Amazing Maize: Authentic Foodways in the World Languages Classroom

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This curriculum unit is recommended for:
Spanish I, II, and III, grades 7-12

Keywords: tamales, maize, indigenous foodways, Columbian exchange, North Carolina history, Spanish, holiday traditions, pellagra

Teaching Standards: See Appendix 1 for teaching standards addressed in this unit. (Insert a hyperlink to Appendix 1 where you've stated your unit's main standards.)

Synopsis:

As explained by Elizabeth Engelhardt, *foodways* is a term for thinking about food in a holistic perspective that considers not foodstuffs, but the social, cultural, and economic context in which our food is produced and consumed. Foodways encompass not only what we eat, but how we prepare it, who produced it, who taught us to produce it, with whom we eat it and with whom we do not eat it.(Edge et al.) In this unit I will connect student's prior knowledge of foods using nixtamalized corn (hominy grits and Mexican style *totopos,* or tortilla chips) with Mexican and Central American traditions such as tamales. Students will also learn about the cultural continuity in indigenous communities in the processing and consumption of corn between Mexico and the United States. Students will learn about the commonalities and differences between Mexican and Salvadoran tamales and related foods such as Navajo tamales and Cherokee bean bread. Students will learn how the European appropriation of maize corn divorced from its traditional processing (soaking in an alkali solution) led to widespread disease, disability and death in the American South in the first part of the twentieth century.

I plan to teach this unit during the coming year to 120 students in Spanish II.

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Introduction: Corn, Drugs, and Rock and Roll

I first learned about the process of nixtamalizing corn from one of my Spanish IV students from Mexico. We were talking about food, and she said her family grew most of their own corn. I asked if they ground the corn themselves. "No," she said, "most people don't. You take it to a mill, and they soak it and grind it for you."

"What do you mean, they soak it?" I said.

"They soak it with–I don't know what it's called. They cook it with *cal* and let it soak. Then they grind it."

"*Cal* as in calcium?" I said. "Limestone?" I only knew *cal* as limestone. In Peru, I had witnessed the custom of chewing coca leaf with a small piece of limestone to intensify the stupefying effects of the drug. I had no idea it was used for preparing food!

"I think so," she said. "It's a white powder." I told her I'd never heard of soaking corn before grinding it and asked why they didn't just grind the whole corn, like we do here. It sounded like an awful lot of work. She made a face. "You can't eat raw corn," she said. "That's for animals."

Little did I know that the process she was describing, nixtamalization, was connected to one of my favorite food memories. In the early 1990's I was retail manager for the Ninth Street Bakery Cafe in Durham, North Carolina, a whole food vegetarian restaurant, bakery and music venue. Artists and creative professionals of all kinds congregated there, and artists from the Athens, Georgia alternative music scene would eat there when playing in Durham. My signature jalapeño cheese grits souffle was an oft-requested item. (R.E.M. and the Indigo Girls didn't play at our café, but it was enough for me; they drank our coffee and ate our grits.) I didn't know that the process that gave baked cheese grits their gelatinous quality and allowed them to cohere was the same process that allowed cornmeal *masa* to form a dough for tamales without the gluten that binds a wheat dough. I didn't know that hominy grits were an indigenous food. I didn't know that the difference between hominy grits and cornmeal mush meant the difference between life and death for poor Southerners in the early twentieth century. I didn't know that the supposed Cherokee forebears in my family's liberally embellished genealogy ate (well, would have eaten) *masa* or hominy grits in the form of leaf-wrapped bean breads anyone from Mexico or Central America would recognize as tamales. All these things I didn't know about the food I was serving we will explore with students in this curriculum unit for the Spanish classroom.

Rationale: Food Talk is Personal

Teaching Spanish for Upward Bound during the pandemic, I had a career-altering experience. I was frustrated with the low student engagement of the students logging in online for my

Academic Saturday Spanish enrichment classes. This did not surprise me; students had been online all week for their regular classes and now they were up early on Saturday morning for still more voluntary schooling. After a couple of sessions of ho-hum pandemic online learning, I had the inspiration to move my laptop and its webcam from my office to my kitchen. Saturday Spanish classes for Upward Bound became a cooking show in Spanish. We made *pico de gallo,* and *café de olla.* We made nachos according to Ignacio "Nacho" Anaya's 1943 recipe. Students immediately brightened up, tuned in, and more importantly started to share their own favorite food traditions–even though they were forty-five minutes away and couldn't even eat or smell the food!

This unit will connect Spanish language, culture and history with food experiences shared by most of my students. Hispanic students are now the single largest group of students at my school. Many students will recognize foodways that connect with practices that they experience in the homes of relatives, if not in their own homes. (Most of my Hispanic students are or should be English-dominant in their speech at home, since I'm only teaching Spanish I and II.) Black and White students will mostly recognize grits. Many (not all) Asian students will recognize the use of banana leaves to cook steamed dumplings, as with Central American tamales.

There is something special about food that connects people, *even when they just talk about it* and can't actually eat together. That is something wonderful about food, too–people who can't share food can still share their memories of food. My Muslim students can't share in my Puerto Rican students' *mofongo,* made with pork cracklins, but they *can* share in their memories of gathering together as a family to celebrate and cook an important meal with special significance. Sharing memories and experiences connected to food can bridge connections not only with curriculum, but between students as well.

Unit Goals

In this unit I will connect student's prior knowledge of foods using nixtamalized corn (hominy grits and Mexican style *totopos,* or tortilla chips) with Mexican and Central American traditions such as tamales. Students will also learn about the cultural continuity in indigenous communities in the processing and consumption of corn between Mexico and the United States. Students will learn about the commonalities and differences between Mexican and Salvadoran tamales and related foods such as Navajo tamales and Cherokee bean bread. Students will learn how the European appropriation of maize corn divorced from its traditional processing (soaking in an alkali solution) led to widespread disease, disability and death in the American South in the first part of the twentieth century.

