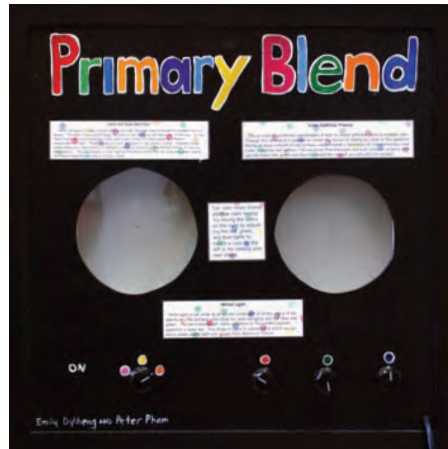




Ferris Wheel Physics

Morgan Malone & Grace Allen

Our ferris wheel is affected by a centripetal force. The wheel must always have a force traveling towards the center or the wheel would stop spinning in a circular motion.



Primary Blend

Emily Dykheng & Peter Pham

By switching on or off colored lights the viewer can explore additive color—the process of combining wavelengths of light to create different colors.



String Vibrations

Derek Hubbard & Lemuel Calpito

By plucking the various strings and adjusting the tension lever at the top, the viewer can explore how mass, length and tension affect pitch.



Pullies—The Teachers' Example

Jeff Robin, Andrew Gloag & David Berggren

Students use pulley systems to experience mechanical advantage, applying different forces to lift the same weight. The equations show how to find the forces involved.

Analog Flash for Windows

Jeff Robin, Art, High Tech High

David Berggren, Engineering, High Tech High

Andrew Gloag, Math/Physics, High Tech High

The assignment for this senior project was to create an interactive, museum-quality exhibit that fit in a window frame and illustrated a principle of math or physics. Analog: most of the projects were mechanical. Flash: like products created with the Adobe Flash software, the products were interactive. For Windows: the products were made not for PCs, but for the actual 24" x 24" x 5" interior windows in High Tech High.

Timelines and Check-ins

The project took a whole semester, and the students worked on it nearly every day. We used an online calendar and weekly check-ins to make sure that no one was falling behind. We were very strict because we wanted all of the groups finished by the deadline.

Books

Students taught each other the content behind their projects, while creating their own books that included images and explanations of the physics and math for all the windows.

Exam

The students took a final exam on the math and physics represented in all the projects. They were allowed to bring the books they had made to the exam, and the exam comprised one fourth of their final grade.

Teacher Reflections

At first I was a little skeptical of exactly how an art teacher, a math/physics teacher, and an engineering teacher were going to come together to create a meaningful and high quality senior project. In the end, this project turned out to be one of the best I have done in my five years of teaching since coming out of industry, and one that I am very proud of.

—David Berggren

The project worked because the three teachers on the team were interested in learning each other's perspectives. I wanted to learn the physics and engineering involved, and my colleagues wanted the displays to be artful.

—Jeff Robin

To learn more about this project and others visit

<http://staff.hightechhigh.org/~jrobin> and <http://www.hightechhigh.org/pbl>



High Tech High Design Principles



Personalization
Adult World Connection
Common Intellectual Mission
Teacher as Designer

HTH Design Principles Checklist

Personalization—High Tech High schools foster student engagement by knowing students well, tapping into students' experiences and interests, and building a strong sense of community.

- small learning community (maximum 125 students per grade)
- advisory program for all students
- projects reflect students' interests and passions
- integrated support services for students with needs

Adult World Connection—All students engage in community-based learning, collaborating with adults on meaningful work that extends beyond the school walls.

- students participate in internships, field studies, and other community-based learning
- student projects contribute to the workplace or community
- students regularly exhibit their work to authentic adult audiences
- students have one-on-one relationships with adults in field placements

Common Intellectual Mission—All students graduate ready for post-secondary education, work, and citizenship.

- non-selective student admissions; student population is representative of the local school district population
- students are not tracked into classes by race, class, or perceived academic ability
- technical and academic learning are integrated across the curriculum
- school has a full-time college counselor/placement officer

Teacher as Designer—Teachers work in interdisciplinary teams to develop curricula and programs for 50-70 students per team.

- teaching staff includes experienced master teachers, recent university graduates, and professionals from the world of work
- curriculum is designed by teachers and reflects their passions
- teachers meet in teams at least one hour daily for planning and staff development
- teachers participate in hiring and orientation of new staff

Questions for Reflection and Discussion

How does the school ensure that each student is known well by at least one adult?

How does the school make the adult world of work visible and accessible to all students?

What are the common expectations for all students, across all subject areas?

How is this a place where teachers can and do learn?

To learn more about High Tech High design principles visit <http://www.hightechhigh.org>



Invisibility

Lacey Segal, English, HTH Media Arts
Margaret Noble, Multimedia, HTH Media Arts

Seniors from High Tech High Media Arts brought the invisible to light during a multimedia exhibition exposing hidden paradigms, underground cultures and unresolved issues. Through documentaries, photo/sound essays, and video installations, students critically explored topics such as graffiti, rave culture, youth activism, self-mutilation, and the media. Students developed their projects in HTHMA's sound lab, using technology to showcase information they gathered from expert interviews and in-depth investigations of local professional, cultural, and institutional communities. The exhibition took place at the Museum of Contemporary Art (MCA) in downtown San Diego.

Teacher Reflection

Playfulness, curiosity, adventure, fun—must a vast abyss always divide these vital states of mind from academic achievement? Hopefully not! I re-learned a precious lesson from my students this year. Exploring intrinsic passion inspires success and cultivates joy! It is the art of effortless effort, a state of steady flow.

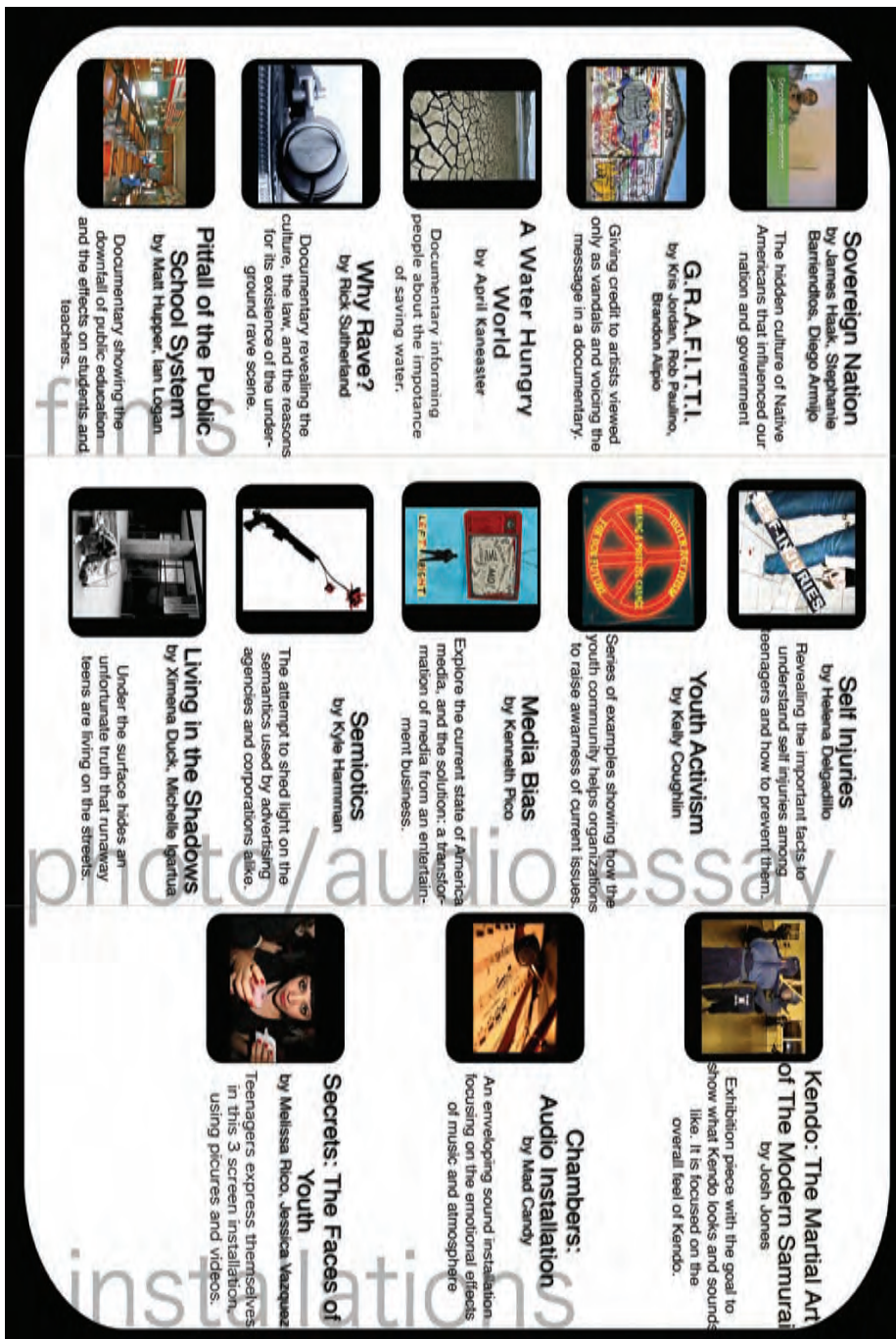
Behind every piece in this exhibition was a story of a student who undertook a personal, artistic, and intellectual exploration, and in doing faced many challenges. For John, a struggling student whose graduation hung in the balance, completing a successful project was of paramount importance. And yet, he could not find a topic to research. My colleague knew John well enough to tap into one of his passions with this question: Is graffiti art or vandalism? Thus, a successful documentary project was born, one that included interviews with police officers, tours of legal graffiti venues, and the creation of several art pieces.

An important element of any project is that student work be displayed for an authentic audience. To that end, my teaching partner and I wrote a proposal “pitching” our project to the MCA's Educational Curator. The result was one night and ample space to exhibit our students' work. After the magical exhibition evening, the museum staff were so impressed with the professionalism of the work, they invited our students back. Three months later, the MCA hosted our “Freedom” exhibition, extending its hours to display its permanent collection alongside our students' work.

—Lacey Segal

For more on this project and others visit

<http://www.hightechhigh.org/schools/HTHMA> and <http://www.hightechhigh.org/pbl>



Options for Reflection

Choose one of the options below. The goal is for you to reflect on at least one aspect of your practice and, for me, to connect with you about your work and explore ways to provide additional support.

Video reflection

Video your class, watch the footage and choose an 8-10 minute clip that you find particularly striking, troubling or interesting. Frame a question to discuss. We will watch the clip together and explore solutions to your question. Try to capture footage not only of your instruction, but also of students at work (building, doing, discussing, solving, writing, presenting).



Project design brainstorm

Choose a project that is still in the design stage. Bring relevant documents that you have created. We will discuss design issues: how to develop an essential question, incorporate inquiry, apply the 6 A's (authenticity, academic rigor, applied learning, active exploration, adult relationships, and assessment), integrate across disciplines, scaffold/chunk deadlines, facilitate critique sessions, develop useful rubrics, etc.

Looking at student work

Choose a completed project or assignment that you think could be improved for future use. Bring three samples of student work, ranging in quality, along with relevant project sheets or rubrics. We will discuss your vision for the project compared to what students actually produced and consider how to improve the quality of work next time.

Action research project

Choose a dilemma that you are having in class, and develop a methodical approach to gaining deeper insight into that dilemma. You may want to survey students, parents, or other staff members first to gain a broader perspective. For our discussion, bring in your plan for addressing the dilemma based on what you have learned so far. What strategies will you try, and how will you assess their effectiveness in meeting your goals for student understanding?

Building a Faculty Culture of Reflection and Conversation

Kelly Wilson, Director, High Tech High International

Too often in schools, teachers work in isolation with little opportunity to engage in adult conversation about their practice. As a school director, I work with teachers to develop a culture that is *collaborative* rather than *evaluative*, where teachers have the time and space to talk about challenges they are facing without feeling like they are exposing themselves to scrutiny or judgment. Our faculty has developed group norms and protocols whereby teachers can discuss and reflect on their work during our regular morning staff meetings. Teachers bring in student work for critique, share dilemmas with critical friends, reflect on student feedback, model and discuss best teaching practices, and observe classrooms using a collegial coaching model. The goal of these conversations is to share our work and make it public, just as we do with exhibitions of student work.

Supporting Teachers

Even within our collaborative culture, I have found it challenging to define my role in working one-on-one with teachers. The very nature of my role is in part evaluative, yet I want to support teachers and to stay connected to issues they are grappling with in their work. To that end, I offer teachers four options for reflection and conversation: video reflection, project design brainstorm, looking at student work, or action research. The goal is for teachers to reflect on issues of practice and for us to explore possible solutions together.

Using Video for Reflection

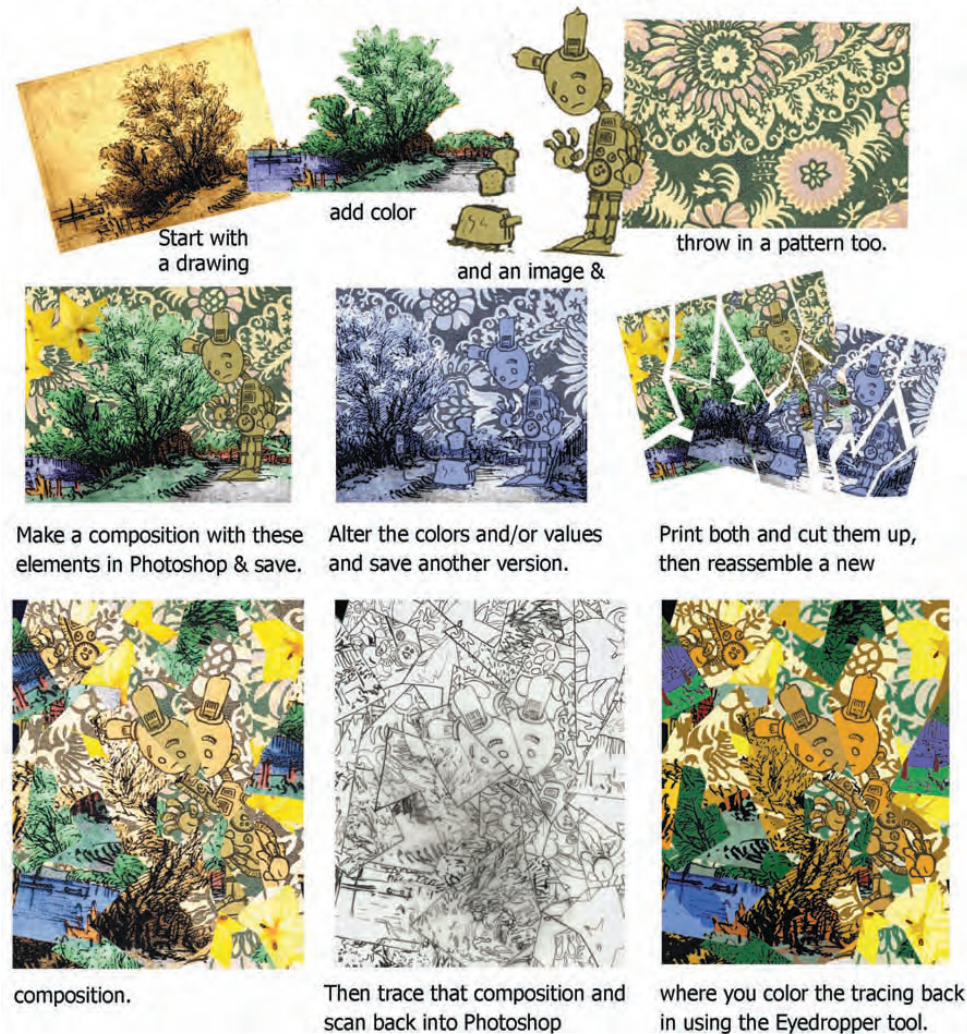
In this work I have been particularly struck by the power of video for reflection. With video, the teacher can *literally* play back the lesson and observe classroom dynamics through fresh eyes, often catching student interactions and conversations they may have missed. This allows for deeper reflection than when I simply share my observations. Our conversations feel more authentic because our discussion is guided by the teacher's perceptions and questions rather than my agenda. Teachers still receive critical feedback on their work, but video helps us focus our conversations on where they would like to grow in their practice.

