

BACTERIA AND YOU

9th Grade Biology, Mary Kraybill

9th-12th Grade Culinary & Hospitality, Larry Singer

AMERICAN CANYON HIGH SCHOOL

This is a beginning of the year project that focuses on bacteria, cells, and microscope usage for Biology, and kitchen sanitation and health in Culinary. During the project, Biology students swab the kitchen for bacteria before cleaning, then clean that surface, and swab again. They then culture the swabs and grow the cultures on Petri dishes, analyze the bacterial cultures, and share their findings with the Culinary students. Biology students also study cells, organelles, and microscopy. Culinary students learn the techniques of sanitizing a kitchen for food preparation. The project culminates in a handbook collaboratively created by Biology and Culinary students focusing on kitchen sanitation and the bacteria that can affect our health that might be found in the kitchen. As part of the process, Culinary students give how-to instructions on cleaning and sanitizing in the kitchen, and the Biology students each do a study of a different pathogenic bacteria that might be found on food or contaminated surfaces.

Teacher Reflection

Biology: After reflecting on the project and accomplishments, my overall impression is that it was a good learning experience for the students, and a nice way to touch base with a different subject area and other students. The students learned bacterial swabbing, culturing, and slide preparation before learning about microscopy. It was good to culture and see bacteria that was in their own environment, and in a kitchen environment.

Student Reflection

I liked doing the project because it helped me understand what bacteria is. At first I didn't know what effects bacteria could have on us. After doing the project I learned a lot, like we should be washing our hands, and cleaning our kitchens more effectively, especially with bleach. I think more students are engaged with the growing of the bacteria and understand what it is. I think other students learned a lot also.

— Monica





CHEESY MATH AND SCIENCE

11-12th Grade Math 3, Nhuy Vu

11-12th Grade Biotechnology 1, Elizabeth Hawkins

AMERICAN CANYON HIGH SCHOOL

In order to answer the Driving Question “What is the optimal curdling agent to make the best cheese?” Biotech students made cheese by testing four curdling agents, looking at how long it takes each to curdle and how many curds it produces. The two best curdling agents were then tested using variable concentrations to determine the best concentration of the optimal agent. Math 3 students analyzed data and used statistics to determine the best curdling agent to make cheese based on four areas: amount of curds made, time to curdle, taste, and cost. Students found the average amount of curds made and the average amount of time it takes the curdling agent to produce cheese. They also took part in a blind taste test where they sampled the four cheeses that were made with different curdling agents. They took the taste test results from all classes and learned how to utilize Google Sheets to make histograms so that they could determine which cheese tasted the best. Finally, they used recipes and proportions in order to determine how much it would cost to use each curdling agent necessary to turn 100 gallons of milk into cheese. Together, students then analyzed the data to write a letter of recommendation to cheesemaker Donna Pacheco about which curdling agent would be the best to use.

Teacher Reflections

Biotech: Biotechnology students learned about the history of cheese-making, types of curdling agents used to make cheese, and improvements on the cheese-making process initiated by the Biotechnology Industry. They then got to make the cheese and taste it. The students really enjoyed the hands-on cheese-making lab activity and going deeper into the study of something that is common but very interesting, and tasty! This project really showed the students how Biotechnology is used in everyday life, and was a great way to start out the year in an interesting, fun, and educational way.

Math: “Why do we have to learn this?” or “When are we ever going to use this in real life?” are common concerns that I am asked as a math teacher. This project allowed students to see where math can be useful to make real life decisions in the business world. The students were introduced to the Biotechnology industry and how it effects something we see on a day to day basis: cheese! The problem was open ended and challenging at the same time. This project was a learning experience for me as well since I have never collaborated with someone outside of my content area to create cross-curricular projects. It taught me how powerful integration can be and allowed me to explore content I would normally not be exposed to. For this project, I was fortunate to use my two externships to Monsanto and the Achadinha Cheese Company to make cheese and unbiased taste tests to help my students have a stronger project experience. Overall, it was a unique and fun way for students to apply mathematics in the real world.

Acknowledgments: THANK YOU!