Corn is not a terribly nutritious food in its raw state. Populations that obtain most of their calories from corn meal are susceptible to pellagra, a dreadful niacin deficiency characterized by the 4 D's: diarrhea, dermatitis, dementia, and death. The disease was the scourge of the American South prior to World War II and whole hospitals were built to treat it. By 1912, South Carolina alone reported 30,000 cases of pellagra a year; four in ten pellagrins, or pellagra sufferers, perished of the disease. (Morabia)

The problem was that Europeans had adopted the maize crop in ignorance of the foodways that made the plant nutritious. Native peoples of the Americas relied heavily on maize but did not suffer pellagra. At some point in the ancient past, Central American people discovered how to nixtamalize corn. The work comes from a Nahuatl word meaning “ash dough.” Nixtamalizing corn is soaking corn kernels in an alkaline solution to remove the outer hull or pericarp of the corn kernel, followed by cooking and rinsing. This produces hominy, which may be used whole or ground into dough or milled into flour.

Nixtamalized corn has properties raw corn meal does not have. First, with the addition of water it will readily form a self-adhering pliable dough, like a dough containing gluten. Second, it has a softer texture and more palatable flavor. Most importantly, nixtamalization makes the niacin present in corn available to the human body. Therefore Mexicans did not get pellagra but Southerners eating a substantially similar diet did.

I want to show students the indigenous practice of nixtamalizing corn and show students how it connects with their lives and diets today. I want to show them the connection between Mesoamerican foodways and foods common to the North Carolinians. Hominy grits, for example, are made of nixtamalized corn. I also want to allow students to compare and contrast different kinds of tamales–for example, Mexican tamales, Salvadoran or Peruvian tamales, and Cherokee bean bread. (Cherokee bean bread is basically a tamal formed as a dumpling. Instead of having a bean filling, the beans are distributed evenly in the dough like chocolate chips in a chocolate chip cookie. Cherokee bean bread is usually boiled while tamales are steamed.)

I want to show students that indigenous and mestizo Latin Americans share a cultural connection with the indigenous people of North Carolina and share foodways with early settler populations. I also want to show students that indigenous culture in Latin America is very much alive and front and center in everyday life in many places. It’s very common to meet Mexicans who have the experience of nixtamalizing and grinding their own corn or who have experienced this in the home of a grandparent or other relative.

I want to compare the different methods people use to process their corn. The most common method is to use cal, or food grade calcium hydroxide. In Mexico and Central America, this was commonly obtained by burning limestone or mussel shells. Ash is another source of an alkali for treating corn. The method remains the same, but each ethnic group has a different preference for wood ash. Some indigenous communities in Mexico insist on oak ash, but the Eastern Woodland indigenous people of the Southeast disdained oak ash for cooking. They used oak for their mortars for grinding nixtamalized corn, which probably imparted flavor, but for processing corn, and for seasoning, preferred hickory or sometimes poplar. The Navajo used juniper ash and their own variety of blue corn. Nixtamalizing corn with ash instead of calcium hydroxide is supposed to yield a different flavor profile but I read that most people find it agreeable. Interestingly, nixtamalizing corn with calcium hydroxide enhances the calcium content of the finished product more than using wood ash, but corn nixtamalized with wood ash has most of the calcium of corn processed with cal and much more potassium. I would like for students to witness and hopefully compare and contrast different foodways in processing corn.

School Demographics

I teach at Independence High School in Charlotte, Mecklenburg County, North Carolina. The school's zone is shaped roughly like a slice of pizza, pointing from a rural and semi-rural area into the center of a city, thereby drawing from a mix of neighborhoods. The school sits on the Charlotte side of the border between Charlotte and Mint Hill, a much smaller and formerly rural community in Mecklenburg County.

Hispanic students now constitute the single largest group of students at the school, but no one group constitutes a majority. The school has 2,083 students assigned, of whom 23.1% of students are White, 30.8% are Black and 37.1% are Hispanic. 5.5% of students are Asian, mostly representing recently arrived refugee populations from Southeast Asia and Nepal. 2.8% of students identify with two or more races. 30.1% of students qualify for free or reduced lunch. (*Independence High School in Charlotte, NC - US News Best High Schools*)

Amazing Maize

Nextli Tamali, or Ash Bread: The Art and Science of Nixtamalization

The word "nixtamalization" comes from Nahuatl words *nextli,* "ash," and *tamali,* "maize dough." Nahuatl is the indigenous central Mexican language of the Aztecs and of thousands of modern Mexicans today. (*Cooking with Ashes – Onondaga Nation*)It's a core tenet of Dine and many other indigenous food traditions that while corn is a vital staple, it is not a viable food source until it is combined with ash. The Dine prefer juniper ash but will use Rabbitbrush and Fourwing Saltbush ash; the Hopi prefer Rabbitbrush. The Dine also gather fossil seashells and burn those to produce calcium hydroxide. For the Dine, the type of ash used depends not only on the availability of the source but also the desired nutritional contribution of minerals. (Nez, 2021) Different types of ash also affected the alkalinity of the soaking solution.
(*Cooking with Ashes – Onondaga Nation*) In the Eastern woodlands, the preferred ash was hickory. (Briggs) The Iroquois Museum recommends poplar. (*Cooking with Ashes – Onondaga Nation*)The ash selected also plays a role in the flavor profile of the end product. (Briggs)(Pappa et al.)

The earliest physical evidence of nixtamalization comes from Maya waste pits of San Bartolo, a Classical Mayan site dating to the 8th or 9th century C.E. The Maya used the caustic water left over from the nixtamalization process to flush their indoor toilets–the alkaline solution would have worked to reduce odor, like a toilet cleaner with bleach. (Thurston)By the time Europeans arrived in the Americas, the process was ubiquitous across indigenous groups growing maize. (Briggs)

Nixtamalization is a multi-step process. First, grains of dried maize are washed. Then, water is added plus wood ash, lime or later canned lye to make an alkaline solution. The maize is cooked in the alkaline solution and then allowed to soak. The alkaline solution is drained off and the kernels are rinsed to remove the pericarp, the outer cover of the maize kernels. Once thoroughly washed, the softened grains are milled to produce dough. The dough is shaped for cooking. (Orchardson) In contemporary times, commercially produced ready-to-use nixtamalized cornmeal, or masa, is now widely available under mass-produced and boutique labels.

