablespoons or less per 50 g of the food.
Low sodium	140 mg or less per serving and, if the serving is 30 g or less or 2 tablespoons or less, per 50 g of the food.
Reduced or Less sodium.	At least 25 percent less per serving than the reference food.
Unsalted or no salt added	no salt is added during processing; however, the product may still contain sodium

Label Reading



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Salt in Cooking

- Tastes good and is inexpensive.
- Our taste (sensory preferences) for salt can be decreased.
- Make gradual changes to lessen the amount of sodium over time.

Functions of Salt

- Added salt improves the sensory properties of virtually every food, making it “taste” better.
- Salt was found to improve the perception of product thickness.
- Salt will enhance other tastes, such as sweetness.
- Used in curing meat and bringing products.
- Used in baking to control yeast.
- Retains moisture.
- Salt removes excess water from cheeses, creating a firmer texture and contributing to reliability, shredding, stretching, and flow characteristics.
- Enhancing raw poultry, beef, pork, and seafood products with sodium-containing (salt, sodium phosphates) solutions to improve the tenderness (juiciness) of leaner cuts of meat.
    - A regular serving of meat (4 ounces) without enhancement contains 68 mg of sodium.
    - The same serving of meat injected up to 10 percent of its weight with brine contains 384 mg sodium per serving.

Strategies for sodium reduction

- Gradual reduction without students' knowledge
- Use of low-sodium foods
- Modification of the size and structure of salt particles
- Use of substitutes and enhancers

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Salt

Salt	Amount	Weight	Sodium (mg)
Table salt	1 teaspoon	6 grams	2300
Diamond Crystal kosher salt	1 teaspoon	2.8 grams	1120
Morton kosher salt	1 teaspoon	4.8 grams	1920
Morton sea salt	1 teaspoon	5.6 grams	2240
Diamond Crystal Salt Sense *Ingredients: salt, silicon dioxide, tricalcium phosphate, sodium bicarbonate, dextrose, potassium iodine*	1 teaspoon	3.2 grams	1560
Morton Salt Substitute *Ingredients: potassium chloride*	1 teaspoon	3.6 grams	0

Sodium in Condiments, Sauces, Salad Dressings

Ingredients naturally low in sodium	
Vegetables, fresh, frozen Vegetable juices (freshly made) Fruits and fruit juices Vinegars Citrus juices	House-made stocks Sun-dried tomatoes Herbs Spices

Ingredients high in sodium	
Pre-prepared salad dressings Pre-prepared sauces Food bases (chicken, beef, vegetable, etc.)	Spice salts (garlic salt, celery salt, etc.) Pre-prepared mayonnaise Canned vegetable juices

Some high-sodium condiments		
Onion salt Celery salt Garlic salt Seasoned salt Meat tenderizer Bouillon	Soy sauce Steak sauce Barbeque sauce Ketchup	Mustard Worcestershire sauce Salad dressings Pickles Chili sauce Relish

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Mean Sodium Content of Condiments, Sauces, and Salad Dressings

Packaged food category	mg sodium (mean value)
Barbecue sauce, ketchup, steak sauce, marinades	1081 mg / 100 gm
Salsa, dips, dipping sauces, tartar sauces, mustard sauce, sweet and sour sauce	712 mg / 100 gm
Asian-style condiments	706 mg/tbsp.
Salad dressing	1019 mg / 100 gm
Mayonnaise and mayonnaise-type dressing	713 mg / 100 gm
Entree sauces (tomato-based pasta sauces)	442 mg / 100 gm
Entree sauces (gravy, cheese, pizza, Alfredo)	550 mg / 100 gm
Dry seasoning mixes	415 mg/serving

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