Donna Pacheco - Achadinha Cheese Company - Cheese-maker

Dr. Chow Ming Lee - Consumer Sensory Science at Monsanto (blind tasting)

Dr. Jose Prado - Monsanto - Guest Speaker



THE GREAT FRY DEBATE

9th-12th Grade Culinary 1, Sarah Goff
10th-12th Grade Chemistry, Debra Hacker
 ST HELENA HIGH SCHOOL

Students were asked to debate whether or not french fries can be part of a healthy diet. Culinary students learned about nutrition - what the body needs and how the body uses these nutrients. Chemistry students looked at how our bodies bond fats specifically. Students conducted research to find experts that would support their assigned pro or con side of the argument. In the process, they needed to learn how to decide if a source was credible and where to find good evidence and research to back their position. During the debate, students needed to effectively communicate their position and be ready to rebut arguments made by the opposition.

Teacher Reflection

This project was welcomed by the students, with a chance to learn to deep fry and eat potatoes; it was a success on all accounts! Not only did the students appreciate the cooking and eating aspect of this project, they gained a better understanding for empathy and the ability to see all sides of an argument. Students collaborated well this time around and were more willing to work with each other to fight for their right to eat french fries! (or to avoid a heart attack)

Student Reflections

I liked learning how to make fries from scratch because it is a simple task to help understand what happens to the oil. I also liked learning how to conduct a good, fair debate. Having to look at both sides of an argument helped me be more prepared for rebuttal.

— Erin, 11th Grade Culinary 1

Being able to cook french fries helped me in understanding the process of how they are cooked, but also helped me get to know my teammates. Having some sort of relationship formed over that cooking day helped me when I had to work with them during the project and debate. We never argued, we helped each other out, and we won the debate because of our ability to work together. In the end, the project was a success because I learned a lot from it: about french fries, their role in health, how to make them, and how to debate.

— Francesca, 10th Grade Chemistry



COMPOSTING IN BIOREACTORS

9th-12th Grade Culinary 1, Sarah Goff

10th-12th Grade Chemistry, Debra Hacker

ST HELENA HIGH SCHOOL

For this project students were asked to build small bioreactors to illustrate the cycle of food compost. Culinary students brought their knowledge of foodborne bacteria, cross contamination, workplace safety and protocols to maintain a safe working environment. Chemistry students brought their knowledge of scientific theory and testing, variable control, and intrigue. Together, students developed and tested a hypothesis to determine the best way to make compost from our student generated food scraps on our campus. Students also visited composting and landfill operations for inspiration and a chance to speak with the experts.

Teacher Reflection

This was the first project that the students collaborated on this year. In the beginning it was a little underdeveloped and our project management was still under construction. However, the students took to the project with enthusiasm and early difficulties were overcome. We learned that this project should have been allowed more time for data collection, and that composting in the classroom is stinky! Next year we will move the composters to the greenhouse in efforts to reduce the smell in the classroom and speed up decomposition rates with heat.

Student Reflections

This project helped to solidify the concepts we learned in culinary about contaminations and spreading bacteria. It was fun meeting people from the other class and I liked meeting the chemistry teacher and it helped me see her class as a more attainable goal.

— Kallie, 9th Grade Culinary 1

The project was very fun, except for the smell of the composting material. The project was awesome. I learned a lot how chemistry is all around us and I think it was a good way to learn about reactions and decomposition.

— Carson, 10th Grade Chemistry

DESIGN CHALLENGE: RECYCLING CENTER

10th-12th Grade Advanced Culinary, Sarah Goff

10th-12th Grade Physics, Debra Hacker

ST HELENA HIGH SCHOOL

This project was a collaboration between advanced culinary students and physics students. They were asked to look at the recycling system currently in place on our campus and improve both recycling collection and campus recycling awareness. Students were tasked with designing a recycling center that separated trash, bottles and cans, paper, and food waste compost. The design needed to be built using recyclable materials. Students were given a construction budget of \$30 per team. After the centers were built and critiqued by community members, students decided where on campus they should be located. The units were monitored and serviced by the students through the rest of the school year.