Indigenous correspondents report that the flavor of mass-produced hominy is inferior to that produced by boiling with hickory ash. (Portman)

The process makes the grain gelatinous, giving the aforementioned gelatinous quality to cheese grits and to Salvadoran tamales alike. The process also makes the niacin, or vitamin B3, in the maize available for absorption by the human body. Protein content is somewhat reduced, but iron, calcium, and other minerals are absorbed into the maize from the reagent solution. (Orchardson)

Corn Kills (or is it Cotton Kills?): the Story of Pellagra

In 1735, Don Gaspar Casál, a Spanish physician, noted a terrible form of what appeared to be a new kind of leprosy among the peasants of Asturias. The illness was known as "mal de la rosa" for the reddened thick skin that would form on the backs of hands and feet and around a person's neck (a sign afterwards known as Casál's collar.) Patients suffered terrible dermatitis and pain when walking, sun sensitivity and fissures in the skin. Later, they would be troubled with digestive distress, and in the late stages by tremor, delirium, and gait disturbances. Finally, they would perish. He noted that patients uniformly ate diets in which maize predominated and ate very little meat. He was perplexed, though, that vegetarians eating diets rich in bread, nuts, cheese and legumes did not suffer from a lack of meat. He was at a loss as to the cause of the illness–but sadly, he almost figured it out. It would be another two hundred years before a scientist would unravel the cause of the disease, which entered English under its Italian name, *pella agra,* "bitter skin," shortened to pellagra. (Major)

In 1735, Casál had already identified the four D's for which pellgra was known: dermatitis, diarrhea, dementia, and death. By 1912, the disease sickened 30,000 South Carolinians a year, and claimed the lives of 40% of the affected. (Morabia) By 1928, by which time nutritional interventions had been devised, pellagra affected 230,000 people in the American South each year and killed 7,000 of these. (Clay et al.)The disease was most prevalent in, but not confined to, the South. In 1914, the Thompson-McFadden Pellagra Commission, which had previously concluded the disease was communicable and had not dietary component, appointed Dr. Joseph Goldberger to investigate the disease. Goldberger quickly realized that in institutional settings such as orphanages and asylums pellagra was common among inmates but virtually unheard of among staff. He immediately concluded that a pathogen was an unlikely cause for the disease, and that the cause must be dietary. He suspected a lack of animal protein was to blame and devised a dietary regimen that consistently and successfully reversed the disease. It would be nearly two decades after Goldberger published his results, and eight years after his death, that scientists determined the disease was caused by a deficiency in niacin, or Vitamin B3. (Morabia)

Teeming millions of indigenous and Hispanic people who incorporated indigenous foodways into their diets were protected, even though they subsisted on diets substantially similar to those poor Spanish peasants and poor Southerners, Black and White. Nixtamalization makes the naturally unavailable niacin in maize available for the human body. (Orchardson) We'll see there's another component in the story of the suffering this disease inflicted on the South: cotton.

When I was in the Boy Scouts, we were always enjoined to wear wool in cold weather, on the grounds that wet wool will still insulate you and generates heat as it dries. Wet cotton, on the other hand, loses all its insulating properties as soon as it gets wet, leading to hypothermia even in temperatures well above freezing. “Cotton kills!” they would tell us. We all wore jeans anyway. It was the South, and no one had wool pants for hiking.

There’s another way that cotton kills, though. Researchers from the National Bureau of Economic Research have determined a causal link between cotton cultivation and the prevalence of pellagra in the American South. While disease usually rises as income falls, these researchers found a paradoxical effect. After the boll weevil destroyed the Southern cotton industry in the early 1900’s, health outcomes for Southerners improved. (Clay et al.)

General Teaching Strategies

Show, Don’t Tell

Remember the scrolling text at the beginning of *Star Wars*? If the 1977 film *Star Wars* had been made by a high school teacher in the 2020’s, instead of by George Lucas, the ninety minutes of the film’s one hour forty-five minute runtime would have been scrolling text, followed by an infographic on the political, economic, and cultural factors leading to the Rebellion and concluding with a 15 minute animation created using Powtoon detailing the passage of the defense appropriations bill that financed the construction of the Death Star. Gripping stuff. Other teachers would look at it and think, “Wow! I need to step up my game. How do I use Powtoon?”

If you look at any–I mean *any*–book on writing, screenwriting, *any* kind of writing, the first advice you’ll get is, “Show, Don’t Tell.” Most composition teachers tell this to their students at some point. Yet, we teachers usually tell when we could be showing.

I aim to bring actual demonstrations to the classroom as much as possible. My classroom isn’t set up as a kitchen. Partnerships with our Culinary Arts department have proven fraught with bureaucratic obstacles. (Career and Technical Education courses receive their funding from a different source from the non-CTE courses. If a general education teacher partners with a CTE teacher on a class, the CTE teacher has to bill their department with an actual invoice requiring payment for the CTE department’s services at market rates.) I may be able to partner with a teacher based in a lab–I’ll look for a crossover there. I may simply have to do demonstrations on video at home in my kitchen and bring in sample products from each stage of production to show students. If that’s what I have to do, I’ll do it.

Keep Them Talking

How many times have I seen the police procedural film trope where the police set up a phone trace to pinpoint the location of the antagonist, but the negotiator on the police end has to keep the antagonist on the line for a predetermined amount of time (which the antagonist mysteriously knows) in order for the trace to work? (*Phone-Trace Race - TV Tropes*) It’s a tired suspense trope by now, but it’s terrific advice for classroom engagement.

I'm excited to have students share their own opinions, views, and above all food memories and experiences, both in their preferred language and in the target language. It's wonderful for learning, for student engagement and for language acquisition. I'm going to build in lots of opportunities for students to share and participate out loud.

Share the Spotlight and Seek Support

When I first moved to Charlotte in 1995 and was looking for a job, I answered a lot of job postings that billed themselves as "education" or "training" positions that turned out to be multi-level marketing pitches. They'd gather job seekers in a rented ballroom, and they'd all give the same pitch: entrepreneurs use other people's talent, other people's time, and other people's money to get rich, and *that's* the secret of multi-level marketing. Then they'd ask us to invest our own talent, time and money. Nope!