To learn more about Professional Development at HTH visit our Digital Commons at <http://www.hightechhigh.org/dc>





Picasso's Influence on HTH—Analytical Cubism



Then print this out and make a painting, like Jewelyn Buduan, senior at High Tech High (front image). To see more student art visit <http://staff.hightechhigh.org/~jrobin>



Power Lunch

Rebecca Smith, Director of Academic Internships, HTH Media Arts

Power Lunch engages students in informal conversations with local professionals and serves as an entry point for potential business/community partners. Students choose to attend during regular lunchtimes. After introductions, the floor is opened to student questions, conversation ensues, and the event concludes with students sharing something they have learned.

Schedule

To maximize student participation, set a regular time and place to hold these conversations. HTH Media Arts hosts Power Lunch every Friday from 11:45 am to 12:15 pm.

Marketing

Post the Power Lunch speaker schedule where students will see it. Involve student leaders to get the word out about the event. Send notices to parents, teachers and students through e-mail. Make announcements at staff meetings so teachers can encourage students to attend.

Speakers

Power Lunch participants have included professionals from healthcare, law, graphic arts, film production, biotechnology, university admissions, catering and journalism.

Testimony

The value of these conversations is that they open up possibilities for students. Students who want to be small business owners, for instance, can talk about their ideas with me. I can make a suggestion or frame an idea. Sometimes, they need to hear from sources outside their parents or teachers. In my experience, it doesn't matter who is sending the message. It's more important that the lesson is learned.

—Adrienne Hunter, Owner, Skyy Limousines

Power Lunch is a great opportunity to experience different professions without going too far down that path. I ask questions about the workday, salary, required education. I feel empowered to make better decisions about my future.

—KJ Edwards, 10th grade, HTH Media Arts

Through Power Lunch, students gain insight into the many, often unanticipated, life pathways professionals have taken. They also learn to appreciate the well-roundedness, flexibility, and collaboration necessary to be successful and happy with future careers.

—Robert Kuhl, Director, HTH Media Arts

To learn more about Adult World Connections at HTH visit <http://www.hightechhigh.org>





Superhero in the Making

Diana Cornejo-Sanchez, Humanities, HTH Media Arts

Chris Wakefield, Math/Science, HTH Media Arts

This project integrates language arts and physics standards while tapping into students' interests in comics and anime. Student pairs researched physics concepts such as magnetism, entropy, waves, thermodynamics, gravitation, and momentum to create superheroes or supervillians whose special powers embodied these concepts. They then developed short stories—and ultimately, colorful bound comic books—starring their characters.

Teacher Reflection

This project really gave students creative freedom. As a teacher, I got to see students' imaginations at work as they developed a story and translated it into comic book form. Their stories had to include the superhero's discovery of his/her power and how he/she ultimately decided to use that power. This presented an interesting challenge for students, since they had to really build a story line, develop their characters and set a tone. The results were great stories and amazing comic books. Through multiple drafts, critiques and revisions, the students also realized how much work is put into the comics and anime they love.

—Diana Cornejo-Sanchez

Embodying Ohm's Law

The science concept my partner and I were given was Ohm's Law. For this, we made a comic called "Strike." It was about a man named Walter Bithers, who felt that all mechanical objects were against him, from his electric toaster that shuts off while he is making his precious breakfast to his car that suddenly has a dead battery. It isn't until he is fired from his job and mugged by an unfortunate young kid—who is struck by lightning and dies instantly, with the voltage going through his body and affecting Walter too—that Walter realizes he has the power to put electrical charge back into objects. He uses this new power to his advantage, recharging the toaster and the car, and soon finds out that he can do illegal things like stealing from ATMs. He steals for months, becoming so rich he doesn't even notice the cops chasing him. But that's not where our story ends. What do you think will happen?

—Shanna McCue, 9th grade, HTHMA

To find out Walter Bithers' fate and to learn more about this project and others visit <http://www.hightechhigh.org/schools/HTHMA> and <http://www.hightechhigh.org/pbl>





The Lost Postcard Collection

Angela Guerrero, Humanities, HTH Chula Vista
with thanks to Breawna Power

Essential Questions

How do you think Odysseus feels during his journey?

Is Odysseus a hero by modern standards?

The Rhapsodist's Task

In a “freaky Friday” body swap, you have become the epic hero, Odysseus! As you journey across the Aegean Sea, you will catalog your trials, tribulations, and feelings about each episode in a postcard home to your wife, Penelope. Create your postcards just like the two-sided postcards we send to our friends and family. On the front, provide a colorful illustration of what occurred in the episode (colorful drawings or photo shop are preferred, but clip-art is acceptable). On the backside, type your letter to Penelope, where you include:

- A detailed, vivid account of what occurred
- Your reflections about how the event affected you and your crew
- At least one quote from the Odyssey, followed by a professional citation

The Final Touch

Type your postcards. Make sure each episode has a title and a picture. Create an eye-catching cover for your postcard collection. Then, number your postcards and create a table of contents. Presentation is important for this project, so make sure you allow ample time to type and display it.

Teacher Reflection

Students were asked to create a collection of postcards from the perspective of Odysseus to his beloved wife Penelope documenting his trip through the Aegean Sea. The assignment helped students become more involved in the story because it asked them to express, in writing, the range of emotions Odysseus may have felt while battling one eyed giants, traveling to the frightening underworld, and witnessing the deaths of his men. Not only did students develop a deep appreciation for the Odyssey, but they also came to understand tone and perspective in their writing.

—Angela Guerrero

For more on this project and others visit

<http://staff.htchv.hightechhigh.org/~aguerrero/> and <http://www.hightechhigh.org/pbl>



Blogging is Writing

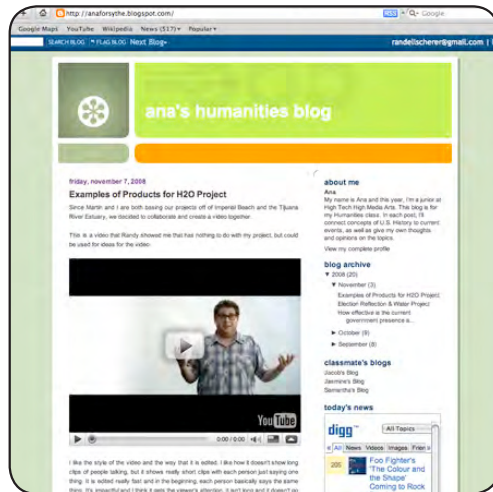
Charlotte Morrisette, Humanities, High Tech High Media Arts
Randy Scherer, Humanities, High Tech High Media Arts

For students of the digital generation, blogging can be an authentic and dynamic way to build literacy and community. In many HTHMA classrooms, teachers and students maintain free blogs that are personalized to reflect their unique personalities. They use these blogs to post work, respond to each other's ideas, and display media resources relevant to their class.

Teachers' Reflections

Blogs gives students the opportunity to seamlessly integrate video, audio or text evidence from the web into their writing; adding such evidence is only a few clicks away. As a result, students become more thoughtful about how they draw upon others' work, and have developed more rigorous standards for what is "good" information in their own writing and on the web.

—Randy Scherer



Blogging in my class has offered me a real-time connection with my students. We are all linked to each other's blogs and we use software such as Google Reader to find out when someone creates a new post. This instant access gives me insight to their writing styles, their personalities, their likes and dislikes and the tragedies and successes of their daily lives.

Blogging also gives students a look into my world. I can share my thoughts on current events and what's going on in my life. I can show students that I've traveled all over the world and that I'm a fan of the same computer games that they like. Topics like these don't always come up in class. By opening up to the class on my blog, I've built closer relationships with my students.

Students' responses to blogging have been overwhelmingly positive; they talk about enjoying writing, and feeling like their work has a real audience. They've also learned how to give each other supportive, useful feedback on their writing. One student recently admonished another for simply saying, "Nice post," on a classmate's recent submission, asking, "How do they know what was 'nice' unless you tell them specifically?" Indeed. Blogging is helping my students become not only better writers, but more constructive critics.

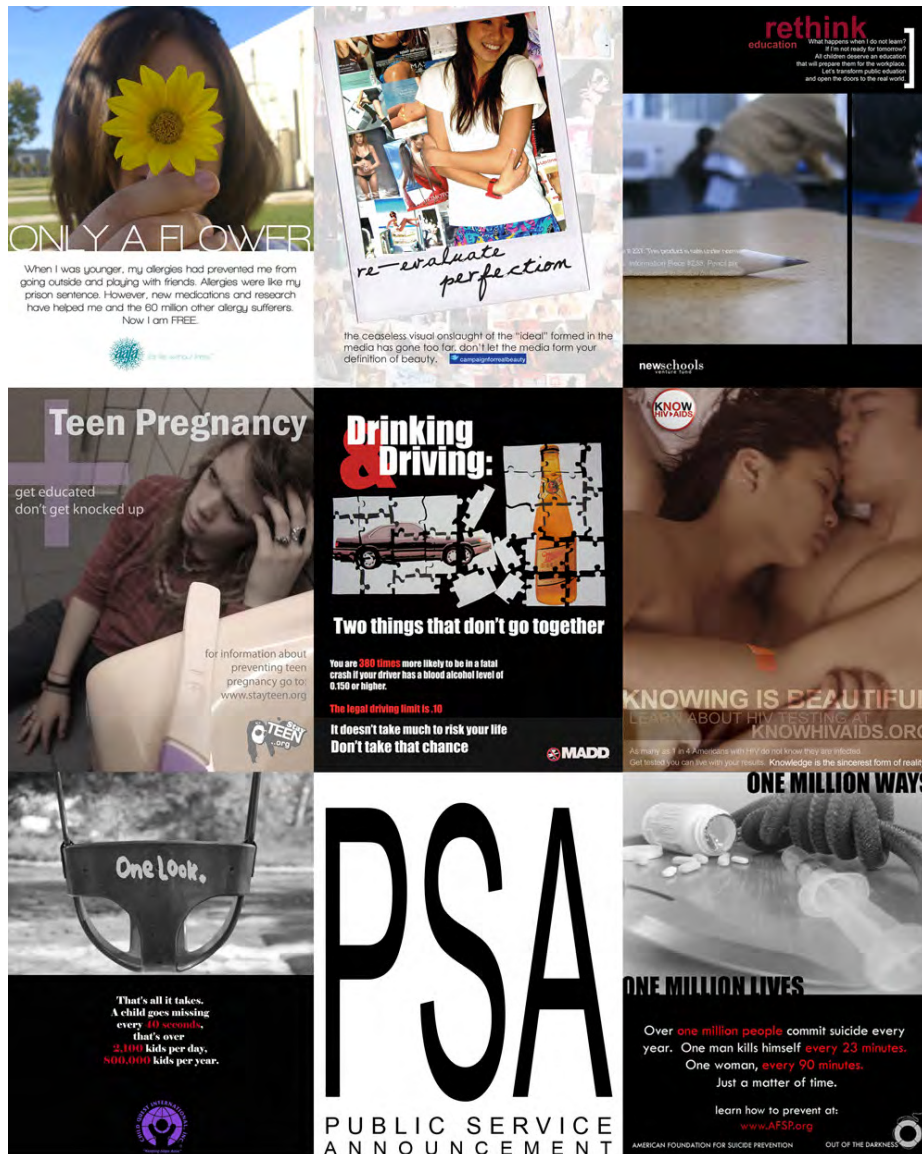
—Charlotte Morrisette



To learn more about blogging in the classroom, visit the HTH Digital Commons and Randy Scherer's and Charlotte Morisette's digital portfolios at

<http://www.hightechhigh.org/>
<http://staff.hthma.hightechhigh.org/~cmorrisette/>
and <http://staff.hthma.hightechhigh.org/~rscherer/>





C A M P A I G N

Public Service Advertising Campaign

David Jean, Digital Imaging, High Tech High

Scenario

Groups are assigned to create an advertising campaign focusing on a social issue. Each group chooses an organization (e.g., D.A.R.E., Operation Smile, ONE) that offers support for those affected by their chosen issue. The campaign must answer one of these questions:

- What are the causes of this social issue?
- What are the direct effects?
- What is being done to aid those who are negatively impacted?

The groups are responsible to create the following:

- 1) Full color magazine ad (measuring 8 x 10 inches)
- 2) 30-second television commercial (digital video format)
- 3) 25-second radio spot

Students work together on research and concept development. Each group submits a minimum of 10 detailed thumbnails for the print advertisement to the teacher, who helps choose a concept for the entire campaign. Each group generates original content (headline and narrative) and imagery (photographs, illustrations). Students may not use images from print publications or the internet except for a high-resolution logo from their organization, as each visual piece (print and video) must include the organization's logo.

Student Reflection

I had never really sat down and thought about how women were portrayed in the media, and this project made me do that. As I was flipping through magazines, pulling out ads for our backdrop, I started to see how women are used or looked at simply because of magazine ads, and how much the ads affect people who read them. I read many magazines and never have been affected by these ads, but after taking a second look, I can see why girls all over the world can be pressured by these. This project was a good way to get an important message out into the real world. Our ad was the most powerful out of the three things that we made, and it really shows how something as simple as a magazine ad can make a difference in a world that can be very difficult to live in.

—Rachel Liuzzi, 11th grade, High Tech High

To learn more about this project and others visit the HTH Digital Commons
and David Jean's digital portfolio

<http://www.hightechhigh.org/> and <http://staff.hightechhigh.org/~djean/>





San Diego/Tijuana Crossed Gazes

Zoe Randall, Multimedia, High Tech Middle Media Arts

Dr. Norma Iglesias-Prieto, Chicana/Chicano Studies, San Diego State University

Twenty-two middle school children (12 in Tijuana and 10 in San Diego) learned and applied the technique of “model animation” to produce short animated films about the lives of children on “the other side of the border.” With the support and supervision of trained visual artists, graduate students, and educators, children of each city discussed the ways they think about and represent the “other side.”

HTMMA students worked under the guidance of two French experts, Sébastien Water and Guilles Coirier, from the independent film company L'Espace du Mouton à Plume. Roland Michon from the University of Rennes 2 in France, Zoe Randall from HTMMA, and Adriana Trujillo from YonkeArt in Tijuana also facilitated the workshops.