Teacher Reflection

This design thinking project was launched in the first semester to introduce students to the design process and project management skills while trying to improve the recycling culture of the high school. Students really enjoyed the voice and choice of the project but underestimated the difficulties in changing ingrained habits of dealing with garbage.

Student Reflections

Green, blue, black, and red. While very simplistic in its design, this project required hard work from all members of team Eco Machine. Although we were relative strangers when first introduced, this project bonded us together and gave us the opportunity to get to know people that we might not have otherwise. It was extremely easy to designate tasks, as we were all eager to get started and we all had different strengths and interests.

— Julia, 12th Grade Physics

This project was a great companion to the Culinary Art program's goal of creating great food, through green and sustainable practices. This composting project was a good way of combining these two different classes. Given the materials, I believe we did very well and achieved our goal of producing a number of receptacles that both are green and benefit various school programs. The project also was a great way to learn how to make composting bins and how to compost. The ability to pick our individual jobs made it more enjoyable to contribute within our interests.

— Alex, 11th Grade Advanced Culinary

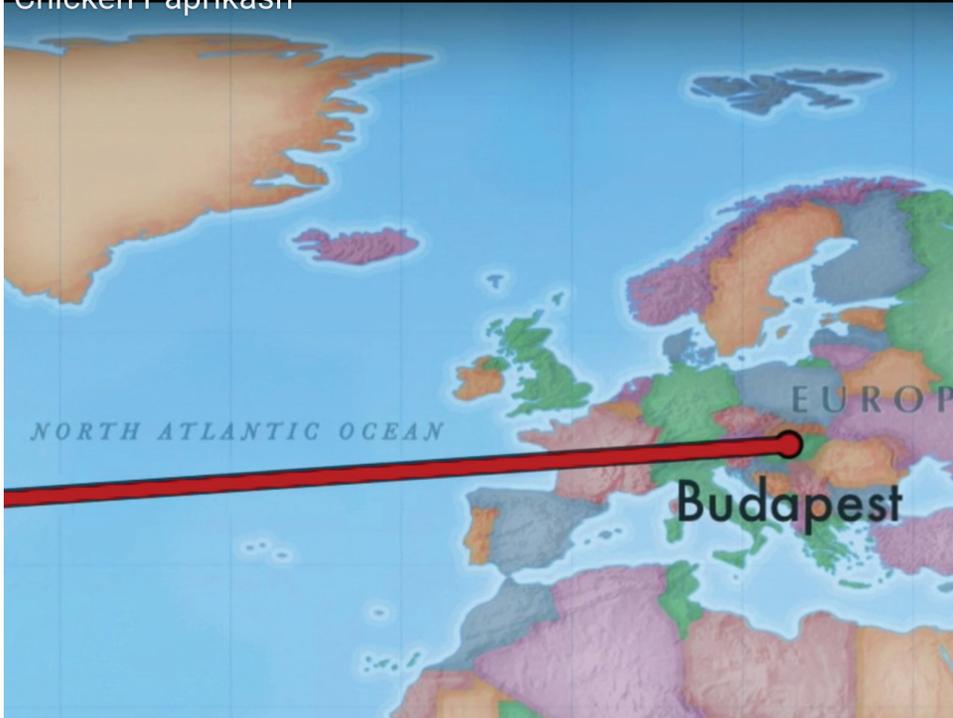
Acknowledgments: THANK YOU!

Christy Pestoni Abreu from Upper Valley Disposal, Christopher Lancaster from Long Meadow Ranch, and Tom Faherty - Green Architect





Chicken Paprikash



FOOD STORIES

9th Grade Biology, Mary Kraybill

9th-12th Grade Culinary & Hospitality, Larry Singer

AMERICAN CANYON HIGH SCHOOL

Food Stories is a Biology/Culinary Collaboration Project that focuses on Farm to table food, global consumerism, and culturally significant dishes. During this project Biology classes study ecology, global/local food sources, carbon footprint, and garden production and harvesting. Culinary's focus is cultural food and cooking techniques. Biology students create a poster and cooking video of a food dish that is special to them. Culinary students teach students of the winning videos/dishes proper technique and together they cook enough of the dish for all to share.