Obviously, I didn't go for MLM. The principle holds true in the classroom, though. I don't have to do this alone. There are plenty of subject matter experts available to share the spotlight and further enrich the student experience. In terms of Mexican and Central American culinary techniques, I'm sure I have students who have some very serious subject matter expertise gathered around the dinner table at night. I can have them make a video or do a Zoom call with them. I can pull in experts from the community, in person or digitally. I can even look for grant and other funding opportunities to cover the cost of implementing parts of my unit. I've sought and received this in the past with success.

Classroom Activities

$Na_3C_6H_5O_7$ Typical Spanish Class

Nothing motivates high school students quite so well as food. To start an explanation of the difference between indigenous (nixtamalized) and Western (dry milled) corn products, we can start with a simple taste test.

I've done this activity before, and it works. Start by brainstorming with students to name some adjectives to describe the taste and texture of corn chips, and give them those in Spanish

- *crujiente:* crunchy
- *el olor:* smell
- *el sabor:* flavor
- *fuerte:* strong
- *delicado:* delicate
- *suave:* soft
- *duro:* hard

…plus, any others they come up with.

Then, ask for a show of hands for students who have tried Fritos (the original Frito-Lay brand.) Ask who has tried Mexican style *totopos* like Santitas brand or Mexican restaurant corn tortillas.

Offer each student 1-2 Frito corn chips first and have them describe the taste, texture, and smell. Do the same with Santitas (or a comparable brand, but make sure they are true Mexican-style chips using corn processed with lime.)

Students will report that the Fritos are harder, have a strong corn taste and a very strong smell, while the Santitas or other *totopos* have a milder smell and taste and a softer texture, staying crispy while less hard and grainy. Explain to the students that the flavor characteristics they observe are due to chemical differences not readily apparent, and that the difference between the two chips could potentially kill them if they were forced to survive on a diet of 90% fried corn. Ask which chips they think are healthier: the Fritos, made from corn dry-milled to remove the pericarp and the germ but not chemically processed, or the Santitas, made from corn chemically processed with a strong alkali. (We're taught that less processed food is always better and chemicals are bad, right?) Explain that surviving on the Santitas would be totally possible but that a diet of 90% Fritos would make them very sick indeed and might prove fatal.

Ask students for a show of hands of who likes nachos and ask what they like on them. Put Spanish words for nacho toppings on the board if they do not know them. Show students a good history in English or Spanish about the history of nachos. I include in the appendix Resources for Students and Teachers my favorite, which not only tells the story of the creation and popularization of nachos but gives a chemistry lesson as well. Nachos were created in 1943 by Ignacio "Nacho" Anaya, maitre d' at two restaurants in Piedras Negras, Mexico, a small town right across the border from a large Army Air Corps base in Texas. Anaya developed his three ingredient nachos (quartered fried or baked tortillas, longhorn cheese, and pickled or fresh jalapeños) as a quick appetizer he could throw together for hungry guests who came to the bar between the lunch and dinner shifts when the chef was absent. The plate became known as Nacho's Special and soon spread to Texas and later to Los Angeles. ("Food History: Nachos - YouTube")

Incidentally, the nacho cheese we know today was developed by an entrepreneur who wanted a version of nachos that could be served immediately without having to toast the chips with cheese on them. Frank Liberto owned concession licenses at several Texas sports stadiums. (Ricos Products, n.d.) He added a salt, sodium citrate, to cheese to lower the acidity, making the proteins more soluble and thereby allowing the liquid and fat in the cheese to more readily emulsify. He created a shelf-stable product that stayed pourable at room temperature without clumping or separating: nacho cheese. The chemical formula for sodium citrate, incidentally, is $Na_3C_6H_5O_7$. ("Food History: Nachos - YouTube")

What I most appreciate about the Mental Floss video on the nacho is that it describes pellagra, a disease caused by chronic niacin deficiency associated with a diet based on dry-milled corn. Sufferers pass through the dreaded four Ds of pellagra: dermatitis, diarrhea, dementia and death. The video also gives a quick introduction to nixtamalization, the process by which native peoples processed their corn. Nixtamalization involves boiling and soaking corn kernels in water with a strong alkali to remove the outer hull of the corn. The process also makes the niacin in corn available to the human body. The niacin in raw corn is bound to other molecules that make it inaccessible to the human body; the nixtamalization process frees the niacin and makes it available for absorption by the human digestive system. The same nixtamalization process also

allows us to form a dough out of corn flour even though corn flour doesn't contain gluten. (Ibid.) That's what allows us to form maize corn dough into tamales, sopes, huaraches, and, of course, the tortillas we are most familiar with.

As I've found in my own experience, there are a lot of obstacles to a non-culinary teacher bringing food and cooking into the classroom. One way I've found around this is to practice informal commands in Spanish along with vocabulary for school supplies, kitchen supplies and food by having students build and use a solar oven. I promise it will be the most fun they've had reviewing informal commands.

Show students a couple different videos in Spanish showing how to make a solar oven from a cardboard box. (Pizza boxes are especially easy; I have included a couple of my favorites in the Appendix.) (¿Cómo Hacer Un Horno Solar? Discovery Kids - YouTube, n.d.) Allow students to browse YouTube and explore different solar oven designs and vote as a class on the design they believe to be most practical and efficient for our class objective: delicious and crunchy nachos!

The next step requires either student families and community partners affluent enough to contribute supplies or an outside source of funding such as grants or GoFundMe. Depending on the design, cardboard box solar ovens can be very simple, and supplies are usually limited to pizza boxes (Domino's Pizza donated a stack to my students), glue, aluminum foil, black paint, and plastic wrap or sometimes the panels of glass that come from certificate frames from the dollar store. Once I assemble supplies, I set aside class time to have students build their ovens in pairs or groups. I give instructions strictly in Spanish after going over the names of all the supplies with them.