Teacher Reflection

This project connected our students to art and international issues. It was a pleasure to see my students engaged in dialogue about the U.S. and Mexico with SDSU grad students and Mexican and French visual artists, while creating a beautifully crafted animation film. The opportunity to learn animation from a French artist, translate French daily to my students, and interact with a diverse group of artists was a real dream. A documentary about their views of the border is being produced, and their animation films will be celebrated in France at international film festivals and used as pedagogical tools at SDSU and other venues. It has changed my life and my students' lives forever to be a part of something so much bigger than ourselves.

—Zoe Randall

Student Reflection

I thought this film was just for fun, and I didn't know French animators were coming. I thought it was only going to take a week, but it took a month, and a month went by very fast. The first time I crossed the border was when we saw the second premiere of our movie in Tijuana. I was kind of scared and nervous because I didn't know what was going to happen. But once I got there and stayed awhile, I got comfortable and thought it was a good experience. I got to learn animation and meet new people like never before.

—Josiah Terronez, 6th grade, HTMMA

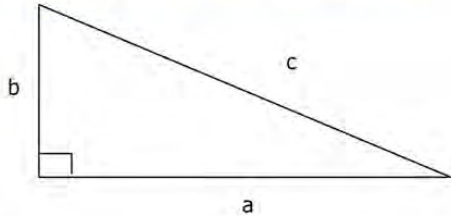
To learn more about this project and others visit the HTH Digital Commons
and Zoe Randall's digital portfolio

<http://www.hightechhigh.org/> and <http://staff.htmma.hightechhigh.org/~zrandall/>



Excel Programs with a Graphic Interface

Lesson 1: Solving for a side on right triangles



Insert the two sides that you know:

a: 4
b: 3 → c: 5
or
a: 4
c: 5 → b: 3
or
c: 5
b: 3 → a: 4

math behind:
 $a^2 + b^2 = c^2$

a.k.a: pythagorean
theroem

Remember the
trig functions by
using:

SOH CAH TOA

Lesson 2: Finding θ

*Now that you know all the sides, you can solve for θ

b: 3 → θ : 0.64 (in radians)
c: 5 → θ : 36.8699 (in degrees)

Skipped lesson 1? Use the other trigonometry functions

b: 3 → θ : 0.64 (in radians)
a: 4 → θ : 36.8699 (in degrees)

Lesson 3: Weight (W)

Enter mass (kg): 5 → W: 49.15 N(newtons)
W: 11.05 lb(pounds)

Look closer:
Always use kg
when solving for
weight

pg.1

Science Friction

Alfred Solis, Math/Science, High Tech High

The goal of Science Friction was to help students understand that physics is all around us, even on the very ground we walk on. Movie theaters, which are notorious for having sticky floors, were the “sole” inspiration for this project.

Students began their exploration of friction by creating the stickiest surface possible—thereby maximizing the coefficient of friction—and performing a series of experiments. The project culminated with students creating software programs that calculated the coefficient of friction for a range of surfaces marketable to the theater industry.

Teacher Reflection

People often think of Excel software as simply a way to display data, but it also provides students with opportunities to quickly become software developers and graphic user interface (GUI) designers. After a one-hour training session, students were not only able to enter in functioning equations and data they derived from assignments and labs. They could also personalize the look and feel of the “software” they had developed.

Excel offers a good way to assess students’ math understanding in the context of project work. For example, when students enter formulas into Excel, they need to be careful about how they use parentheses or their formulas won’t work correctly. This compels students to check their work and revisit or rethink concepts like the order of operations. In addition, having students create software around a math topic—for example, unit conversions—motivates them to learn the content and provides them with a handy program they can use throughout the year.

—Al Solis

Student Reflection

In this project, I created a program used to calculate the coefficient of friction, angles, weight, and percentage increase of friction between two objects. You can insert different numbers such as angles or mass and see how the results changed. This is a useful program for those who don’t understand their homework or don’t have a calculator. You can even use this program if you don’t understand the terminology because it includes a glossary for those tricky words. Even though it may not look like it, I created this program by using Microsoft Excel.

—Molly Uyeda, 9th grade, High Tech High

To learn more about this project and others visit the HTH Digital Commons
and Alfred Solis’ digital portfolio

<http://www.hightechhigh.org/> and <http://staff.hightechhigh.org/~asolis/>





Artwork by Alex Davis, 10th grade, High Tech High North County

Writing on the Walls

Shani Higgins, Art, High Tech High North County
Jenny Pieratt, Humanities, High Tech High North County

Through this multidisciplinary project, students at HTH North County will explore and address an issue of concern in their community: the prevalence of tagging and graffiti. Students will research the history and lasting influence of gangs in California, conduct an ethnographic study of tagging and graffiti in the city, maintain video blogs as a form of on-going reflection, and create photo essays of their experience. They will study the difference between tagging as vandalism and graffiti as an art form—putting their learning into service by painting over tags that have damaged property and by creating their own graffiti-style art for a gallery show at the Escondido Arts Partnership museum.

Essential Questions

What is the difference between graffiti and tagging?

How can we change the negative perception about graffiti in society?

Student Reflection on the Transition from Tagger to Artist

I have broken the law. Vandalism is the destruction or damage of property, and I used the aerosol can as my tool. I knew it was against the law to paint on private property, but this style of art was a way to express myself and a way to relieve the stress of my mind, ignoring everything but the adrenaline rush that came from being afraid of getting caught.

But then there was the canvas. I had never used a canvas before. My canvas had been the empty walls in the streets. Using a canvas and acrylic paint gave me another way to get out of this world and be set free into my own world. I never knew I was an artist until I had my first art teacher in high school. She has helped me turn my life around.

Teacher Reflection

I'm excited about this project because it's a great integration of Language Arts, Social Studies, Technology and Fine Art. It allows students to get inside the lives of others—by reading *Always Running* by Luis Rodriguez and investigating the history of gangs and graffiti—and to connect those lives to their own through writing and art.

—Shani Higgins

To learn more about this project and others, visit the HTH Digital Commons and Shani Higgins' and Jenny Pieratt's digital portfolios at

<http://www.hightechhigh.org/>

<http://hthnc.hightechhigh.org/~shiggins/> and <http://hthnc.hightechhigh.org/~jpieratt/>



A Hero In My Eyes

Diana Sanchez, Humanities, High Tech High Media Arts

After studying the question, “What is a hero in today’s society?,” students created a textual and visual representation of a hero in their life. Students utilized literary devices, sensory details, and the narrative form to create a written character sketch of their hero in a heroic moment, and then represented that moment through photography.

Teacher Reflection

I like to start the school year with an identity project that helps me get to know my students, and helps them get to know one another, to build a strong classroom environment. This project encouraged students to think about who has made an impact on their life. For most students, this was a piece of cake. They knew who they would select. For a few who had trouble identifying someone, this was their first challenging project in a project-based school. Working with these students, I learned about the struggles that prohibited heroes from rising in their lives, and about their sources of motivation. The highlight of this project for me was seeing the pride in my students’ eyes as they saw their black-and-white pieces displayed throughout the school.

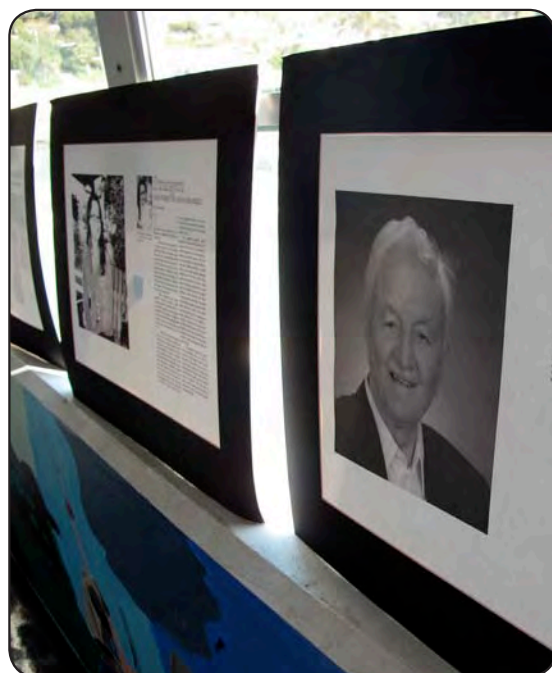
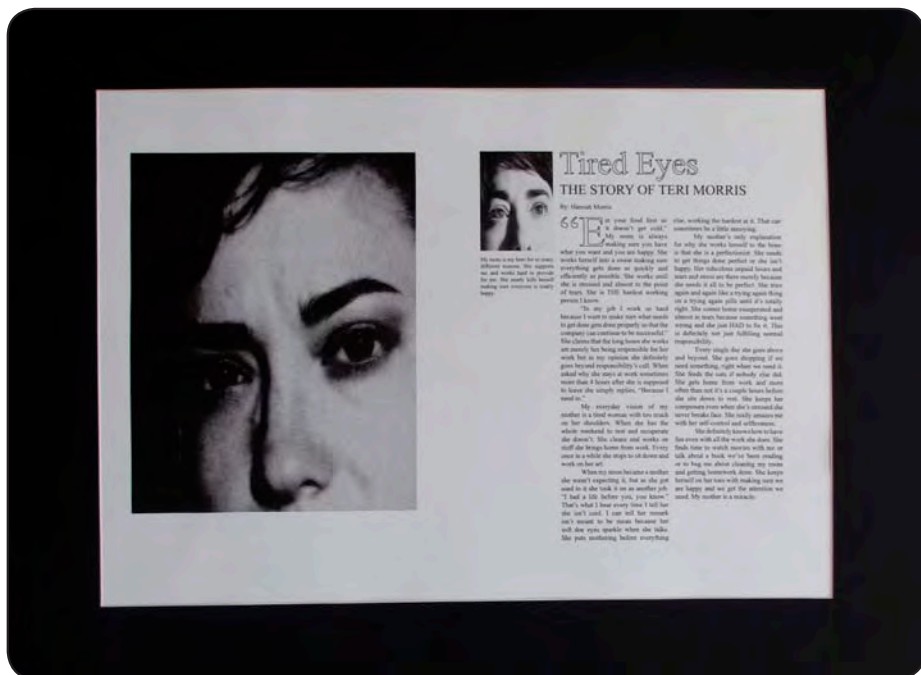
—Diana Sanchez

Student Reflection

The Hero in My Eyes project opened my eyes to a whole side of my mother’s life that I may not have seen otherwise. We conducted interviews with the person we viewed as our Hero. This gave me the chance to learn what my mom went through being a single mother: how hard it was to raise a baby by herself, only at the age of seventeen, with barely enough money to support us. It taught me to appreciate my mother more than I already did. Not only did it show me another side of her, it showed me another side of writing. We were taught how and when to use literary devices, descriptive writing, interviews, and narrative for our character sketches. I used these elements to put a voice in my writing, one that made my audience feel like they were really there as it all happened. I was able to convey why she is my hero without directly saying it. I can say that the Hero in My Eyes is one of my favorite projects so far. It helped me develop my writing skills and my relationship with my mother.

—Brandi Coley, 9th grade

To learn more about this project and others visit the HTH Digital Commons and Diana Sanchez’s digital portfolio at <http://www.hightechhigh.org/> and <http://staff.hthma.hightechhigh.org/~dsanchez/>



Aboriginal Art

Andrea Barrett, Art, High Tech Middle



Artwork by Bethany Shedrick, High Tech Middle, 8th grade

Middle school students studied the Aboriginal Art form, including non-naturalistic abstract designs and naturalistic paintings of human, plant and animal figures. They then selected a wild animal they felt represented their personality, wrote an artist statement about the qualities they shared with their animal, and created an animal self-portrait using the traditional dotting technique and abstract design elements used by aborigines.

Teacher Reflection

Australian Aboriginal art is the oldest living art tradition in the world, with paintings in rock shelters dating back 20,000 years. This art incorporates the use of concentric circles, “u” shapes, and lines with earth tones from substances collected from the natural world. I introduced the project early in the year, and it was a good way to get to know my students. Every single piece was amazing—even students who struggle with art produced careful, thoughtful work that they were proud of. Fifteen of the pieces are now hanging at the Encinitas Health Clinic, where they have drawn rave reviews from physicians, patients, and visitors. I’m happy with the results, but next time I’ll introduce critique earlier in the drafting process, using models from this class to initiate conversations about what qualities are present in beautiful work.

—Andrea Barrett

Student Reflection

Creating my painting using the traditional aboriginal technique was incredibly soothing. I considered it to be yoga for my mind. I enjoyed creating my dot painting because it was a meaningful way to express myself. The animal that I chose to represent my personality was the African Pygmy-kingfisher. I chose a colorful bird because it allowed me to play around with a variety of colors. I also chose this bird because it has a long beak for going after its prey and this represents how I go after what I want. Aboriginal art tells a story, so I decided to incorporate a narrative in my painting. In my work the bird is perched in a tree in the African desert, daydreaming about rain. I am pleased with my final piece. I enjoyed learning a new technique and look forward to incorporating it into my artwork in the future.

—Bethany Shedrick, 8th grade

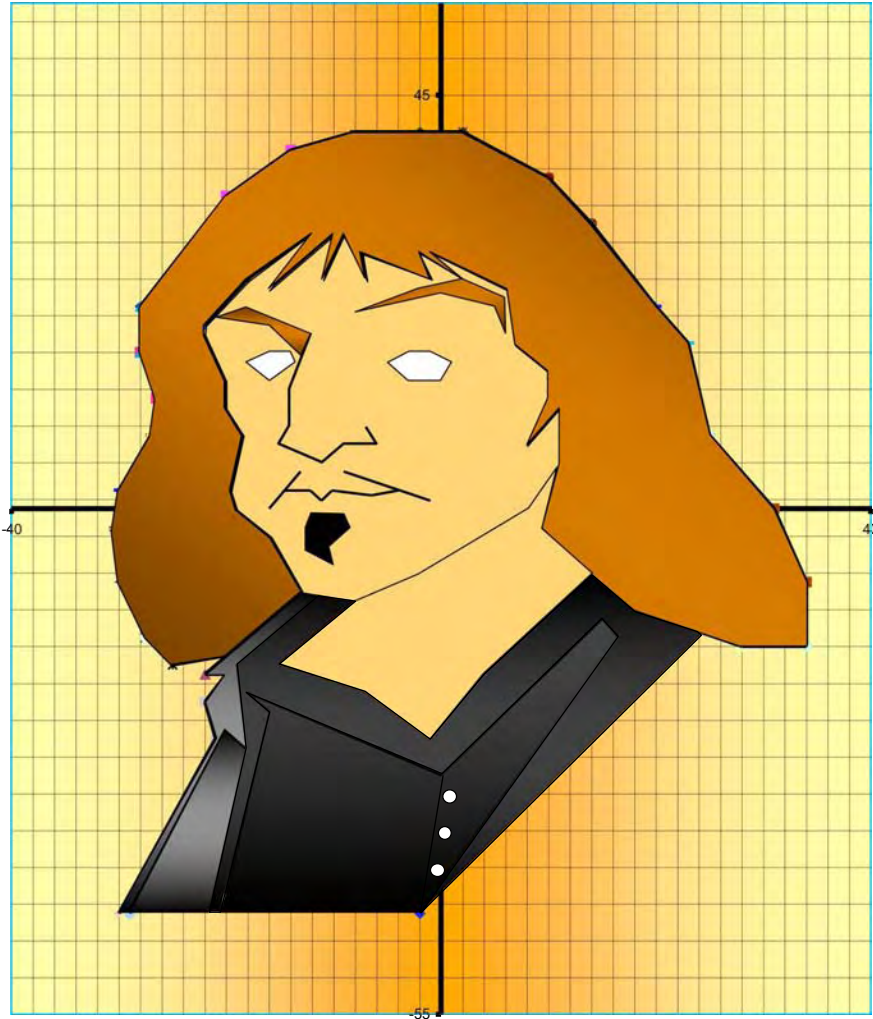
To learn more about this project and others visit the HTH Digital Commons
and Andrea Barrett’s digital portfolio at

<http://www.hightechhigh.org/> and <http://hthidps.hightechhigh.org/~abarrett/>

Graph-It Design

Alfred Solis, Math/Physics, High Tech High

RENE DESCARTES (1596-1650)



Rene Descartes by Matthew Lung, HTH, 9th grade.