Teacher Reflection

Biology: This project incorporated the school garden, ecology, culinary produce, and the importance of fresh local food. It gave a good balance of ecology study, outside garden work, and was able to tie in culturally significant food from the homes of the students. I especially enjoyed getting a glimpse into the cooking lives of my students and every year I get to share this experience with my students by making some of their special dishes in my home to share with my own family.

Student Reflection

The project Food Stories was introduced with the following driving question: What stories does food tell us about us and our society? The main product we did consisted of a video explaining the stories behind a main dish and its ingredients.

— *Jastis*

This really helped me learn about the food that was made in my culture. The dish that I made was Pancit, and it is a famous Filipino dish from the Philippines. Before this project, I didn't really know about this dish until I asked my mom about it. I learned that Pancit is a popular dish for parties because the noodles represent good and long life. Overall, I really enjoyed this project because I got the chance to connect with my Filipino culture.

— *Janryl*

MOUSETRAP CAR

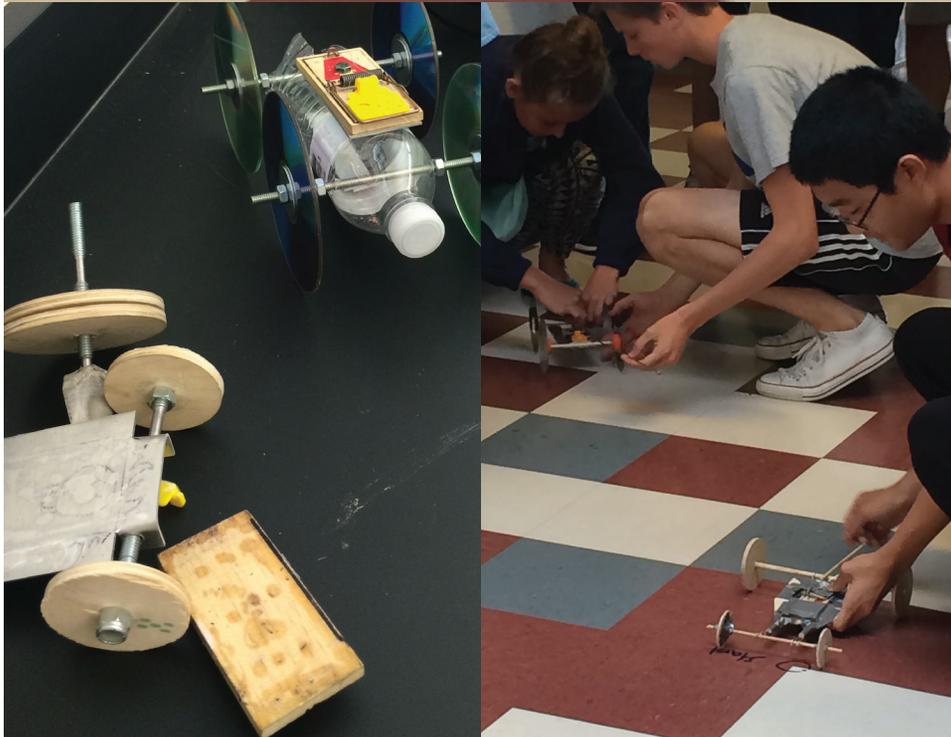
10th-12th Grade College Prep Physics, Alex Saslow
10th-12th Grade Manufacturing & Product Development, Ron Solomon
NAPA HIGH SCHOOL

Groups consisting of Physics students and Manufacturing and Product Development students worked together to design, prototype, and build a vehicle powered only by a provided mousetrap. Students could use any materials they wished, as long as it was not a power source. The only requirements were that the mousetrap and a piece of sheet metal were included in the vehicle, and the entire vehicle travelled at least ten feet. The scope of the project given to the students was: Teams of Physics and Manufacturing students will design and build a rolling vehicle (car) powered by a mouse trap. The vehicle must incorporate the entire 3" x 4" piece of aluminum and the mousetrap provided by the instructors. Students are responsible for all other materials. The only source of power is the mousetrap. The mousetrap car that can travel the furthest wins!