Allow at least a day for paint and glue on the boxes to dry. Purchase corn tostadas, ultra-thin sliced Colby cheese, and pickled nachos or instruct students to bring them. You'll also want to have disposable polyurethane or vinyl gloves suitable for food service for the students to use, paper plates and paper towels and anything else you'll need for cleanup. Find a sunny, hot day and have your students each top a tostada with a slice of very thinly sliced Colby cheese and some pickled jalapeño slices and place them in the ovens. If they keep them facing the sun, they should have tasty nachos eventually, but depending on oven design and the quality of the build it can take many minutes to melt the cheese. (This recipe follows Ignacio Anaya's 1943 recipe. Ignacio Anaya used Longhorn cheese, which is Colby cheese sold in wheels instead of logs or bricks. It's hard to find Longhorn cheese at all where I live but you should be able to find Colby or, in a pinch, Colby Jack cheese for an authentic flavor profile Ignacio Anaya's patrons would recognize.)

You're going to have some time to fill while the students wait for their solar ovens to melt their cheese, so use this time to teach them about the discovery of nutritional deficiencies and the dawn of the science of nutrition, thanks to the Spanish physician Don Gaspar Casál.

Ask students what they remember about the Columbian exchange. Ask students to name some crops that spread from the Americas to Europe and Asia during the Columbian exchange. They will probably name tomatoes, potatoes, chiles and chocolate, if not corn and potatoes. Explain to students that the Spanish brought corn and potatoes back to Europe. Starting in the 18th century,

peasants in Europe typically grew cheaper, less valued crops like maize or potatoes to feed themselves and their families and grew high-value crops like wheat and rye to sell or to pay their rent if they were sharecroppers. Unfortunately, the Spanish brought corn seed back with them from the Americas but did not take care to bring with them the technique of nixtamalization.

In 1735, the Spanish doctor Don Gaspar Casál was working in a poor region of Asturias where most peasants lived on a diet of mostly maize corn. He identified a peculiar new type of "leprosy" he called *mal de la rosa* for the thickened, red irritated skin of sufferers. The afflicted exhibited a peculiar collar-shaped rash of reddened skin around the neck and chest, followed by similar lesions on the trunk and limbs. The afflicted suffered gastrointestinal distress and eventually debilitating neurological symptoms. He noted that the disease occurred almost exclusively in peasants who ate mostly corn and very little meat and cheese. (Major)We know *mal de rosa* by its Italian name, *pelle agra,* "bitter skin."

While the doctor Casál noted a correlation between pellagra and diet, it would be over two hundred years before science determined the cause. In the rural South of the early 20th century, pellagra was endemic. Cotton monoculture dominated the usage of arable land, and a majority of the population relied upon corn imported from Midwest milled using the new Beall process. The Beall process for removing the hull and germ of corn resulted in a finer and more shelf-stable cornmeal. Unfortunately, the process removed virtually all the niacin. Thousands of people died of the disease every year. Many suffered seasonal bouts of the affliction. Southern state governments built whole hospitals to contain pellagrins, or pellagra sufferers. No one knew for sure if the disease was contagious or not. (Clay et al.)

In 1914, Joseph Goldberger, working with institutionalized pellagra patients, noted that even in the close confines of an institution the disease only affected patients, never staff. This ruled out for him a communicable agent as the cause of the disease. In 1915 Goldberger proved that pellagra was caused by a dietary deficiency and that a diet rich in milk, eggs, and meat would reverse the course of the disease and restore sufferers to health. It was not until 1937 that Conrad Elvehjem proved that niacin deficiency was the cause of pellagra. (Burris et al.)Finally, in 1951, Kenneth Carpenter discovered that the niacin in unprocessed maize was not available to the human body and that only treatment with a highly alkaline solution would release it and make it available to the human body. (*Vitamin B3 (Niacin) - Medicine LibreTexts*)

If it's a warm and sunny enough day, the nachos should be about ready by the time you've taught them all this. Enjoy!

Amazing Maize: Tamales, Broadswords, and Grits

Here's where you need to decide how far you're going to go in terms of offering students an immersive experience. You might decide you have the resources to take your students in the classroom all the way through the process from dry flint corn to nixtamalization to tamales. You might decide to nixtamalize corn at home and show students samples of corn at the different stages (dry flint corn, nixtamalized corn, ground masa, and finally tamales.) You could show students a video of traditional methods of nixtamalizing corn using both lime and wood ash and then use commercially available masa meal to make tamales, either at home as a demonstration

or in the classroom. You could show students a video of traditional nixtamalization and let *them* make their own videos of tamale preparation at home. Any way you do it, you'll increase your students' cultural competency and awareness and give them a memorable experience.

Ask for a show of hands of students who have ever tried grits. Ask if anyone eats them at least once a month, or once a week. Then ask who eats corn tortilla chips at least once a month, or once a week. Explain to students that the hominy grits so ubiquitous in the South are in the same indigenous culinary tradition as other masa products such as tortillas, Mesoamerican tamales, Cherokee broadswords, atole, kanuchi, and so on.

You can simplify things for them by dividing the foods into three categories: baked or fried flatbreads, steamed or boiled tamales, and porridges. Tortillas, huaraches, sopes, arepas and pupusas are all in the flatbread family. Tortillas are thin and flat and used to hold other food; sopes and the larger, oblong huaraches are like very thick fried masa tortillas covered with toppings. Central American pupusas and South American arepas are like large sopes or huaraches filled with different ingredients and fried. (Bakall)

The tamal family consists of maize corn breads that are wrapped in leaves and steamed or boiled. This includes, of course, tamales, which are usually (but not always) filled with a variety of fillings. Traditional wrappers may include corn husk for Mexican tamales and banana leaf for Salvadoran tamales. (*Mexicans and Salvadorans Swap Tamales - YouTube*) Navajo blue corn tamales use corn husk, like Mexican tamales. (Pete and Tuba City Regional Health Care Corporation)Cherokee broadswords (bean bread) are typically made with corn husk today because corn husk is readily available from the store. Traditionally, corn leaves are used as the wrapper. (Albert) Tamales from the Mexican state of Chiapas are also often wrapped in corn leaf or *milpa;* these are known as *tamal agrio* or "bitter tamal." (Moreno)

