In preparation for the popular school-wide Halloween carnival, 7th graders challenged themselves to build and program entertaining carnival games. Working in pairs, students experimented with various ways to trigger MaKey MaKey circuit boards. Then they began developing carnival-style games that could be adapted to work with MaKey MaKey, Scratch and craft materials. Their primary goals for the project were to improve their programming skills, to improve their engineering/craftsmanship skills, and to practice a design process that includes prototyping, feedback and revision. After weeks of testing, students hosted their Halloween-themed games at the carnival. Popular games included pinball machines, ring toss, target games, a room escape activity, and whack-a-mole.

Teacher Reflection
The driving force of this project was the authentic audience. Since the entire school would interact with their project, the 7th graders were incredibly motivated to create an entertaining activity. One of the biggest design challenges was creating a game that would be fun for kids 4 to 14 years old, so whenever possible I had younger students play early versions of the games to provide feedback. This project gave students practice managing an open-ended, long-term project and quickly learned the importance of staying organized and productive.

Student Reflections
I learned how to make a pinball machine! The flippers especially were hard to make. I tried out numerous possible ways to make them before finding an outcome I liked (and one that worked). I know I can use the engineering and craftsmanship skills I learned in the future.

—7th grade student

I am particularly proud of the rail sensor in the middle. It took a lot of different ideas that didn’t work, but I created something that worked pretty well.

—7th grade student
Seniors at HTHNC received a simple prompt: “Create a machine or kinetic art piece that operates cyclically. Consider using a motor or human power to drive the mechanism(s).” Drawing inspiration from various real-life and online sources, students designed machines in a wide variety of domains. Some student groups made marble mechanisms with rollercoaster-like tracks, while others made gear-based art, and a few made motorized bicycles. After initial planning and prototyping, each group sat down with their engineering teacher to draft goals for the machine’s functionality and aesthetics. During the build phase, groups utilized the resources in the HTHNC Makerspace that best suited their needs. Most relied heavily on the laser cutter and a handful incorporated 3d-printed parts. Some basic materials were available to all groups, with the option to source additional materials online and make requests for purchase orders. In the first iteration of the project in Fall of 2015, students had just four weeks to build and very few groups met their goals by the time of school-wide exhibition. The current semester of HTHNC seniors will have roughly four times that long and will exhibit their work in June of 2016.

Teacher Reflection
I hoped this project would allow students to express themselves through design and technical work. I appreciate when science, technology, engineering, art, and math are deeply blended and not merely set up to complement one another.

Student Reflections
It was really cool to see the differences in other students’ projects as compared to mine and see the challenges and difficulties they faced. And it was a lot of fun. —Kira M.

The cyclic machine project was an opportunity to use hands on experiences and physics concepts to make machines that didn’t just display learning but were fun to use. —Ryan G.

To learn more about this project and others, visit http://mamarillas.weebly.com/
In this student-created and student-run simulation, community participants took on the roles of Syrian citizens forced to seek refuge in another country. Students began this project by studying all facets of the Syrian Refugee Crisis, initially planning to create either a play or an exhibition about the refugee crisis. After deciding that neither product would have the impact that they wanted to achieve, a group of students proposed a simulation. We analyzed existing simulations, video games and non-fiction accounts of refugee journeys in order to identify common routes and develop “character sheets” for participants to use. As students designed and refined the simulation, we carried out weekly “play-test” in which staff members and other students went through the simulation and then evaluated their experience.

Teacher Reflection
I knew this project would be logistically complex when we started, but the extent of the challenge only became clear once we were in the midst of it. Students figured out the complexities of European immigration law, worked out the going rate for smugglers under a variety of circumstances and the likelihood of gaining refugee status in a particular country, and then developed characters by creating composites of real people’s stories. The students’ commitment to their roles was inspiring, especially considering that the simulation took place in our school’s outdoor lunch area, with barriers indicated by overturned tables, student-made fake barbed wire, hand-painted signs, and caution tape.

Student Reflection
Almost everyone that passed through the simulation and went to the debrief room told me what a great simulation it was and how realistic it felt for them. They also told me that even though it felt real, they knew they were going home afterward. But other people don’t know that—this is their everyday life, and this is a reality for a lot of people.