For the Graph-It Design project, each student used Excel software to create their own “mathterpiece” of an image pertaining to a historical figure. Students identified 124 sets of data points from an image of their choice, and derived 25 different linear equations to reproduce the image. They then presented and displayed their work gallery-style during an exhibition night.

Teacher Reflection

As a teacher, I enjoy leveraging the power of Excel in different ways. In this case, it helped me to integrate art and mathematics. Also, Excel software acts like a video game because it assesses students’ work in real-time. When they entered data points and equations, they could see whether or not it aligned with the original image. This instant feedback made them check their work every step of the way. This taught perseverance, because even though the graphs involved a lot of work, the students wanted them to look great for the exhibition.

—Al Solis

Student Reflection

Pictures can easily be drawn or taken, but this project proved to be not as simple. We used Excel to draw our picture, but rather than drawing in lines, we calculated the equations for each straight line on an x-y axis and entered the equations into Excel. The first thing that I did once I had my picture was to plot the points on an x-y graph. Then I connected the dots and started to solve for the equations of my lines. Even though we were only required to solve for 25 lines, I solved for my entire portrait of Rene Descartes. In the end, I was really proud of the fact that I did not draw any lines and I was amazed at how well my picture looked compared to the real portrait. I was in awe as the lines popped up onto the screen as I entered in the equations. It really helped me visualize line equations. From this single project we learned about a vast range of concepts, from slope, y-intercept, equations of lines, parallel lines, perpendicular lines, and to how to graph lines in Excel.

—Matthew Lung, 9th grade

To learn more about this project and others visit the HTH Digital Commons
and Alfred Solis’ digital portfolio at

<http://www.hightechhigh.org/> and <http://staff.hightechhigh.org/~asolis/>



The Role of the Blood Bank

by Alex Burtson and Gabby Aligada

Importance: Blood is always in high demand. Donating is often overlooked. Increased donating is a necessity in order to save lives.



Donation: The average man and woman have 12 and 10 pints of blood in their bodies, respectively. One pint of blood per person is donated, which is capable of saving 3 lives. Individuals can donate whole blood, platelets, and/or plasma.

The Importance of Donation



Blood, Plasma & Platelets

Who Donates: Every potential donor must first be screened and tested for any potential bloodborne diseases. There are 3 types of donors: volunteer, replacement, and professional.



Process: Blood is screened for diseases such as HIV, Hepatitis, and West Nile Virus before it is transfused. It is refrigerated until needed. Blood is then distributed to hospitals according to demand.

The Process of Transfusion



The Blood Bank Project

Blair Hatch, Biology/Multimedia, High Tech High
Jeff Robin, Art, High Tech High

This project was a collaboration between the San Diego Blood Bank and HTH seniors, as well as between an art teacher and a biology/multimedia teacher. Divided into pairs, students explored *bloody* topics ranging from leukemia, sickle cell anemia and the Aids epidemic to the use of blood in film, the history of vampires, and the role of blood in religion. They then created a painting on a blood-related theme on a large piece of custom cut wood. A rectangular opening housed a laptop displaying a DVD presentation with audio and motion graphics they had designed to teach the community about their topic. Students' final projects were exhibited at the JETT Art Gallery in San Diego.

Teacher Reflection

This project signaled my return to science teaching in a partnership with our art teacher, Jeff Robin. The project allowed me to improve upon my early attempts, long ago, to have students create multimedia presentations in science. Additionally, I delivered traditional science instruction and assessment through lecture, weekly tests, lab dissection of a fetal pig and cat, a midterm and a final. The combination of traditional and project-based instruction offered both the breadth and depth required for college level science. Knowing that the art would be exhibited at a gallery served as excellent motivation for the students, and the well attended event was a community showcase for the school.

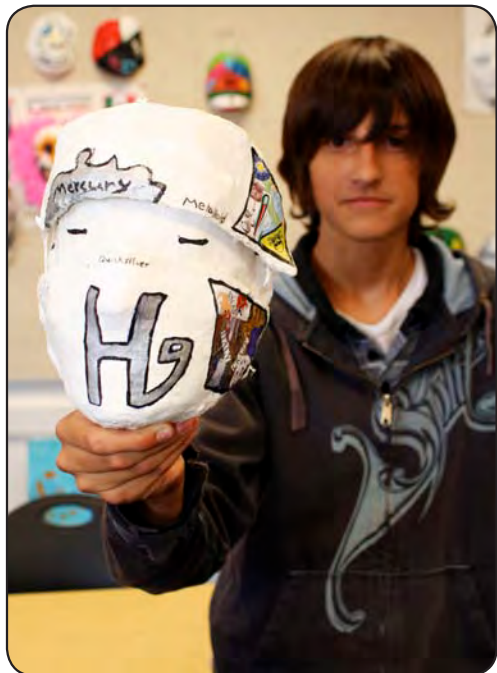
—Blair Hatch

Student Reflection

My classmates and I didn't just learn the crude essentials to create a movie, or learn the rules of mixing and conserving paint. We learned about the astounding life that blood brings to society. It travels through our heart, oxygenates our brains and bodies, protects us from diseases, simply keeping us alive. At the same time, we had the opportunity to share its message with our community. Without it we cannot strive, live, or even have the opportunity to give. When there are flaws, we have epidemics such as AIDS, or leukemia, or anemia. At the same time, blood is prevalent in entertainment. Without so much as a drop in action or horror movies, there would be no Hollywood. This opportunity was nothing like I have ever had, and looking back, it was the most work, but the most fulfilling project I've done in high school.

—Gabby Aligada, 12th grade

To learn more about this project and others visit the HTH Digital Commons and Jeff Robin's & Blair Hatch's digital portfolios at
<http://www.hightechhigh.org/>
<http://staff.hightechhigh.org/~jrobin/> and <http://staff.hightechhigh.org/~bhatch/>



Chemical Identity Masks

John Fisher, Humanities, High Tech High Chula Vista

In this interdisciplinary project, students created a two-sided identity mask. On one side they represented their personal identity, as it has been formed through their socialization by family, friends, and the media. On the other side they represented a chemical element that they felt best symbolized their personality.

Teacher Reflection

This was our first project of the year. It was a great way to create a positive culture in our classroom, while introducing students to the basic principles of sociology and chemistry. It takes a certain amount of trust to breathe through a straw and allow someone else to completely cover your face with wet plaster for 15 minutes or so. The students bought in to the process and had a great time. It also was a great way to build a culture of critique and refinement, as students worked through multiple drafts to get to their final product.

In the end, there was a wide range in the quality of the masks. In reading the student reflections, many students with less developed masks mentioned that they wished they used their class time better. We modeled and did several critiques, but because creating the masks was such an involved process, many students had trouble revising concepts once they had begun. When I teach this project again, I will make sure that students take the process of generating ideas and drafting their masks as seriously as making the masks. Then they will have a clearer vision before they begin designing and painting.

—John Fisher

Student Reflection

In this project we made an impression of our face and designed it to show our hidden identity. After getting an impression of my face I started to layer the mask with more plaster until the mask wasn't fragile anymore. When the first mask dried I made a second mask for my chemical identity. Though at first I thought I would have two separate masks, one for humanities and one for chemistry, I ended up having my element mask on the outside and the humanities mask on the inside. In the end I think that I was really able to achieve the concept of "Beautiful Work" and have the project up to my standards.

—Devon Stanley, 10th grade

To learn more about this project and others visit the HTH Digital Commons and John Fisher's digital portfolio at <http://www.hightechhigh.org/> and <http://staff.hthcv.hightechhigh.org/~jfisher/>





Cuentos Infantiles

Johanna Jorfald, Spanish, High Tech High Media Arts

Students produced Spanish children's books and gave them to Spanish-speaking children. In pairs, students in my Spanish I class were assigned a basic Spanish vocabulary unit such as clothing, colors or animals. Each pair created a list of the most common words and verbs in that unit and gave a mini-lesson to the class, providing them with handouts and activities. The student-led lessons generated a strong understanding of important vocabulary, and each pair used this knowledge to write and illustrate a story for a simple, colorful, and creative children's book. When the books were completed, the students practiced reading them to each other before we took them to an orphanage in Tijuana, where they read the books to the children. After a full day of reading, laughing, bonding, and playing in Spanish, we donated the books to the orphanage so they could build their first library.

Teacher Reflection

This was one of the longer and more memorable projects I have done. My students placed great importance on being accurate in their spelling and conjugations, and on creating stories that would impress and engage Spanish-speaking children. They worked hard to make the books unique and professional. It was exciting to see them bring their stories to life. They spoke beautifully in Spanish, trying hard to make no mistakes as they read to their audience. The project ended with tears of happiness and sadness as we said goodbye to our new friends. My students not only learned important content, but they also made a difference in other people's lives.

—Johanna Jorfald

Student Reflection

When I was told we were making a Spanish children's book, I didn't really understand what an eye-opening and true learning experience this was going to be for me. The actual experience of going to Tijuana and reading the books we made to the orphans was life-changing. Even though Tijuana, Mexico is only a 20 minute drive, the atmosphere is drastically different. This project taught me a new language, a new culture, and most importantly, how to make a change in someone else's life.

—Katie Smith, 12th grade

To learn more about this project and others visit the HTH Digital Commons
and Johanna Jorfald's digital portfolio at
<http://www.hightechhigh.org/> and <http://staff.hthma.hightechhigh.org/~jjorfald/>



Ocean Beach Pier, photograph by Kelsey Murphy, HTHMA, 11th grade.

Media Saves the Beach

Brandon Davidson, Biology, High Tech High Media Arts
Randy Scherer, Humanities, High Tech High Media Arts

Is it safe to go in the water? This question began an exploration of San Diego's beaches and bays, and of the biological, ecological, political and cultural factors that affect the overall health of local coastal ecosystems.

In biology, students analyzed indicator bacteria levels at six popular coastal locations, as well as the health and diversity of microscopic life in local plankton populations. They used ordinary equipment such as microscopes and more sophisticated equipment on loan from a local non-profit group. Students then trained community members about how citizens could participate in water testing and help preserve coastal ecosystems.

In humanities, students generated original research questions and pursued these as journalists. Some produced short documentaries, editorials, or photo-essays based on their biology research. Others produced large-scale pieces of art with accompanying artist statements. One group published a professional quality 12-month tide calendar, which they sold locally to raise money for further projects. Student projects were critiqued by panels of peers, teachers and local experts before exhibition.

Teacher Reflection

The critical factor was that we started with questions that truly made all of us curious. Scientific results and the ensuing humanities projects required rigorous testing methods and protocols—our research had to be done “right,” and each cycle of tests generated new questions. In this sense, original research involved a self-perpetuating cycle of inquiry and motivation.

—Randy Scherer

Student Reflection

My video explained the dangers of surfing in polluted water. I did a lot of original research to find bacteria levels at different beaches and to learn what kinds of illnesses come from polluted ocean water. I also interviewed a doctor, a local surf shop owner and a member of Coastkeeper, an environmental nonprofit.

—Stephanie Luna, 11th grade

To learn more about this project and others visit the HTH Digital Commons and Brandon Davidson's & Randy Scherer's digital portfolios at

<http://www.hightechhigh.org/>

<http://staff.hthma.hightechhigh.org/~bdavidson/>

<http://staff.hthma.hightechhigh.org/~rscherer/>





Pinhole Photography

Rachel Ching, Math/Chemistry, High Tech High International

Project Description

Students built pinhole cameras and took black-and-white photos, which they then developed, scanned into a computer, and manipulated using Photoshop to create their own unique piece of digital art. In the process, students learned about the optics involved in cameras—how the light ray's path affects the size, orientation and distortion of images. They also learned about the chemical reactions that occur between light and the silver bromide on the photo paper, as well as the chemical reactions in each step of the development process of a photograph.

Teacher Reflection

This was my fourth year doing this project. In the first year I focused on technical aspects such as constructing and using the camera, and working in the darkroom. The next year, I increased the connection to the outside world with visits to the Museum of Photographic Arts and to Chrome Digital, the last full service photography facility in San Diego. In the past two years, I have tried to boost the professionalism of the final works of art and of our exhibition. This year, students wrote artist statements to accompany their pieces, and we mounted all the work in a similar fashion to mirror a professional gallery.

My students really enjoyed this project. Many had only used digital cameras, and the idea of developing photos in a dark room was “magical” to them. They valued the opportunity to showcase their artistic creativity through the project, something people might not expect from a math/science class.

—Rachel Ching

Student Reflection

After hearing Rachel tell me that I was going to take pictures using an oatmeal canister, suddenly this project piqued my interest. Not only was I able to make some neat photographs, but I was also able to learn about how a camera takes pictures. Because of this experiment, I have found a whole new respect for photographers. At first, I was confused by how something simple, such as taking a picture, could be considered art. Now, because of this experiment and research, I learned that a photographer is a person who is able to catch the beauty of the world.

—Natasha Smith, 10th grade

To learn more about this project and others visit the HTH Digital Commons
and Rachel Ching's digital portfolio at

<http://www.hightechhigh.org/> and <http://hthidps.hightechhigh.org/~rching/>





1. **Assignment.** “Make a poster showing what you have learned about ancient Greece.”
What kind of work might you expect from students? What else would they need?
2. **Components.** “Your poster must be 2 ft. by 3 ft. It must represent culture, politics, religion, or architecture. It must include an example of how that aspect of ancient Greece affects our culture today. There must be a title and captions for each illustration/photo explaining why it is important. There must be a map of ancient Greece.”
How might this poster be higher quality than the first? Would describing the components be enough?
3. **Characteristics of a quality product.** “Your poster must be organized, balanced, creative, and pleasing to the eye. It must use color, space and borders effectively.”
How would this help increase the quality? What else would be needed?
4. **Models.** Use samples of exemplary student work to show what quality looks like. What does “organized” look like? Balance? How can color enhance meaning? What is effective use of space?
5. **Design rubric.** Describe different levels of quality. Look at student work and professional models to name the attributes of weak and strong work. Identify 4, 3, 2, and 1 levels.
6. **Mini-lessons and workshops.** Teach skills needed to complete the product. Offer lessons on organization, relevant content, balance and color, word choice, sentence fluency, etc.
7. **Self-assessment.** Help students assume responsibility for their own learning. They can assess themselves on the rubric.
8. **Feedback from others.** Students can learn how to give effective feedback, based on the rubric, that is kind, helpful, and specific.
9. **Multiple drafts.** Students focus revision on one aspect at a time. They get feedback after each revision.
10. **Conference with teacher.** Students get feedback from the teacher before producing final drafts.
11. **Exhibition.** Publicly display work to peers, to the community, to experts in the field.
12. **Reflection.** What did I do well? Where did I meet the learning targets? Where did I fall short? What do I need to work on to reach them next time?