The porridge family includes Mexican stapes such as atole, a sweetened cornmeal beverage. (*Mexican Atole (Warm Cornmeal Drink) • Curious Cuisiniere*) Kanuchi is a hickory nut flavored Cherokee preparation alternately described as a beverage or a porridge; now it is often prepared with rice like *horchata.* (Albert, "Interview with Nico Albert")Grits are a thicker porridge of coarsely ground nixtamalized maize that was eaten throughout Virginia and the Carolinas; in 1584 Sir Walter Raleigh was among the first Europeans to enjoy the dish. In 1607, settlers at Jamestown were introduced to the dish as "rockahomine," later known, of course, as "hominy." (Wulff)

Find a good video to show how to nixtamalize and grind corn. You can use this for your own instruction. I strongly recommend any teacher undertaking this unit view Max Miller's excellent video on Aztec tamales. (Miller)I don't recommend it for classroom use. It's a little long for a video in English. Also, the video mentions details of pre-Columbian traditions such as consumption of dog meat and a festival in which snakes and frogs were eaten alive. These aren't relevant to Mexican culture today and could encourage negative stereotypes of present-day Mexican culture if that's the only detail a student walks away with. What Miller does do is give an excellent demonstration of the nixtamalization process with corn, lime and tequesquite, an alkaline mineral composed mostly of sodium chloride and sodium bicarbonate used as a

seasoning. He also grinds the nixtamalized corn using traditional implements. Per Max Miller, it is an awful lot of work, and he does recommend using store bought masa meal instead. (Ibid.)

There is also the option of nixtamalizing corn with wood ash. There is no shortage of video resources in English and Spanish demonstrating how to do this. The problem is obtaining the ash. Culinary grade juniper ash is commercially available for Navajo cooking, but it's sold in small quantities clearly intended for use as seasoning and not in the quantities needed for processing corn. Making your own ash is trickier than you think. Newspaper used for starting fires, fire logs, and commercially sold charcoal all contain chemicals that may be toxic. (*Cooking with Ashes – Onondaga Nation*) So, if you're planning to burn wood yourself to produce culinary ash, you'll have to be sure you are using a hearth that has not been used prior for anything other than this purpose.

My frank recommendation: I think I'm up for nixtamalizing corn at home to make a demonstration video for my classroom. I honestly think it's too lengthy a process to do a demonstration at school. I recommend using lime instead of ash for the reasons of safety and expense I listed above. If you have extensive homesteading skills and space for outdoor burning and cooking, go for it! If you think using commercially prepared masa meal is a better use of your time and energy, that's perfectly fine.

For my own students, I'm going to recommend a project where students make a video demonstrating a recipe using nixtamalized maize (masa meal or grits.) Students will use informal commands to give instructions. Speaking will be scored on the PALS rubric used by my district. (See Appendix.) Importantly, students who do not wish to show their own kitchens will have the option to create a video using informal commands on choosing healthy foods. This will avoid negatively impacting students who have less advantageous housing arrangements.

Another option for my students who speak Spanish in the home would be to make a video interviewing a relative or neighbor in Spanish about their food traditions–for example, sharing memories of making tamales at home at Christmastime. This would be an excellent way to allow heritage and native speakers to step up as content matter experts in the classroom.

As all students at my school have access to Chromebooks with cameras, there should not be a negative impact on students based on access to technology. Students willing to share videos will contribute to a classroom food video film festival. I believe this is much safer and less fraught with potential issues (food safety, allergic reactions and cultural proscriptions) than making food and bringing it in to share as students might have done in the past.

Mo' Money Mo' Problems: Cash Crop Farming and the Boll Weevil Paradox

My most unexpected finding in my research was that the arrival of the boll weevil in the American South resulted in a dramatic *reduction* in pellagra deaths in precisely the regions where cotton production was most heavily impacted. In case you did a double take the first time you read that, yes: a reduction in pellagra deaths followed the boll weevil everywhere. (Clay et al.)Why is this, and does this tell us anything about cash crop farming in impoverished areas like

the Western Guatemalan Highlands? Does cash crop farming negatively impact nutrition? Naturally, it depends on who you ask.

Pellagra was first discovered, of course, by Don Gaspar Casál in a region of Spain where peasants were growing maize to feed their families and cash crops to sell or pay rent. (Major) In the American South, pellagra and the cotton economy went hand in hand. The amazing work of Clay, Schmick, and Troesken in "The Rise and Fall of Pellagra in the American South" lays out a clear causal relationship between pellagra and cotton farming. (Clay et al.) Southerners ate a niacin-poor diet of primarily salt pork, molasses, and corn. With the rise of cotton cultivation to the exclusion of other crops, corn was imported from the Midwest, not grown or milled locally. While local stone-grinding of corn preserved at least some of the niacin in the germ, the Beall degerminator popularized in the early 1900s removed nearly all of the niacin content from imported Midwestern corn. (Ibid.)

The boll weevil first appeared in Texas in 1892. The insect arrived in South Carolina in 1917 and had spread to all counties in North Carolina by 1922. The late 1910s marked the end of the rise and beginning of decline in pellagra deaths in the Carolinas, precisely at the time of the arrival of the pest and the decline of cotton. Immediately following the arrival of the boll weevil, cultivation of sugarcane, sweet potatoes, "Irish" (Peruvian) potatoes, rice and hay all increased. Peanuts are high in niacin and hay is used to feed animals whose fresh products (eggs, milk, and meat) are much higher in niacin than salt pork, which is low in niacin. (Ibid.)

As the impact of the boll weevil diminished, cotton returned to the South and pellagra cases surged again in the 1920s. Pellagra rates dropped precipitously again in the late 1920s and through the 1930s with the arrival of the Great Depression and the drop in cotton cultivation. Finally, in 1937, the cause of pellagra was discovered, and the illness became nearly 100% preventable or curable with the advent of food fortification. (Ibid.)