—Verenice

To learn more about this project, visit Alec Patton’s Digital Portfolio at alecpatton.weebly.com
The Meals and Muppets Project

Edrick Macalaguim and Kyle Linnik,
7th Grade Humanities and Math/Science
High Tech Middle Chula Vista

In this interdisciplinary project, students looked at the essential question: “Should I eat that?” Inspired from student voices criticizing our school’s lunch program, we dove deeply into a holistic investigation about the food we eat. The voices of our students were clear, they wanted to create a product that would have lasting value and impact. Students read The Omnivore’s Dilemma, watched various documentaries, and explored the nutritional values and science behind the everyday food they were consuming. Using the magic of the Maker movement through muppet building and filmmaking, our students transformed their learning about food justice, urban farming, and making healthy food choices into a professionally produced movie, using muppets as a way to engage kindergarten students at neighboring school High Tech Elementary.

Teacher Reflection
We are always amazed by our students’ craftsmanship and professionalism when given an authentic audience beyond our classroom walls. The result is attention to detail and motivation for learning that had previously been unmatched. Authentically engaged in their work, our students learned, not because they had to, but because they wanted to, and the results were far beyond what anyone expected. This has been a true deeper learning experience.

Student Reflection
Sharing the message of eating and living healthy using muppets was an idea that seemed far-fetched and wild from the beginning. Now, staring around the classroom, I marvel and bask in the glory of our beautiful work. I’m so glad to have been able to participate in such a wonderful and unique project, and to know that I left a positive impact on my Kindergarten friends and families, helps me understand that I have the power to make a difference. —Adrian S.

To learn more about this project and others, visit https://sites.google.com/a/hightechhigh.org/edrick-macalaguim-s-dp/projects/the-meals-and-muppets-project
William Shakespeare lived in the late 1500s and early 1600s, but his plays are now performed all over the world in nearly a hundred languages, and he is known as one of the greatest writers of all time. The fact that literature and other media borrow from Shakespeare's works, speaks to how important he is to a global culture. One dynamic way to experience Shakespeare was to work as a class to perform a show. After reading The Reduced Shakespeare Co. presents The Complete Works of William Shakespeare (abridged), 10th grade students performed the entire play for Exhibition. Students choose to perform, direct, build sets, work on costumes/makeup/hair or marketing. Throughout the semester, students worked with Shakespearean texts and resources to discover whether or not Shakespeare is significant in the making of our culture, and debate whether he is still relevant today.

Teacher Reflection
I had fun getting to know my students in a new way and my students had fun getting to know me and each other, and this fun developed into strong pride in the finished products of the project. This project represented a truly collaborative process. We learned a great deal about ourselves during the stress of creating a public performance. We all now have a new sense of connection with Shakespeare and his works, which leads to an important step into a larger cultural world.

Student Reflection
Honestly, the performance itself was the best part of the project. It was the culmination of all of our hard work that we put into rehearsing, memorizing and staging the show, and I felt proud once it was all said and done. By holding it at the San Marcos Civic Center, our team had the opportunity to experience what it was like to perform out in the community, and impact people outside of the traditional school setting.

—Robbie

To learn more about this project and others, http://mrshowardsdp.weebly.com/the-complete-works-of-william-shakespeare.html
HTHMA 12th grade students in Digital Arts, English, and Mathematics investigated the complexities of man-made structures found in urban/rural design and architecture. As part of this investigation, students explored the formal aspects of visual representation as well as the psychology and symbolism communicated by these visual compositions. As importantly, students learned to analyze critically how man-made environments affect the way we interact with each other and how this impacts our social world. All buildings, no matter how neutral or insignificant they appear to be, are designed to establish particular power relations between the people who use, work in, live in, or pass through them. Thus, students considered how our structures, cultural norms, and even our very identities are formed by design. The students’ inquiries and research culminated into a final exhibition using projections and paper sculpture to simulate a large-scale paper city lit up by interactive and provocative projected art. In this city, the audience explored unexpected and disturbing intersections between mathematics, computer programming, social constructs, cultural identities, and architecture.

**Teacher Reflection**

We asked students to do very sophisticated and complicated intellectual and artistic work. This process was messy before it was beautiful. But the final culmination was intricate, elegant and thoughtful. We are very proud of our students’ work.