The final exhibition for the project was a race day where teams competed against each other to see whose mousetrap car could go the furthest. Through this project students designed drawings to scale meeting industry standards, learned and utilized basic machining tools and equipment, created a free body diagram of their mechanism showing how the force changes magnitude, and measured/calculated quantities such as mass of mechanism, average torque of mousetrap, force applied to axle, torque of axle, torque of wheel, theoretical acceleration of mechanism, etc.

Teacher Reflections

Some of the groups were very ambitious, making a "gear box" system so that the car would start on a higher gear to get it moving, before jumping to a lower gear for more power. We found that students did not use their time wisely until the first prototype was due. After the initial grading was received, the groups really started working well together. We didn't see as much planning based on physics and math as we originally wanted, but the projects were still very successful. In the end it was a very interactive project that the students had a lot of fun with, and they even accidentally learned something.





WINERY ROBOT GAME

11th-12th Grade AP Physics 1, Alex Saslow

10th-12th Grade Manufacturing & Product Development, Ron Solomon

NAPA HIGH SCHOOL

The Driving Question for this project was: **How can wineries and hotels be more family friendly?**

There is a demand for hotels and wineries to attract people to stay longer, to incorporate families, and to have something engaging for all members of the family. In this project, students were challenged with the problem of designing a game that could be played with robots at a winery tasting room. The goal for this game was to make the tasting room more family friendly by giving the children of customers something engaging to do. Students worked in groups of seven, with a mixture of AP Physics and Manufacturing & Product Development students to try to solve this problem. The groups used the engineering design process to work through various ideas and iterations of their games. They prepared a sales pitch including a working prototype of their game. They used Vex Robotics, where the groups needed to design, build, and program the robot. At least one functional piece of the robot needed to be custom manufactured by the students or modified in some way. The groups presented their sales pitches to an authentic panel of community members including winery owners, hotel representatives, human resource managers, and more, demonstrating how their robot game worked and why theirs in particular should be chosen. Final work was assessed using a rubric evaluating Written Communication, Oral Communication, Collaboration, Agency, and Knowledge and Critical Thinking.

Teacher Reflections

All in all the project went very well. Most of the groups pulled everything together and had a successful sales pitch with a working prototype. The biggest issue we had was keeping the groups on track and self-motivated. We were also surprised at how the physics applications were not obvious to the students, we needed to be explicit with them. All of the groups had good ideas for games that would be kid friendly.



THE SKIN YOU'RE IN

Human Anatomy and Medicine, Learetta Boulding
NAPA HIGH SCHOOL

For the Skin Your'e In project, students created 30 second commercial advertisements promoting a skincare product they developed for people with a specific skin condition, along with delivering a 4 minute presentation/pitch. As part of the project, students completed a lab titled "Sunscreen and Cancer." In this lab, they had to compare and contrast several sunscreens with different SPF ratings. Students used sunscreen, transparency film, UV sensitive paper, and "good ol' sunshine" to complete the lab! They determined whether there is a difference in the amount of UV radiation that passes through sunscreens of varying SPFs. Throughout the project students reflected on perceptions of beauty's value in society. They watched interviews with a super model who has a rare symmetrical form of vitiligo, making deep connections to themselves, beauty, and society.

Teacher Reflection

I enjoyed this project. The students were creative, worked well together, and gave compelling presentations related to their product. In the future, I would like to think outside the box regarding a panel for student presentations of their end-products.

Student Reflections

In the very beginning of the project we had to research different skin disorders and there were many offered to us as topics. We decided to start collaborating from the beginning and we divided up the list of disorders between us. We then presented to the rest of the group our individual knowledge again for all of us to be on the same page and have the same understanding. It was great to have our thirty second spot light and to be able to hear the rest of the students present what they learned about the integumentary system. Once we all had the same comprehension, we collaboratively decided that we would focus on acne, a skin condition that occurs when hair follicles plug with oil and dead skin cells.

— Claudia