Can this tell us anything about the impact of cash crop cultivation in Central America and its impact on malnutrition, or is the American South under the sway of King Cotton a unique case? For example, the NGO Change for Children asserts with axiomatic faith that cash crop farming is responsible for malnutrition in Guatemala, and that the preservation of native cultivars is essential to the battle against malnutrition in traditional communities. (*Community Food Security - Change for Children*) Is this so? The answer is not as obvious as it may seem.

Writing from a clear neoliberal perspective, Lopez-Ridaura et al. make the case that in the Western Guatemalan highlands, the farms with the most reliance on subsistence agriculture had the poorest nutrition. Farms that use a diversified strategy of subsistence farming combined with cash crop farming or those exclusively devoted to cash crop farming fare the best. Furthermore, the writers assert that native corn varieties were the lowest-yielding and were of far more value culturally than nutritionally or economically. (Lopez-Ridaura et al.)So, what's the story? Is cash crop farming good or bad for farmers in Latin America (or, more specifically, the Western Guatemalan Highlands)? At this point, I'll ask you not to skip ahead for spoilers but to stop here with your students and play a game.

The farming simulation 3rd World Farmer was developed by students at the IT-University in Copenhagen in 2005 (obviously, before the term "Third World" was considered dated and taboo.) The simulation allows students to digitally simulate sixteen cycles of the agricultural year of a small family farm in Africa. (Once again, this could be problematic, as "Africa" is a huge and diverse continent. The simulation takes a certain level of civil strife, drought, pestilence, and politically motivated banditry as the norm, and this could reinforce stereotypes about Africa if we are not careful.) For the game's shortcomings, I think it's still worthwhile for teachers to play, and we can experience the game ourselves, share it with our colleagues and get feedback, and decide as to whether it is suitable for our own classrooms. (*For Educators - 3rdWorldFarmer Manual*)

Here's what happens in gameplay: you start with a small plot of land, four family members, and $50 in cash. You can buy seed for different crops (maize, wheat, peanuts, and – ugh – cotton.) You can buy animals. You can send your kids to school (in gameplay, always a losing proposition) or not. You can dig wells, buy farm equipment, and buy animals. At the close of each season, a gamble on a higher-yield food (peanuts or animals) might pay off, or there might be a drought. Bandits might steal all the animals you just bought, or parties to armed conflict might "liberate" your farm equipment. You might get ahead – maybe. But not much. It's one step up and two steps back a lot of the time.

Stick with the game for a full sixteen cycles, though, and you'll realize that the drought, the rebels, and the pestilence aren't the big factors holding you back. If you get to where you do have $1,500 or so saved up, you'll eventually find there's nothing more you can do because there's one commodity in the game you can't buy, and that's *land.* You can only get so far, and no farther. If you play the game with your students (and they can play it in Spanish), see if they come to that realization.

So, what's going on in the Western Guatemalan Highlands? Are cash crops good or bad? Lopez-Ridaura and friends would have us believe yes, they are very, very good. The farmers with the most food security are those with a diversified maize strategy, a diversified coffee strategy, a maize-specific cash crop structure, or a coffee-specific cash crop structure. The least food secure are always those with a maize monoculture subsistence strategy. (Lopez-Ridaura et al.)Here's the rub: read far enough, and you'll learn that the chosen strategy has mostly to do with the size of the plot of land. Farmers in the Western Guatemalan Highlands don't even consider cash crop farming until their own land is providing 50-70% of their food needs. (Ibid.) The farmers with the smallest plots never clear that threshold. Farmers with larger farms always diversify for cash crop farming *once they've met a significant portion of the family's nutritional needs.* The real issue isn't whether an individual farmer clings to old ways such as subsistence farming and use of native cultivars or whether they make modern, entrepreneurial planting choices. The real issue is *land.*

There are a lot of papers out there on the inequities of land distribution and the expropriation of smallholder farms in Guatemala, and Carte, et al. have written a pretty good one. Carte and company point out that 2.5% of Guatemalan farms occupy two thirds of arable land in Guatemala. Farmers in the Western Guatemalan Highlands aren't malnourished because they cling to native cultivars and won't adopt modern diversified strategies; they aren't malnourished

because of their own cash crop farming practices, either. On the contrary, cash crops help the *individual* farmer. What keeps most Guatemalan farmers in poverty, though, is that a tiny handful of farms take up almost all the land. What's left over just isn't enough land to provide enough nutrition to support a family. (Carte et al.)

Afterword: Not Everyone Can Share Food, But Everyone Can Share Memories

We've been through an awful lot – everything from Mayan toilet cleaner to the chemistry behind nacho cheese. That's a lot of ground to cover. The most important thing, I think, is once again, keep them talking! In any language. Get students talking about food: their favorite foods, their least favorite foods, and, above all, their food experiences. There's something special about sharing food, but not everyone can share food. People have allergies, people have cultural and religious dietary restrictions, and above all, schools have rules about sharing food. We can't always share food together.

One thing we can all share together is food *memories.* We may not be able to eat each other's food, but we can feel each other's feelings. When we talk about the food special to us and the occasions when we shared them, we know what that feels like even if the actual foods are foods we've never eaten or would never eat. Food memories are emotional and sharing them can form emotional connections just as if we were sharing actual food.

When my students point out that I talk about food almost every day, I point out to them that eating is something they all have in common: they all do it, every day. It's something they can all relate to. I hope all our students can share experiences in our language classes and form a sense of community talking about things they enjoy.

Appendix I: Standards

Connections to Other Disciplines:
NH.COD.3.1 Use the target language to give short spoken or written presentations about familiar academic topics.
NH.COD.3.2 Produce a sequence of simple phrases and short sentences relating common themes in other disciplines.
NH.COD.3.3 Use readily available technology tools and digital literacy skills to present academic information in the target language.
NH.COD.4.1 Understand cultural practices and perspectives from the target culture.
NH.COD.4.2 Identify the products of the target culture.

Communities:
NH.CMT.4.1 Compare traditions and events of the target culture and the students' culture.
NH.CMT.4.2 Identify examples of products, practices, and perspectives in the community related to the target culture.
NH.CMT.4.3 Identify key characteristics of target culture traditions.