**Student Reflection**

For me the most challenging and rewarding aspect of the project was having to make decisions about our physical art piece that insured our research was visible. We needed to be aware throughout the process that the aesthetic choices we made on our physical structure needed to have meaning and purpose. —Ilias

To learn more about this project and others, visit [http://margaret-noble.net/educator/codedstructures](http://margaret-noble.net/educator/codedstructures)
In this project students looked at how current neuroscience research contributes to education models and how we learn. Using these findings, students determined pathways to a career that might be best for them as prospective college students. Students used resources such as seminal papers of cognitive science research at UCSD, neuroscience labs developed with the Salk Institute in La Jolla, the “Society for Neuroscience” resource sites, and researcher interviews to determine how brain based education can help them. Students connected this knowledge to college and career resources such as Naviance, and NACAC, along with interviews with college admissions staff, college alumni, and professors to help guide them to a beneficial college experience and rewarding career. The work culminated in a share-out of their plans with a creative piece in front of the student’s advisory classes and in transitional junior presentations at the end of the year.

Teacher Reflection

The project really benefitted from the help of outside sources such as our college counselor, Tricia Abdullah, and the admissions staff and neuroscience researchers at UCSD. Student work has served a great purpose in reorienting how students go about the college process. A major highlight was students communicating with professors at colleges to understand whether classes they might take would align with their long term goals.

Student Reflections

This project made me take a critical look at the pathway of my education and career in a way I hadn’t before. Connecting neurology to education in a broad sense was really interesting, and gave more context on complex brain information.

—Thomas

I knew I wanted to be a lawyer, but I had no reference for the in between steps; I now intend to use the ways my brain learns to properly select a university and major.

—Johana

To learn more about this project and others, visit www.leaderbiology.weebly.com
Walk In Their Shoes
Heather Calabro, 9th Grade Social Studies
Mid-Pacific Institute, Honolulu, HI

In order to learn the concepts of Imperialism and Independence Movements in a project-based atmosphere, 9th grade students created an exhibition of related issues using shoes. Each student chose to research an issue or event in the Congo that was somehow a result of imperialism. The students synthesized their research into an essay about their issue or event, and later created an illustration that would represent their research findings. The illustrations were transferred onto shoes which would be auctioned off at the exhibition's closing to benefit a charity in the Congo. The exhibition included the shoes hung from above for all to view, along with the students’ research pieces, allowing guests insight into the history of imperialism and independence movements.

Teacher Reflection
My students asked me if they could create artwork on shoes, explaining to me that customizing shoes was trendy. I could see that it was truly something they were interested in, so I began to procure shoes for the project. The students were engaged as they knew their work would be publicly displayed at the exhibition, but also because they would be bid upon. I do believe that students enjoy a bit of competition! I was very proud of the project the students had so much choice and voice in, as well as the authentic byproduct of raising funds for charity.

Student Reflections
I enjoyed being able to see everyone’s shoes being sold off at the auction. Hard work really does pay off! I also enjoyed talking to the crowd at the exhibition, especially my classmates and their parents. —Chaz

I sharpened my writing abilities through the prose component of this project. I feel like it is one of the best papers I’ve ever written. I now know I can write something that can make people feel emotion. —Michael

To learn more about this project and others, visit https://sites.google.com/a/midpac.edu/shoes/
In this interdisciplinary project, students examined data and readings to explore the ways in which our invisible privileges impact our opportunities and experiences in this society. Our goal was for students to learn to be more understanding and empathetic individuals who better understand the complex power structures we face. We launched our project with a walking field trip downtown to observe inequities that exist in our own city. During the next six weeks, students examined income inequality, gender inequality, and inequities in our education and criminal justice systems. Students then specialized in one of these topics in preparation for our exhibition, making infographics and designing interactive activities in order to share statistics and trends. For our culminating event, we hosted a symposium in the local community where students, parents, and community members engaged in meaningful conversations about race, gender, education, and income inequality.

Teacher Reflection
This project engaged our students in difficult conversations about inequities in society. Our goal was to expose students to new ideas and challenge them to consider perspectives different than their own. This created moments of discomfort at times, but we wanted students to be comfortable with their discomfort. With this project we planted a “seed” that will hopefully lead to further questioning and exploration by students as they encounter these topics as adults.

Student Reflection
Unlike a lot of projects that do not leave lasting impressions, I believe that this project left a lasting impression on both the audience and the students. I know for a fact that I put myself in a lot of perspectives that I have never even considered before. Without opening yourself up to situations in which you might not feel completely comfortable, you will never have progression in your beliefs.