Hispanic Artist Inspired Self-Portraits

Andrea Barrett, Art, High Tech Middle

Hispanic Artist Inspired Self-Portraits



High Tech Middle's art class celebrated Hispanic Heritage Month by researching the lives and work of several Hispanic Artists. Students worked in groups of four to create biographical presentations on their chosen artist and individually created self-portraits inspired by the work of their artist. The artists represented a range of countries and artistic styles: Colombian artist Fernando Botero; Mexican artists, Rodolfo Morales, Frida Kahlo, and Diego Rivera; Chilean artist, Roberto Matta; Spanish artists, Pablo Picasso, Joan Miro, and Salvador Dali; and Puerto Rican artists, Francisco Oller, and Jose F. Rios. Students presented their biographies and paintings to the class on October 15 to commemorate the final day of Hispanic Heritage month.

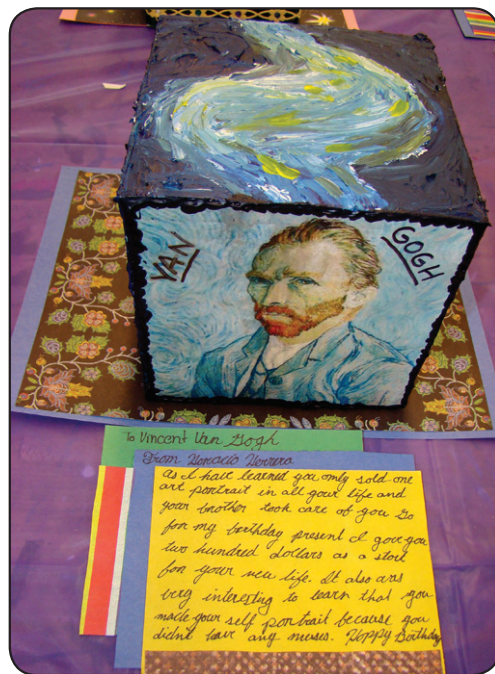
Teacher Reflection

I have been doing this project in my art class for three years. It is one of my favorite projects because there are a variety of components—research, a self-portrait, and an oral presentation—and all students have the opportunity to succeed. I enjoy watching the students researching the lives and artwork of their chosen artist. I love to see the expressions on their faces when they see their first Salvador Dali painting or when they first read the biography of Frida Kahlo. They get so excited to share this new information with any one that will listen. I am also amazed every year at the quality of their self-portraits. They really get to know the style of their artist and do a wonderful job of making successful portraits inspired by their work. The real satisfaction comes at the end of the project. Students present their biographies, portraits, and artist statements with confidence and pride. I am currently looking for a gallery to show the final portraits and artist statements from this semester. I find myself more and more impressed by this project each year.

Artwork on the cover and corresponding Hispanic artist, clockwise from the top, provided by: Sianni Rosenstock & Quinn Butterfield (Rodolfo Morales), Anastasia Ovanessoff (Frida Kahlo), Luis Morales (Rodolfo Morales), & Lexus Jackson (Diego Rivera).

To learn more about this project and others visit the HTH Digital Commons
and Andrea Barrett's digital portfolio at

<http://www.hightechhigh.org/dc/> and <http://staff.hightechhigh.org/~abarrett/>



Artist Happy Un-Birthday Project

Tara Giannini, Art, High Tech High Chula Vista

For this Un-Birthday project, each student spent one week studying an artist whose work has influenced contemporary art. Artists varied by gender, culture, time period, political views, artistic medium and content. Students then paid homage to their artist by creating an Un-Birthday present and accompanying gift box. The gifts were displayed at an Artist Happy Un-Birthday Party on exhibition night, complete with a birthday cake and decorations. The event was a cacophony of color, paint, and imagination that paid tribute both to Judy Chicago's famous "Dinner Party" art piece and to Lewis Carroll's Mad Hatter's Tea Party in *Alice in Wonderland*.

Teacher Reflection

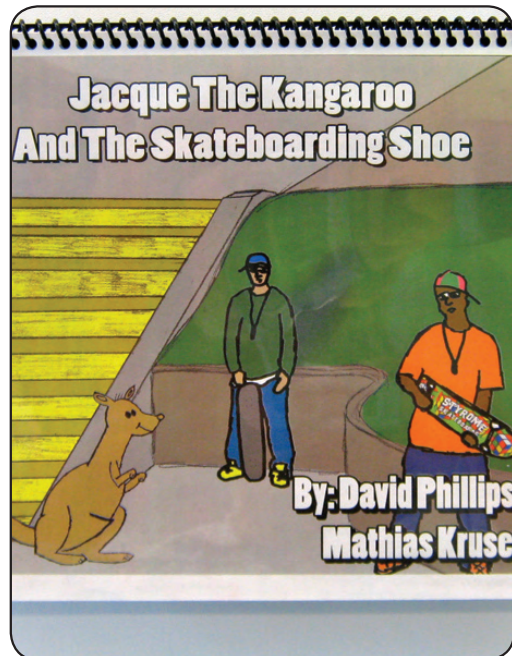
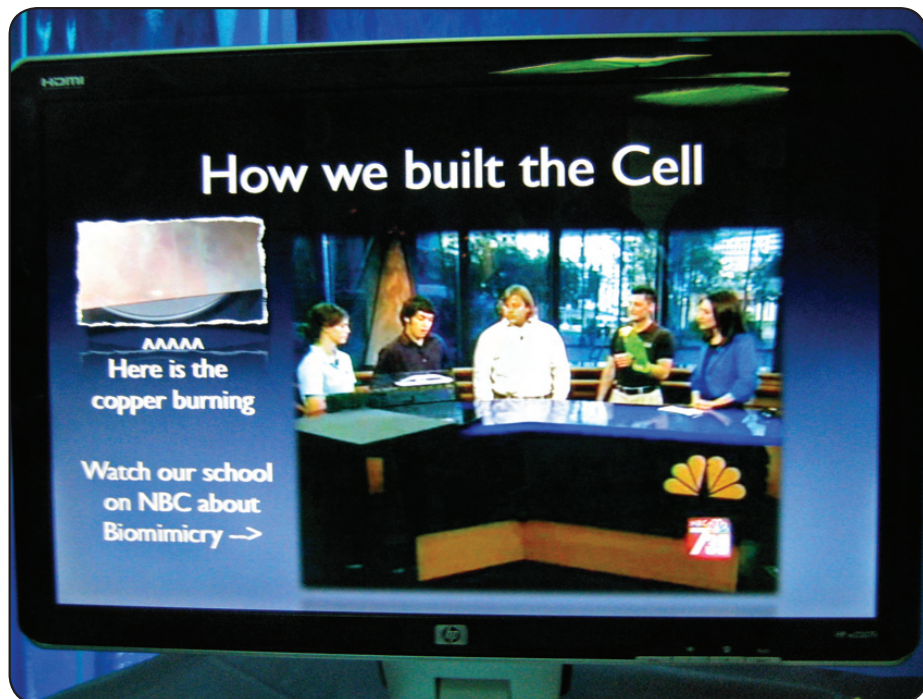
Choosing the gift was perhaps the most important and difficult part of the project for the students, as they were asked to distill what they had learned about their artist into a single object. The students loved the idea of presenting their projects on exhibition night to a public audience. This added another layer of meaning to the work and encouraged even further reflection and refinement of the projects.

Student Reflection

I chose Edgar Degas because I am very fond of his art, and particularly the pastel drawings of ballet dancers. On the top of the box, I placed a cutout of his self-portrait. On the back of the cutout head is his name and a copy of his very first sketch of a ballet dancer. I then painted the sides of the box the color of his skin. On the body of the box I put a leotard and a tutu that I made to fit the box, which represented what he loved to draw and paint: ballerinas. On the four sides around the box, I re-created four of his paintings. Inside the box for the present, I placed something very valuable to me, and something that I knew Edgar Degas would enjoy drawing: my first pair of Pointe shoes. In the end, I learned a lot, not only about Edgar Degas, but also about what "creativity and imagination" looks like when it transforms from an idea to an art form.

—Amanda Snyder, 10th grade

To learn more about this project and others visit the HTH Digital Commons
and Tara Giannini's digital portfolio at
<http://www.hightechhigh.org/dc/> and <http://staff.hthcv.hightechhigh.org/~tgiannini/>



Cultural Solutions In Nature

Matt Leader, Math/Physics, High Tech High North County
Jenny Pieratt, Humanities, High Tech High North County

In this project, students investigated biomimicry—the quest for solutions to human problems by mimicking processes in nature—through a scientific and cultural lens. They researched existing examples of biomimicry, such as scientists learning from spider webs how to create material strong enough for bulletproof vests, and using models of bats’ echolocation in darkness to develop a “smart” cane for the visually impaired. They also researched an indigenous culture and used concepts from biomimicry to design an innovation that addressed a need within that culture. Each student created an interactive display addressing the physics concepts involved in their innovation, as well as a fable that suggested solutions to cultural sustainability issues through the use of their innovation. The fables were shared at exhibition, published in a book, and sold to raise money for people from indigenous regions around the world.

Essential Questions

How can humans overcome problems through the use of innovations in biomimicry?
How can biomimicry enhance the sustainability of indigenous cultures?

Teacher Reflection

This project encouraged students to be innovative thinkers. They collaborated with adult researchers on ideas that could be used in the field of science and educated the public through television appearances and community exhibitions. The project challenged students to think from an interdisciplinary perspective and reminded us, as teachers, about the natural connections between our disciplines. The content we asked our students to master was difficult, and they rose to the occasion, developing innovations they were proud to present to the community.

—Jenny Pieratt

Student Reflection

Now that I look back on the exhibition of our work, I see many positive things that came out of it. We worked on it in both classes and our entire team was able to work side by side to put forth a great effort. I got to talk to and meet new people at the exhibition, while sharing my fable and innovation of a skate shoe that emulates a kangaroo’s jump. I feel proud of the work I accomplished, and the exhibition was a grand success.

—David Phillips, 9th grade

To learn more about this project and others visit the HTH Digital Commons
and Matt Leader’s and Jenny Pieratt’s digital portfolios at

<http://www.hightechhigh.org/dc/>

<http://staff.hthnc.hightechhigh.org/~mleader> and <http://staff.hthnc.hightechhigh.org/~jpieratt>





The Creative Masters (Los Maestros Creativos) Project

Tom Gaines, Spanish, High Tech High North County

In The Creative Masters Project, students select a creative Spanish-speaker from any walk of life. They research the cultural and historical forces that shaped the Master and his/her work. Then they re-create or re-express the work in their own way—creative writing, spoken word, digital presentation, sculpture, etc. A written reflection accompanies the project as well, all in the target language: Español.

Teacher Reflection

The Creative Masters project exceeded my expectations. The students' passion for the work, diversity of products, and heartfelt reflections truly shined. This project reminded me why I teach. When students are given the opportunity to express themselves uniquely, they can fly—and these kids soared.

Student Reflections

John Singer Sargent is a great artist. He gives his work feeling and liveliness. He thought that the dancer was not his best work and the world never saw it until 1985, when it was found 55 years after his death. But the dancer has a certain feel to her. She wasn't meant to be beautiful and her dance wasn't meant to be elegant. Her dress flows with her every move, her arms move separately from her body, she's not smiling nor is she frowning. I chose to re-express "The Spanish Dancer" by re-creating the painting in Prismacolor colored pencils.

-James Zvetina, 9th Grade

This was a creatively complex project. I wanted to choose a sculptor from the very beginning because I had some clay at home that I hadn't managed to use. I had never created a sculpture before, so I thought that it would be a fun new experience. I also created a PowerPoint for my presentation, a poem, and made a collage in PhotoShop.

This was one of my favorite projects so far in Spanish. I liked that I could present what I felt in many forms of art, with people understanding and feeling what I was trying to portray to them. I also felt that this project taught me about the Spanish culture while I still enjoyed doing something that I liked.

—Angelica Orlova, 9th grade

To learn more about this project and others visit the HTH Digital Commons
and Tom Gaines's digital portfolio at

<http://www.hightechhigh.org/dc/> and <http://staff.hthnc.hightechhigh.org/~tgaines/>



Story/Art Project

Jen Peterson, Humanities, High Tech High International

Students analyzed numerous short stories with attention to tone, mood, structure and other literary elements. Each student chose one author whose work they examined closely. They then wrote a short story emulating at least three specific literary elements characteristic of their author. They also created an original art piece inspired by a particular fictional work of that author. Students exhibited their artwork, along with nameplates that explained the connection of their visual to the work of fiction on which it was based. Their stories were professionally published in a student-edited class anthology.

Teacher Reflection

This is one of my favorite projects because it provides students with the opportunity to express themselves creatively and allows for student choice, which I find motivates students to do their best. Past students often tell me that they really enjoyed the project and that they now look at literature with a different perspective. They tell me they notice particular authors' characteristics and recognize "bad" writing. This project teaches them how to be thoughtful critics and good writers, but also how to enjoy literature at a deeper level.

Student Reflections

Doing this project made me realize how different styles of writing are, and that each author has a unique style. I chose to emulate Bryce Courtenay's style of writing in *The Power of One* and this helped me understand why someone would write a dialogue-based story. Like Courtenay, I used a lot of dialogue and inspiring lines, but I added my own touch to it. That's how I learned to make my own writing distinctive and unique.