Appendix II: Resources for Teacher and Student Use

Resources for Teachers

$Na_3C_6H_5O_7$ Typical Spanish Class

Food History: Nachos, by Mental Floss: This is a great video. If it's too long for an English-language source in your classroom, you can split it up into two viewings. It's well-researched with tons of information on food history, nixtamalization, pellagra and even the vampirism panic of eighteenth-century Europe. ("Food History: Nachos - YouTube")

Amazing Maize: Tamales, Broadswords, and Grits

Unwrapping Aztec Tamales: The Tamale Wars, by Tasting History With Max Miller: Tasting History is a fun and truly informative channel by Max Miller. Not every video is appropriate for classroom use; the videos are educational, but it's not a children's channel. Most videos are appropriate for high school students. This particular video had a step-by-step breakdown of how to nixtamalize the right amount of corn for a batch of tamales, and ventures into the turn of the twentieth century craze in the United States for tamales or "red hots" served from carts. (Miller)

Discover a Traditional Cherokee Bean Bread: Most people would be surprised to find that foods we would readily recognize as tamales are part of the indigenous culinary tradition of the Southeastern United States. Definitely watch the video by Cherokee chef and activist Nico Albert. (Albert, *Discover a Traditional Cherokee Bean Bread | Native America | PBS Food*)For another take by Albert on the same recipe, see King Arthur Baking for a Cherokee Bean Bread that is more traditionally boiled rather than steamed. (Albert, "Modern Masa Cherokee Bean Bread Recipe | King Arthur Baking")Albert's blog post, *Masa harina is a link to the long legacy of corn in Native cuisine*, is a highly informative quick read on links between United States and Mesoamerican indigenous culinary traditions.

Nixtamalización del maíz con ceniza paso a paso, by Fundación Tortilla de Maíz Mexicana: This video, in Spanish, is a treasure. In parts of Mexico with ready access to mollusk shells (sometimes snail shells) or with a lime-burning industry for the manufacture of cement, lime was used in pre-Columbian times and is still used. All over Mexico wood ash is readily available and in many communities was and still is the preferred alkali for processing corn, just as in North America. Our correspondent in this video uses oak ash, unheard of in our Southeastern Woodlands; each indigenous group had its own preferred variety of wood. Very instructional and suitable for classroom use in whole or part. This video is from Michoacán. (Fundación Tortilla de Maíz Mexicana)

Receta de tamales de ceniza, nejos o corundas de ceniza -- Receta documental desde la nixtamalización - YouTube: This video, also in Spanish, shows how nixtamalizing corn with ash, grinding the corn and making tamales is traditionally a communal affair, not something done alone in one's kitchen. This group uses ash at a higher ratio of ash to corn than the previous video and you'll see tamales made with milpa, or corn leaf, as Cherokee broadswords are traditionally made. (la cuinique)

PALS rubrics: the PALS rubrics are one of the best instruments I've encountered for scoring student writing and speaking. The beauty of this rubric is that they are simple enough that students can use them to self-evaluate and evaluate peers. They've been around a while (2005) and are still in widespread use; they are archived here courtesy of the Wayback Machine. (*World Languages: PALS*)

Charlotte in Five Tamales: this 2016 article by Dr. Tom Hanchett for the Southern Foodways Alliance gives concrete examples of the diversity of Latin American cuisine in the contemporary Southeast. I strongly recommend the article to teachers whether you live in Charlotte or not. The article was written a few years ago but it still holds up. Incidentally, if you do live in the Charlotte area as of this writing, Dr. Hanchett's current favorite tamales are the Columbian tamales sold at LaPanderiaCLT on selected weekends. They come wrapped in banana leaf with a whole chicken leg and with boiled egg and potato slices inside. You can follow them on Facebook. (Hanchett, "Charlotte in Five Tamales | Southern Foodways Alliance"; Hanchett, *Email Message, 08/23/2022*)

Mo' Money Mo' Problems: Cash Crop Farming and the Boll Weevil Paradox

For Educators - 3rdWorldFarmer Manual: If you want to use the 3rdWorldFarmer simulation in your classroom, take a look at what other educators around the globe are doing. This page has resources and lesson plans galore. (*For Educators - 3rdWorldFarmer Manual*)

Resources for Students

$Na_3C_6H_5O_7$ Typical Spanish Class

¿Cómo hacer un horno solar? ¿Por qué? Discovery Kids - YouTube; ¡Horno Casero Usando el Sol como Combustible! - Eddie G - mitú - YouTube: If you're looking for a good starting place to get your students building solar ovens for their nachos – in Spanish – these are two videos that students of all levels of Spanish can comprehend by watching. I used these videos and no English at all in a summer program where many students had no prior Spanish experience. Everyone made an oven and everyone ate nachos. (¿Cómo Hacer Un Horno Solar? | ¿Por Qué?| Discovery Kids - YouTube)

Amazing Maize: Tamales, Broadswords, and Grits

Maseca: recetas con sabor a México; Recetas – Maseca Centroamérica: Rather than just turning kids loose on YouTube, you might direct them to Maseca's separate recipe portals for Mexico and Central America, respectively. (In the mood for cheesy cornbread? Check out the Maseca Centroamérica portal!) Here students will find vetted recipes that are easy to follow. One caveat: the Mexico recipe portal uses the U.S. measurement system (cups, teaspoons, etc.) while the Central American recipe portal uses metric. Students with a food scale at home should have no trouble, but not everyone does. (*Recetas – Maseca Centroamérica – El Mejor Maíz de Esta Tierra*)

Mo' Money Mo' Problems: Cash Crop Farming and the Boll Weevil Paradox

3rd World Farmer: Students can play the thought-provoking game here. The game came out in 2005 and certain aspects may not have aged as well as others, but the game retains value as a thoughtful simulation students around the world find engaging. Gameplay is available in English, Spanish, Danish, Czech, French, Italian, German, Hungarian, Portuguese, Mandarin, and Turkish. (*For Educators - 3rdWorldFarmer Manual*)

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