—From anonymous survey

To learn more about this project and others, visit http://mindthegap2015.weebly.com
All 10th Grade students explored social justice and activist movements, investigating current and historical societal issues, activist interventions, and the lasting impact of a human movement on our global community. Their two essential questions were 1) How does one empower the powerless? and 2) How powerful is a single voice? After choosing an activist to focus upon, students conducted targeted research and collaborated in pairs to write an artist statement which identified the social movement their activist was a part of, explained how their activist intervened and lastly, analyzed their activist’s impact. Finally, students created string art portraits to accompany their written piece. The exhibition took place at Freshly Faded Barber Shop, a forum dedicated to community activism and social change.

Teacher Reflection
It was our goal for students to create art with a technique that was new to them, and to devise ways to incorporate different perspectives for very pertinent historical topics. As the project was conducted, it was amazing to see the collaborative process that took place between both teachers and students. Whether the students were researching, crafting their artist statements, or creating their string art portraits, they worked as a team, communicated well, and relied upon each other to accomplish something to the best of their abilities. Students walked away with a more insightful perspective with regard to social justice and activism, and were looking for ways to put into practice and utilize their new mindsets.

Student Reflections
I have a better understanding of how activists shape our world and was able to make beautiful work that truly honors them. —Audrey

Because of this project, I was able to understand those who ignite social change, the power behind activist movements, and ways that communities come together to accomplish a single goal. —Jessica

To learn more about this project and others, visit http://nicolehthma.weebly.com/
To push the plant reproduction lessons in my Botany unit beyond just memorizing and labeling plant anatomy, I developed a project to help students explore various seed dispersal adaptations. To begin, students were given several short video and text resources about different seed dispersal mechanisms (wind-blown, animal, water, gliders, fire etc.). Students put their understanding to the test by drawing several environmental factors out of a hat and designing a seed that could successfully disperse under those conditions. Plastic Easter eggs, beads, pipe-cleaners, popsicle sticks and other recycled materials turned into seeds that, for example, grow on a vine, live in a hot and arid climate, and are surrounded by herds of large, furry mammals. Students practiced their engineering skills by creating several iterations of their seed and testing them until they arrived at a product that worked. Students who drew ‘aquatic environment’ tested and improved their designs in a water bath, while students who drew ‘windy environment’ tested in a wind tunnel. Students were creative in conducting their tests, including using faux fur coats to represent large mammals.

**Teacher Reflection**

Plants are among the most overlooked and underappreciated life forms, but my students came away from this project with a sense of awe and respect for the wide range of seed dispersal mechanisms employed by plants. The skills that my students developed—applying general knowledge to a novel situation, perseverance, and resilience in the face of failure—made this project truly special.

**Student Reflections**

It was fun to build my own seed and create a dispersal method for it because I think it really helped us understand how cool it is that plants are able to adapt to distribute their seeds in different environments.

—Else

I liked this project because it made me think of an ecosystem in a lot more depth. I also liked how we got to make the seed and go through prototypes until we had it perfect.

—Nayan
Explorers of the World
Jen Schultz, Linda Salamanca, Diane Hawke
High Tech Elementary Explorer, Kindergarten

This project introduced Kindergarteners to exploration, observation, mapping, multiple perspectives, critique, and collaboration. Students took observation walks around our immediate community, a village of seven charter schools within a residential neighborhood. They created draft maps of their classrooms and campus, and drew pictures from their observations from varying perspectives. One of their final products was to create three dimensional maps of our campus which were installed in each of our schools to guide our many visitors. To create these maps, children worked collaboratively in groups, and gave and received critique, with each group contributing to a larger whole product.

Teacher Reflection
This was a hard project! The students had to use a lot of perseverance and grit to complete it. It was their first experience with critique. The children gained a great deal of spatial awareness by mapping things from multiple perspectives. Often mapping is introduced when children are older, but Kindergarten is a good time to do it because that is when the neural connections for visual processing are developing. They also learned how people use maps in the real world.

Student Reflections
Mapping can take you to a lot of places. —Arielle
Explorers do stuff in a kind way. —Zynen
Mapping is about being precise. —Aiden
My favorite part was making the 3D map. —Athaniel
The hardest part about mapping was finishing all the drafts. —Chiyo

To learn more about this project and others, visit https://www.hightechhigh.org/schools/HTEX/?show=projects