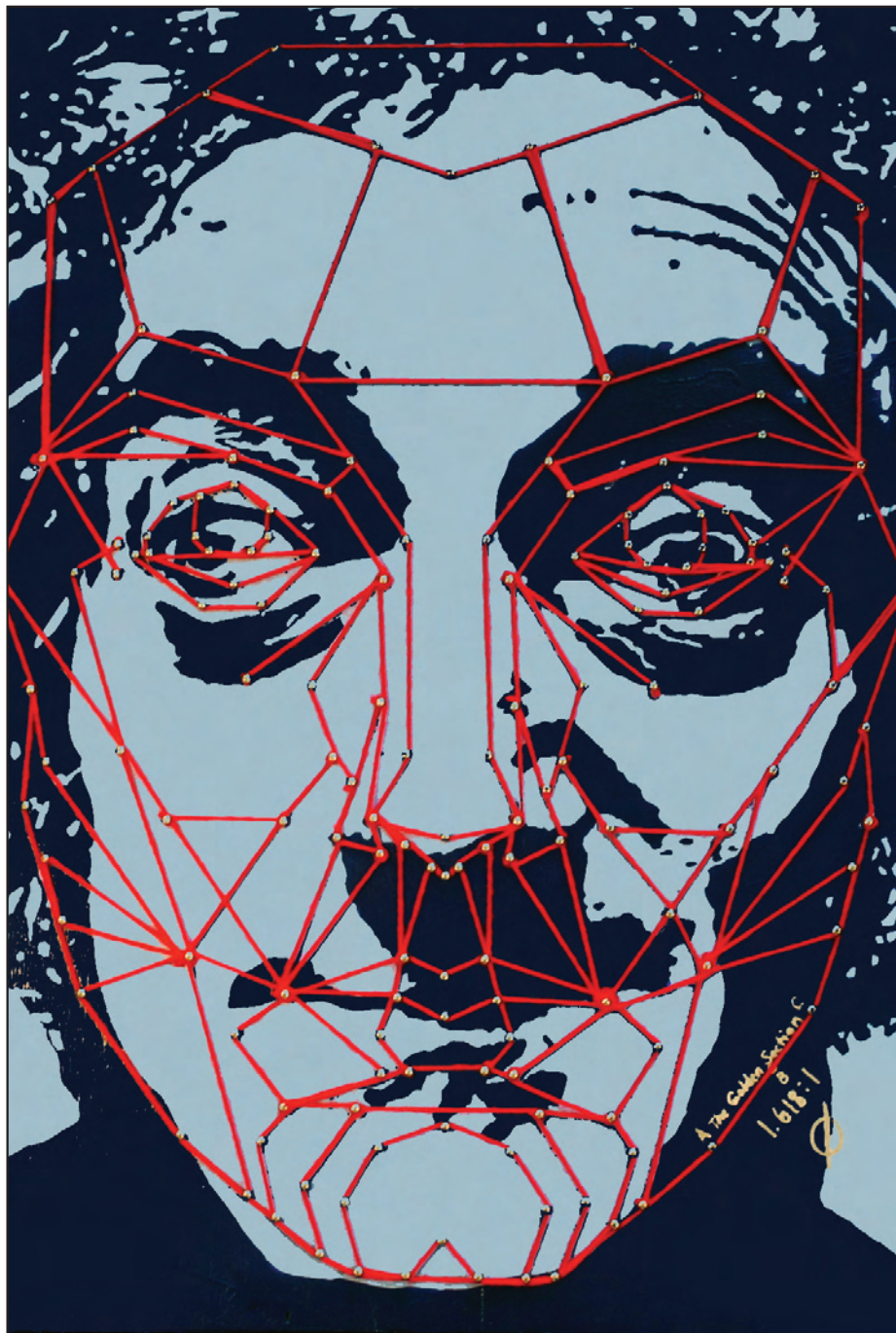
—Faith Bentley, 10th grade

My artwork was inspired by the short story "Who's Irish?" by Gish Jen. In the story, a grandmother from China comes to visit her daughter in America and discovers that some things are done differently in America. I tried to capture the underlining theme of unity despite difference in Jen's story by uniting 130 smaller pictures into an overall picture using a program called AndreaMosaic. Seen from a distance, my piece has the appearance of two hands shaking in agreement and wearing the Chinese and American flags. The multiple smaller pictures represent specific aspects of Chinese or American culture that set the cultures apart from each other and make them each unique.

—Katie Ho, 10th grade

To learn more about this project and others visit the HTH Digital Commons
and Jen Peterson's digital portfolio at
<http://www.hightechhigh.org/dc/> and <http://hthidps.hightechhigh.org/~jpeterson/>





Calculicious

Jeff Robin, Art, High Tech High
Andrew Gloag, Math, High Tech High

Calculicious was a cross-curricular project between art teacher Jeff Robin and math teacher Andrew Gloag. The students designed art pieces that reflected various calculus concepts that they learned in class. Their paintings, along with their critiques of each other's work, were published in a full-color book available at <http://www.blurb.com/bookstore/detail/675796>.

Student Reflection

The Marquardt Decagon Mask is a facial map based on the Golden Ratio [1.618 (phi) to 1]. The ratio has been found to determine human attractiveness based on the placement and proportion of facial characteristics. Initially, the mask alone was the sole element of my acrylic painting design. However, after a meeting with Jeff and some edits, the direct application of the mask to a human face seemed to be a better exercise of the mathematical concept itself. After finding a nice portrait of a profoundly handsome actor named Marty Feldman, I decided to apply the mask to his face in my painting.

Outlining and painting small spaces carefully proved to be difficult but important because those fine details composed parts of Marty's face as a whole. I had to remain very aware of lines and borders to keep the face legible. Next, I created the actual Decagon Mask with red yarn to show both consistencies and inconsistencies.

—Ana Vargas, 12th grade

Student Critiques

Your painting was really different from the majority of peoples' in that you drew a distinct person as opposed to shapes, and you used string to display your math as opposed to painting it on. You might want to explain how you made these decisions. Just out of my own curiosity and to show contrast, you could mention someone whose face does fit the decagon mask.

—Emily Burns, 12th grade

I agree that Marty Feldman is profoundly attractive. I don't think you do him justice...I offer the same advice that you offered me: What did you struggle with? I know the math gave you a hard time, and I think you should explain that in your text. Everything seems effortless, and I think people might like it more if they heard about your struggles.

—Kristen Colley, 12th grade

To learn more about this project and others visit the HTH Digital Commons
and Jeff Robin's digital portfolio at

<http://www.hightechhigh.org/dc/> and <http://staff.hightechhigh.org/~jrobin/>





the {hu}Manifest Project

by Anne Duffy and Paul Lopez



The {hu}Manifest Project

Anne Duffy, Math/Chemistry, High Tech High
Manuel Paul Lopez, Humanities, High Tech High

Students worked individually on an integrated project exploring the essential question, *How does the character of an individual or a society change following a time of conflict?* Inspired by 20th century art and political movements, students explored aspects of their own experiences by writing poetry and developing an original manifesto in the form of a chapbook—a pocket-sized booklet popular from the 16th through the 19th century. In chemistry they used stoichiometric calculations to make the raw materials for various paints, which they then used to create paintings that became the covers for their manifestos.

Teacher Reflections

Students learned to apply stoichiometric calculations, but the artistic component was equally important for kids to feel comfortable expressing themselves. Since mathematics and science are collective as well as individual endeavors, students worked on problems together, presenting multiple solutions and justifying individual solutions. They learned to make mistakes in front of their peers, yet also respectfully point out mistakes to others.

—Anne Duffy

It was memorable to watch students inscribe their chapbooks to family and friends after the public reading. They sat silently for minutes before putting pen to paper, thinking of the perfect words to write, showing they had taken ownership of their work. The revision process was critical to the project. We encouraged students to settle for nothing less than their best work.

—Manuel Paul Lopez

Student Reflection

The project was an eye-opening experience and helped me discover new things about myself. Before, I was not one who would generally write poems—now I do. I learned that poetry is a helpful way to express oneself. I had a difficult year, and the challenges and obstacles I have faced went beyond what I should wear and how I should look. Family issues made me re-evaluate my situation. This challenge is one I no longer have to face alone. Through writing poetry I learned to open myself up to others. Reading our peers' poems, and how they expressed their truths, brought us closer as a team. I am proud of my work and of my peers.

—Alyee Camacho, 10th grade

To learn more about this project and others visit the HTH Digital Commons and Anne Duffy's and Paul Lopez's digital portfolios at

<http://www.hightechhigh.org/dc/>

<http://staff.hightechhigh.org/~aduffy> and <http://staff.hightechhigh.org/~plopez>



Urban Ecology

Nicole Costa, Math/Science, High Tech Middle
Bobby Shaddox, Humanities, High Tech Middle

What is urban ecology? How can humans create sustainable and efficient modern urban ecosystems? Students explored how humans interact with nature in urban ecosystems, applying concepts of sustainability and efficiency to design improved modern cities. They researched green building techniques, transportation options and alternative energies. In both their science and Humanities classes, they wrote articles and created original illustrations to explain their chosen topics. After a series of peer critiques, the articles were published in an Urban Ecology magazine that we sold at our school's annual Exhibition Night. We sold over 70 issues that evening, and orders are still coming in.

Teacher Reflections

What struck me from the outset was that the subject matter was very adult. Initially it was difficult to get 6th graders to care about "green" design. Once we got underway, the best part was seeing the students getting excited, creating their artwork and laboring to make their articles perfect for the magazine. Towards the end, our classroom literally turned into a magazine workroom. Bobby and I were editing, and the students were scurrying around scanning artwork, helping each other edit, working in Adobe Indesign, creating models of their topics and perfecting their layouts. It was an incredible vision of controlled chaos.

—Nicole Costa

I was amazed at how 6th graders grasped high-level concepts about ecologically sustainable building technologies. Not only did they become experts on their topics, but they convincingly debated the pros and cons with adult guests on Exhibition Night when we premiered the magazine. The repeated comment that I heard from adults was, "I can't believe this was created by kids!" I think the authentic, purposeful nature of the project helped students step up to the challenge of learning about advanced topics such as hydrogen fuel cells and solar thermal technology. My favorite part was teaching the students about page layout and design for the magazine, where I could bring my skills as a graphic designer into the classroom. We used real-world models (a collection of science magazines) to help our students generate expectations and high standards for their graphics, illustrations and writing. Multiple peer critiques helped us create a polished product and facilitated student-centered learning throughout the project.

—Bobby Shaddox

To learn more about this project and others visit the HTH Digital Commons and Bobby Shaddox's and Nicole Costa's digital portfolios at
<http://www.hightechhigh.org/dc/>
<http://staff.hightechhigh.org/~ncosta> and <http://staff.hightechhigh.org/~bshaddox>





The Graphic Novel Project

Patrick Yurick, Multimedia, High Tech High Chula Vista

The HTH Graphic Novel Project, based at High Tech High Chula Vista, aims to instruct high school students in professional standards of graphic novel/comic book design and execution while simultaneously researching local causes and topics, telling their stories, and using comic sales to benefit the selected cause.

The project is an after school program and participation is completely reliant on its volunteer members. Since the inception of the HTH Graphic Novel Project, 19 students have worked together to create a completed comic book entitled “La Sombra De America” (The Shadow of America) that showcased student research on the escalating violence in Tijuana, Mexico. The project is continuing in the 2009-2010 school year with a new service learning topic centered on teenage dropout rates in California.

Teacher Reflection

It has been my pleasure to discover a group of talented and like-minded comic enthusiasts who were desperately searching for a venue to express themselves. Being a part of the HTH Graphic Novel Project has influenced every part of my teaching and has heightened my senses as an instructor. There are no grades in the project, so students are driven solely by self-motivation and discovery. To inspire student ownership and self-motivation, I have had to develop clear and attainable objectives, design work and challenges that could be completely owned by the students, and force myself to trust the creative instincts of students even when I did not fully understand them. There is no question that magic occurs in this project, but there is a constant question of how that magic works and how it can be replicated.

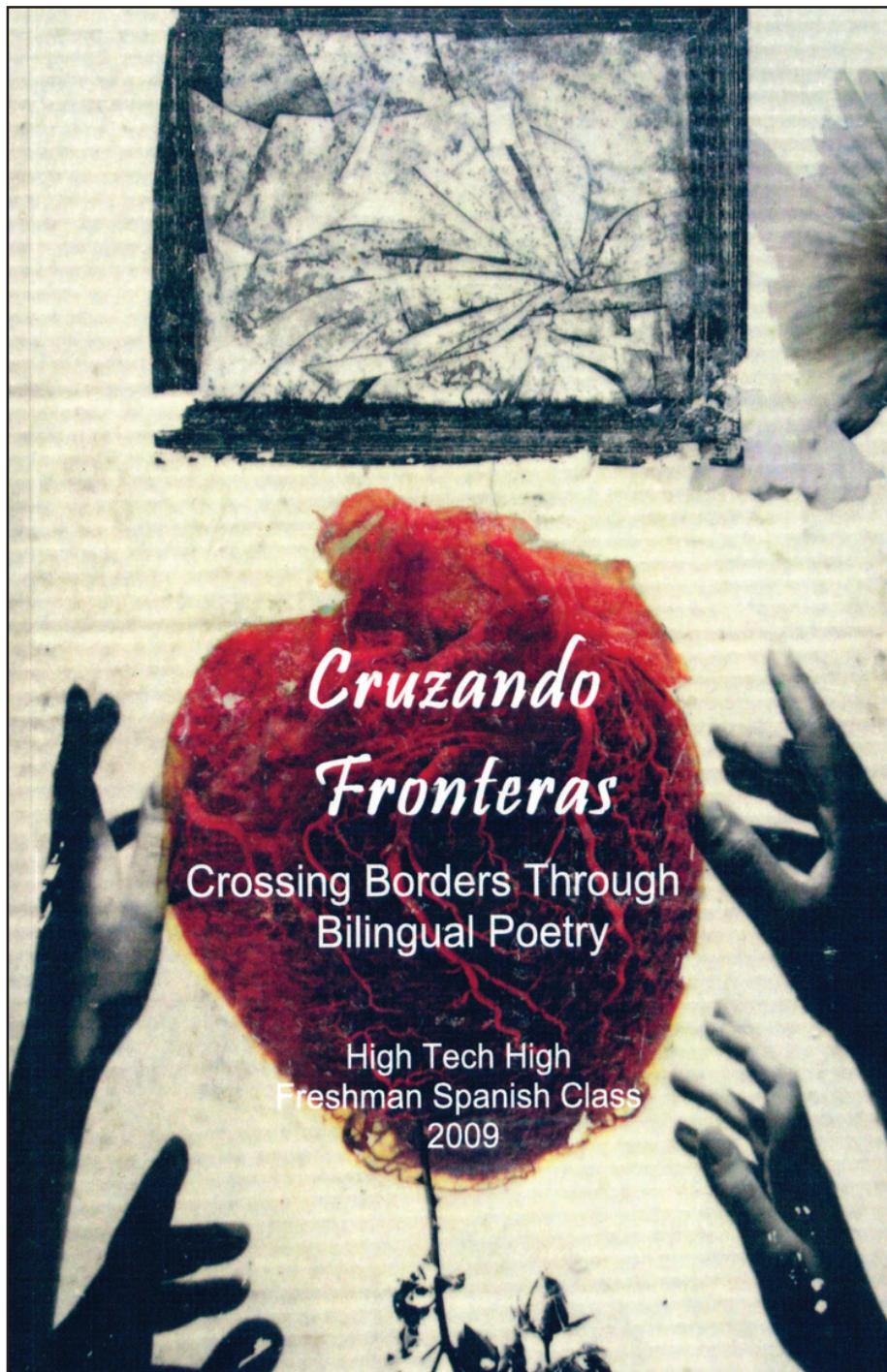
Student Reflection

At the start of the program, our group of about 15 students sat in a circle and decided on which jobs we would each like to pursue. The group needed a leader, and I was considered for the part. Up until that point, I had never been chosen to be a candidate for a leader because I was usually quiet. As the production manager, I assumed a great deal of responsibility over the course of the program, which gave me a chance to break out of my shell and show my true skin.

—Evan Berg, 10th grade

To learn more about this project and others visit the HTH Digital Commons
and Patrick Yurick’s digital portfolio at
<http://www.hightechhigh.org/> and <http://staff.hthcv.hightechhigh.org/~pyurick/>





Bilingual Spoken Word

Jenny White, Spanish, High Tech High



In Spanish class, freshmen explored the theme of “Cruzando fronteras” (crossing borders) through bilingual spoken word poetry and artwork. They worked with spoken word professionals, took part in workshops and performed their work locally. They created anthologies of their work, available at the HTH bookstore at <http://www.hightechhigh.org/books>. Proceeds go to support refugee students.

Estoy Perdido by Alonzo Stamps

Estoy perdido
Y nunca me van a encontrar
I am not physically tied,
But mentally bound,
Y tiemblo cuando pienso en estar
Solo.
Because of my fear of being stoned,
Con piedras,
Breaking my weak withered bones,
Releasing the monstruo in me,
Pero siento que el monstruo es mí.
To be or not be,
That monstruo that I call me,
Now I see,
Or do I?

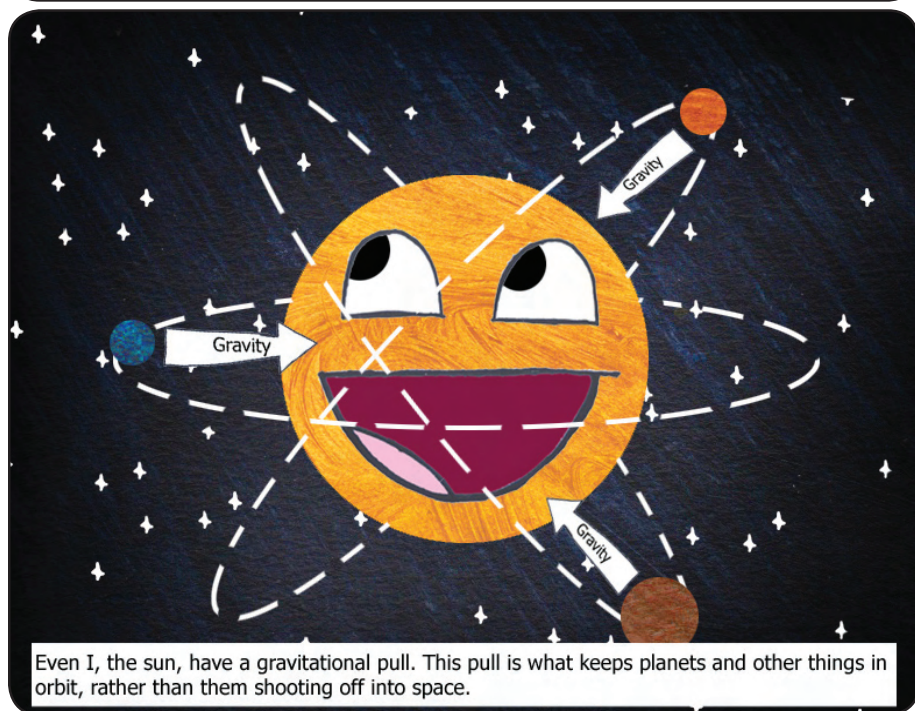
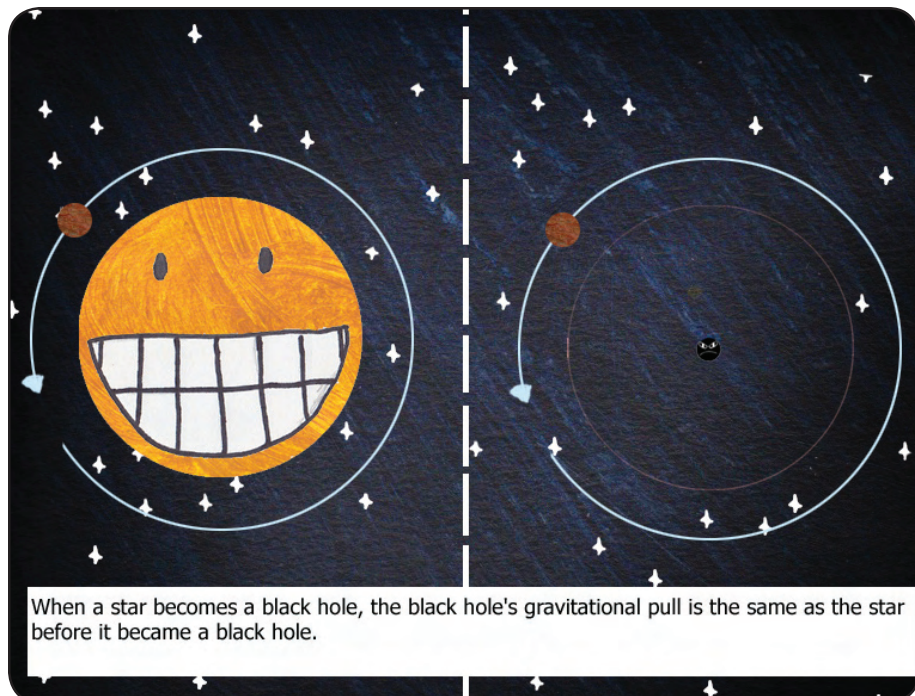
If it has merged with me,
I must split myself,
This way I can gain wealth,
No dinero,
But self,

Cause I believe in self wealth,
Creciendo
Knowing,
Because without self
Tú estás perdido,
And never to be found,
And mentally bound,
Como yo.

Until I find me,
And then I will fly farther
than your eye can see,
Cause when I find me,
Yo sere, Unstoppable,
Cause I will rule,
Me,
Nadie puede o me va a juzgar de mí,
But if they do,
It won't matter cause,
I will have myself together,
Y en fin,
WHAT ELSE MATTERS?

To learn more about this project and others visit www.hightechhigh.org
and Jenny White's digital portfolio at <http://staff.hightechhigh.org/~jwhite>





Children's Astronomy Book Project

Aaron Commerson, Math/Physics, High Tech High
Juli Ruff, Humanities, High Tech High



Students created an illustrated book to teach young children about our universe. In pairs, students chose and researched topics in astronomy. They wrote essays about their topics, learning about outlining, thesis sentences, topic sentences, supporting evidence, and MLA citation in their Humanities class. They then composed stories about their topics for 8-10 year olds, creating storyboards with scripts and hand drawn art, and editing mock books through several rounds of critique. Their stories and artwork, published through blurb.com, are available at the HTH bookstore: <http://www.hightechhigh.org/books>.

Teacher Reflection

The most rewarding aspect was the numerous drafts the students completed for their essay. I was glad they understood that correctness was the goal, and however many drafts it took to achieve that goal was what they had to do. Some students did more than eight drafts. Reading that many essays was a challenge, but by taking this seriously we sent the message that doing *something* was not good enough. It had to be done right.

—Aaron Commerson

Student Reflection

One important thing we got out of this project was realizing how to communicate and collaborate well. The idea of the story was hard to come up with, as well as editing it to ensure the content was correct and understandable. Even making pictures was a challenge, because we had a tough time deciding what to do and how to do it. In the end, we were able to learn some valuable skills that we will need to use in our future at HTH, including communication, time management and, if we create another product for children, the ability to simplify concepts.

—Ethan Chan and Michael Thompson, 9th grade

To learn more about this project and others visit www.hightechhigh.org
and Aaron Commerson's and Juli Ruff's digital portfolios at
<http://staff.hightechhigh.org/~acommerson> & <http://staff.hightechhigh.org/~jruff>





Geometric Mural Project

Lauren Niehaus, Math/Science, High Tech High Chula Vista

Students experienced the beauty of math by creating murals using specific geometric shapes. They prepared a proposal, including a blueprint, a to-scale colored miniature, a business letter describing their work, and an estimated budget. Student groups presented their work to a selection committee at Qualcomm, Inc. Qualcomm then chose the winning mural designs, which the students painted at full scale as a class.

Teacher Reflection

Geometry and art are deeply interconnected disciplines. Repeating simple geometric patterns over and over again can create astonishingly beautiful results, as in the famed mosaics of Moorish Spain. And geometry is a crucial ingredient in more conventional artwork, used to create a sense of perspective or of balance. This project helped students to appreciate both the beauty of mathematics (by incorporating geometric shapes into their designs) and its practical value (by estimating, for example, the amount of paint needed to implement their designs).

Qualcomm provided financial support and gave students a serious professional challenge: presenting their work and ideas in front of a large, unfamiliar audience. Watching student after student speak with clarity and confidence was exhilarating—one of my proudest moments as a teacher.

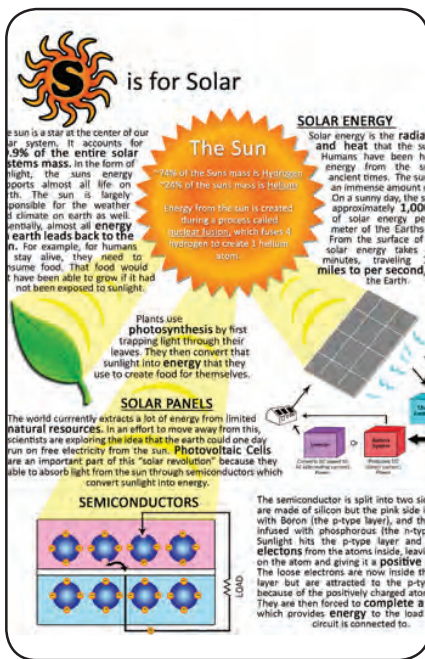
Student Reflection

This project broadened my horizons on geometry and art. It opened my eyes to how two different subjects come together every day. The main thing I learned was leadership. I learned how to communicate with my group members, and how to delegate work evenly. We were able to showcase our creativity and learn about geometry, art, and business through our relationship with Qualcomm.

—Rayna Kim, 10th grade

To learn more about this project and others visit www.hightechhigh.org and Lauren Niehaus's digital portfolio at <http://staff.htcv.hightechhigh.org/~lniehaus>





Physics A to Z

Andrew Gloag, Physics/Math, High Tech High



The decision to make a *Physics A to Z* guide came from merging physics concepts with the style of the London A-Z travel guide. Each student completed research on a physics concept of their choice, with the intention that their best ideas would become book pages. We used David Macaulay's *The Way Things Work* to see how illustrations can help explain science, as well as *The Cartoon Guide to Physics* and the illustrated version of *A Brief History of Time* to gain inspiration for what those visuals might look like. Students created all of the art, and we spent class time refining the visual elements on the pages. The final book is available at the HTH bookstore: <http://www.hightechhigh.org/books>.

Teacher Reflection

This project lasted eight weeks, with each student writing several drafts and creating illustrations along the way. It was crucial that the students read and critiqued each other's work. We regularly posted the work online in a Moodle discussion forum for whole-class critiques, which meant that every student was familiar with all the science. Shuffling the topics students had chosen into 26 different lettered sections was a challenge—for example, we combined several pages into an “E is for Electricity” section. Many of the illustrations were drawn by hand and then reproduced in Photoshop. Some students used Adobe Illustrator or Google SketchUp, while others used watercolor. The finished book gave the students a sense of accomplishment, and the professional finish gave me a sense of pride in what we achieved.

Student Reflection

In this project we were balancing science and writing, teamwork and private study, learning and teaching, collaboration and cooperation. By the end, it was clear that all of our topics were interconnected. This opened our eyes to the true meaning of science: a powerful collaborative force empowering individuals of different talents and strengths to make a difference in society while learning about the world.

—Rachel Roberts, 10th grade

To learn more about this project and others visit www.hightechhigh.org and Andrew Gloag's digital portfolio at <http://staff.hightechhigh.org/~ajgloag>





Philosopher Shrines Salon Night

Peter Jana, English, High Tech High

Jeff Robin, Art, High Tech High

How is social order maintained? Students explored this question in a study of early modern political philosophy where they decoded complex texts and shared ideas in Socratic seminars. Contemporary texts, simulations, skits, and creative writing supplemented core readings from Hobbes, Locke, Rousseau, and Adam Smith. In a salon night exhibition, students displayed philosopher shrines and engaged in philosophical discussions. The shrines housed objects representing key ideas from the philosophers, in front of a backdrop designed and painted in art class. Students explained the objects, performed skits illuminating the concepts, and participated in Socratic seminars where parents also took part.

Teacher Reflection

This was my third philosophical salon, but the first to include philosopher shrines. The shrines—along with the simulations, skits, and seminars—were an essential means of engaging students with the primary sources. The highlight of salon night was when parents got a chance to “roll up their sleeves” and get in the trenches with their kids, and kids demonstrated they could engage in analytical adult discourse.

—Peter Jana

Student Reflection

We held seminars after each text. We would spend days reading and taking notes, asking questions and trying to understand the text. Then all of our hard work was put to use in seminars. Your perspective was tested and what was said either strengthened your belief or sometimes changed your mind completely. The seminars helped connect the readings to each other, and helped tremendously with constructing the shrines. The shrine objects made us think and connect to the readings on a deeper level.

—Pauline Vela, 10th grade

To learn more about this project and others visit www.hightechhigh.org and

Peter Jana's and Jeff Robin's digital portfolios at

<http://staff.hightechhigh.org/~pjana> & <http://staff.hightechhigh.org/~jrobin>



Urban Homesteading Project

Colleen Gavan, Environmental Science, HTHI

Jennifer Mullin, Engineering, HTHI



High Tech High International (HTHI) seniors designed sustainable solutions for urbanites, including aquaponics systems, hydroponics gardens, solar ovens, a grey water system, a portable solar shower, and structures for housing backyard chickens. They exhibited these products and showed community members how to start similar projects in their own homes.

Teacher Reflections

Students applied their ideas about sustainable living and appropriate technologies toward viable solutions. They presented their designs in our courtyard workspace, which became an urban homesteading showcase.

—Jennifer Mullin

Just when I thought I wouldn't be able to squeeze one last drop of motivation from the seniors' reserves, they exceeded my expectations with an exhibition that was engaging for the public and themselves. They knew their stuff!

—Colleen Gavan

Student Reflections

The best part was the exhibition, when we had our clay oven cooking delicious homemade pizzas. It was fun to see people's faces when we told them how we made the oven, but even more important was that we had made something useful that people could create in their own backyards.

—Allison Ferrini, 12th grade

It was amazing to see how Tilapia, with their unique digestive tracts, can filter water and supply nutrition for plants growing in a system. At the exhibition I presented not only to “ordinary” people but also to an aquaponics professional. If a high school student like me can create change, then societies can emulate the same idea to decrease pollutants.

—Bryan Kelley, 12th grade

To learn more about this project and others, visit www.hightechhigh.org and Colleen Gavan's digital portfolio at <http://blogs.hightechhigh.org/cgavan>





Illuminated Journals

Pat Holder, Humanities, High Tech High

Inspired by Ken Kesey's *Jail Journal*, which links writing with original art, students selected a journal entry of their own and created a design to bring it to life. They turned their humanities class into an art studio and constructed a permanent display for the work on the classroom wall.

Teacher Reflection

We open class with journaling almost every day. This exercise broadens the bandwidth between students' thoughts and their more formal writing, and has created a context for our class discussions. However, journals lose their power when students think their writing will just end up on the shelf. I urged my students to look at their journals as a grab bag that could provide the foundation for public expression through art. They responded by presenting insightful political perspectives, efforts at understanding their sexuality, unease with newfound class-consciousness, attempts at making sense of death, and other issues central to the humanities. In the end, the real benefit for me was that I was reminded of the need to hear what really matters to my students and incorporate their voices into my teaching.

Student Reflection

We turned our writing into an art piece that involved us putting ourselves in vulnerable positions. For my piece to be honest, I had to put myself in a state of mind where I couldn't care what people thought of me. When you hide yourself from people because you're scared to tell them about the real you, you're hiding a person that can change the opinion of other people. I wrote my piece to let everyone know that I ain't ashamed of being who I am. I didn't do this project for the grade. I did it so people can get to know the real me. If there was a grade for letting yourself be vulnerable I should get an A grade. Don't grade me on my work for how powerful it is, because I just want to be rewarded with people accepting me.

—11th grader

To learn more about this project and others visit www.hightechhigh.org and Pat Holder's digital portfolio at <http://staff.hightechhigh.org/~pholder>



The Hidden Garden

Rachel Nichols, Humanities / John O'Reilly, Environmental Science
Joshua Krause, Art / Margaret Noble, Multimedia
David Stahnke, Math / 12th Grade Students

In a hidden garden revived from the 1920s, seniors from High Tech High Media Arts installed art and media among the flowers and fruits they had cultivated that fall. The projects spanned five disciplines and culminated in an exhibition celebrating the interconnectedness of nature.

Shine (Art & Humanities)

Inspired by the Japanese Shoji tradition, students wrote Haiku poems and silk screened them onto hand-built lamps that illuminated the landscape on exhibition night. Visit <http://staff.hthma.hightechhigh.org/~jkrause> & <http://staff.hthma.hightechhigh.org/~rnichols>

The Experience of Environment (Environmental Science & Multimedia)

Science and digital art came together in sound, video and interactive installations that examined the social, economic and physical complexities of our environment. Visit <http://staff.hthma.hightechhigh.org/~mnoble>

Fractal Projections (Art, Mathematics & Multimedia)

Through mathematical analysis and computer graphic design, students produced fractal art slides that were cast onto the interior garden walls. Visit <http://staff.hthma.hightechhigh.org/~dstahnke>

The Hidden Garden (Environmental Science)

Creating and nurturing a community garden, students explored environmental science themes like biodiversity, composting/waste reduction, nutrient cycling, and sustainability. Visit <http://staff.hthma.hightechhigh.org/~joreilly>

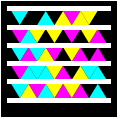
Teacher Reflection

Students were asked to produce digital media projects that were both scientifically rigorous and artistically interesting. After several tiers of brainstorming, pre-production and individual project advising, students and teachers alike were beaming over their productions.

—Margaret Noble

DNA Barcoding Invasive Species

Jay Vavra, Biotechnology, High Tech High



DNA BARCODING INVASIVE SPECIES

Styela plicata
Colonial Tunicate Phylum: Chordata

Scientist: Zach Rosenblatt, San Diego Bay
Sample ID: USA
Objective: To identify potential invasive species of the San Diego Bay
Native Range: Japan
Source: Cruise Street Pier, San Diego Bay
DNA % Match: 100% to *Styela plicata*
Verified by: Gretchen Lambert
BLAST date: November 2009

Symplegma reptans
Colonial Tunicate Phylum: Chordata

Scientist: Zach Rosenblatt, San Diego Bay
Sample ID: USA
Objective: To identify potential invasive species of the San Diego Bay
Native Range: Japan
Source: Cruise Street Pier, San Diego Bay
DNA % Match: 100% to *Symplegma reptans*
Verified by: Gretchen Lambert
BLAST date: November 2009

High Tech High
San Diego Bay Study

This study is a component of the HTH San Diego Bay Study, now in its eighth year. Aware of our previous publications and DNA barcoding research, biologists from the Southwest Division of the U.S. Navy asked us to do a pilot study for a large-scale ecological survey of the bay. The project focused on the influx of non-native species that has created a shift in the regional ecology, resulting in a number of current and potential ecological and economic problems.

We began with a focus on benthic marine invertebrates. Student teams took on taxonomic groups, striving to identify all species within their taxa (e. g., Molluscs, Arthropods, Cnidaria). They collected samples from the bay for DNA barcoding in the HTH biotech lab, identifying a variety of organisms and invasive species. Their findings will be shared with the Invasive Species Management Plan.

Through such surveys students and collaborating scientists could prevent and slow the spread of invasive species through early detection, rapid response, and eradication, ultimately reducing the effects of bioinvasions on human health, the economy, and the oceans.

Student Reflection

We learned biotechnology skills and gained an understanding of how these applications could serve the community. We generated over 100 DNA barcodes and discovered eight non-native and invasive species. We presented these results to the annual meeting of the Southern California Society of Environmental Toxicology and Chemistry, where we showcased the phyla we had discovered and the threat that invasive species pose to the region.

—Kathleen Estrella, 12th grade

Acknowledgements

The project exemplifies community-based conservation and Jane Goodall's Roots & Shoots program. It was supported by the U.S. Navy Southwest, Life Technologies, the Regional Occupational Program, and the Port of San Diego. DNA sequencing was conducted by the Aquatic Ecology Division of USGS. Thanks to our partners!

Visit Jay Vavra's portfolio at <http://hthbiotech.sdccte.org>





Wall of Resistance Project

John Bosselman, Humanities, High Tech High Chula Vista

Jenny Morris, Biology, High Tech High Chula Vista

In 1961 the Soviet Union constructed a wall in Berlin that symbolized the cold war divisions that brought the world the closest it has ever been to annihilation. We asked our students to create their own wall, focusing on the conflicts of the 20th and 21st century and a specific human body system. Each panel of this Wall of Resistance offers student perspectives regarding the effects of the war on society, the human body, or even the individual human cell.

Teachers' Reflection

It was rewarding to see the students engaged in their research and the astounding creativity that emerged in their art. The essential questions driving each art piece were generated by the students, allowing for a diverse set of reflections on particular times and body systems. No two pieces were alike; each conveyed a different message and tone. In the end the students created characters related to their art pieces and portrayed these characters on the night of exhibition. The room was vibrant not just from the images and colors on the walls, but from the students acting and engaging the public on their thoughts of war.

Student Reflection

Until I actually did the research, I had no idea how much impact war has on people and society. Not only does it affect the soldiers fighting in the war, but their families and friends as well. I studied the circulatory system, which pumps and circulates blood throughout the body. When a soldier, for example, is shot it can create something called cavitation, where the bullet creates a cavity in the skin and can potentially leave room for infection from bacteria. Soldiers and civilians are being shot right now in the war in Iraq, and it is mind-boggling that this is the norm over there, yet the sound of a word such as "cavitation" brings chills to my body. This project re-affirmed my beliefs about war and how unnecessary and ineffective it is.

—Maddie DeVault, 11th grade

To learn more about this project and others visit www.hightechhigh.org and Jenny Morris and John Bosselman's digital portfolios at <http://dp.hightechhigh.org/~jmorris> and <http://dp.hightechhigh.org/~jbosselman>





Inner Nature Mask Project

Inspired by Joseph Campbell
Lacey Segal, English, High Tech High

While much of the Western academic tradition focuses upon the external world, we shifted the paradigm and became “inner astronauts” in order to understand how our perceptual lenses influence that which we study. Integrating concepts from psychology, mythology, sociology and Eastern spirituality, we created masks as tangible representations of our lives, hopes and dreams.

—Students Michael Lung, Carter Muenchau, Emlyn Thompson

Student Artist Statement Excerpts

My idea was to show my life at school, and how I put on a white mask, but also that I’m breaking through it. This psychological repression will not last. Under the mask is myself which is black. It represents black stereotypical things I like to do, but can’t talk about at school. In creating this mask I realized I don’t want to hide myself. It’s a rude awakening.

—Iran Daresbourg

Women have been socially constructed to think being emotional is a bad thing. Living in this society, I too hide my true emotions. My mask portrays a person who has used smiles to cover up frowns, laughter to cover up tears, and jokes to cover up harsh words.

—Jewel Powe

My mask is made of plaster strips, four layers of Plaster of Paris, and two coats of Modge Podge. I am truly sensitive. Society ostracizes men who show the slightest bit of emotion, and so, over the years I have developed a hardened shell.

—Chris Connell

Teacher Reflection

Every action begins with a thought, and every thought rides upon a sensation. What if young people learned how to release negative thought patterns before they devolved into destructive behavior? The process begins with an honest acknowledgment of their inner landscape.

To learn more about this and other projects visit www.hightechhigh.org





Ancient Sailing and Seafarers

Aaron Commerson, Math/Physics, High Tech High
Juli Ruff, Humanities, High Tech High

This project looks at how and why seafaring peoples ventured out to the deep blue, whether for trade, adventure, or conquest. Students look at how environments and situations influenced technological advances, navigation methods and more. To experience firsthand the difficulties facing ancient seafarers, the students spend days learning to sail and paddle an outrigger canoe. They examine the technology and physics of sailing while building their own sail cars that can move upwind. They consider how different societies solved problems common to water travel: stability, buoyancy, movement, and direction.

Project deliverables included the sail car, scale maps requiring trigonometry, and demonstrations explaining buoyancy, balance, and propulsion. Students exhibited these at our spring exhibition, where they also performed original plays.

Teacher Reflection

Students create their maps on separate quadrants of wood, which are then assembled. No one is allowed to touch another student's piece of the map. This rule sets a high standard, since individual mistakes in the math, plotting, or painting become obvious when the boards are assembled. Students help each other to do the work correctly, because all four pieces are necessary to exhibit their maps.

Student Reflection

Many components came together in a visual presentation of the journeys of ancient seafarers. Everyone learned the fundamentals of cartography, the importance of meticulous calculation, and trigonometric functions behind every scaled map. We had to work efficiently in teams with people we had never talked to before, creating a professional piece for display. Making a map from scratch was a magnificent way to learn about real world math connections and the seafarers that traveled the ancient world.

—Christiane Pham, 9th grade

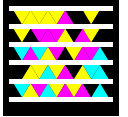
To learn more about this project and others visit www.hightechhigh.org and Juli Ruff's digital portfolio at <http://dp.hightechhigh.org/~jruff>





Conceptual Art Project

Amy Callahan, Math, High Tech High



When an artist uses a conceptual form of art, it means that all of the planning and decisions are made beforehand and the execution is a perfunctory affair. The idea becomes a machine that makes the art.

—Sol LeWitt, conceptual artist

Each student designed a unique art piece using a set of mathematical concepts. Students then followed their own directions to create their piece on a canvas. The class then chose 11 of these pieces to enlarge on the wall, demonstrating that in conceptual art, the original artist need not be the one to execute the piece. By following their classmates' instructions and images, the students were able to realize perfectly their classmates' concepts.

Teacher Reflection

I had three main goals for my students: to strengthen their ability to explain their mathematical thinking, to practice math concepts they had learned so far, and to gain exposure to a new art form. While creating a design was somewhat challenging, students struggled most with composing clear directions for their designs. It took many drafts to make directions that were clear, concise and correct. This was a great exercise in proof: how could they know that their directions would produce exactly their design if followed by someone else? It was a nice surprise just how rigorous this component of the project became.

Student Reflection

My partner and I created a piece called "Tree of Lines," using simple lines and angles to create a tree. The concept was simple, but if someone else were to re-create our piece it might be harder than it looks. I learned that math can be explained through many different forms and concepts. Through art it was more exciting, yet still challenging. Having someone else re-create our art on a wall instead of seeing it on a small canvas definitely made us very proud of our work.

—Yleana Cueva, 11th grade

To learn more, visit www.hightechhigh.org and Amy Callahan's digital portfolio at <https://sites.google.com/a/hightechhigh.org/amycallahan/>



ECONOMICS ILLUSTRATED

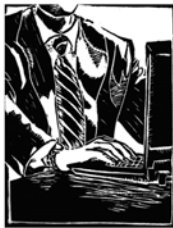


**A HIGH TECH HIGH PROJECT
BY THE TENTH GRADE STUDENTS OF
DAN WISE AND JEFF ROBIN**

Greed Advances Technology?

Camille Gomez

*The invisible hand
does not apply to
all matters in soci-
ety, but in the case
of incentives for
producers and con-
sumers, it works
magnificently*



The invisible hand is the theory that shows greed in society as a positive thing. However, if it worked in all situations, society would never be harmonious and unbalanced that it is now. The invisible hand does not apply to all matters in society, but in the case of incentives for producers and consumers, it works magnificently. Companies will continuously make a profit by updating features on laptops that consumers want, and this benefits the buyers as these new features make their work easier and their lives more enjoyable.

People rely on laptops and the internet for various things: renting movies, ordering off the web, keeping in touch, writing papers, storing information etc. Huge companies, offices and business men require their use along with average individuals; the laptop has become a widely used product. It has been shown that producers will take a commonly used product and make it better in the interest of self gain, which also benefits all who use the product.

A specific example of the constant development of laptops is the pc Notebook. The pc Notebook was first developed in the 1970's, although it took many different versions to make it cheaper, smaller, and more efficient. The first pc Notebook of 1972 was extremely heavy and chunky, had limited features, and was expensive. Still, its development was an incredible technological breakthrough for its time. It became an example for future designs, and with every try there were more efficient versions. Now, the pc Notebook is barely five pounds, can easily be slipped into a bag, has high speed internet almost anywhere, and has a battery life of more than two hours.

Laptops are relatively durable and can last for years, so the only way that companies can continue to make money off of them is by coming out with ones that are better than the latest version. In the thought of saving money, companies and designers focus on the main aspects of the laptop that would appeal most to consumers. For example, when talking over the web with video chat became the latest trend among computer users, companies worked on designing high speed, high definition web cams.

It can be argued that society advances with selfish acts. As with the pc Notebook and other technological advances, most incentives have to do with material, financial, or reputational gain. It's possible that a more efficient device will replace the laptop, such as the iPad. The invisible hand would be guiding designers and inventors to make a more efficient product with the intention of making a profit. This would benefit all who buy it. The invisible hand theory does not apply to all situations but properly explains the functions and incentives of manufacturers, businesses, and companies.

Why Buying American Doesn't Work

Kai Wells

*Buying American-
made products
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ing more jobs. But,
in the long-term, it
will damage our
economy badly*



Dear Americans: In recent years, and especially since the recession, this has been the mantra of "patriots" across the nation. The recent jobs bill that went through Congress may even have subsidies to encourage it. But what effect would buying products made in the United States really have? Would it create jobs for Americans? Would it save the failing auto industry? Or would it ultimately hurt our economy? According to the Theory of Comparative Advantage, the latter could be true. Rather than only buying merchandise from the US, we should reduce our workforce towards industries in which we have an advantage and trade for products abroad. This is the only way that our global economy can flourish in the long run.

Why does buying American sound so attractive? The most common and convincing argument is that it will create more jobs for Americans. An estimated \$4 billion loss jobs were lost between the beginning of 2008 and the end of 2009. It stands to reason that if we bought more domestic products, our economy would grow and we could create jobs. Furthermore, if we bought more of our own goods, we could save failing sectors such as automobile manufacturing. The industry employs hundreds of thousands of people, many of whom have become highly specialized workers. This is an enormous investment in human capital that would simply be wasted if they were forced to learn new skills.

Finally, there is one more reason. By 2009, we imported \$1.475 billion worth of goods while only exporting \$955 billion worth. In effect, we shipped almost half a trillion dollars from our economy and distributed it around the world. If we could import fewer items and produce them locally instead, we could reduce the amount of capital that is sent out of the country and hopefully improve our nation. It seems like an absolute certainty that we should only buy things from other Americans. That is a reality?

Economics tells a very different story. While it is imperative that we create more jobs for Americans, this is only a temporary bandage over the much larger wound in the economy. According to the Theory of Comparative Advantage, self-sufficiency is never the most efficient way to prosper. The United States must expand its trade with other countries. In fact, this took place in December of last year: exports from the United States grew by 1% from the month before, probably because the weak dollar made American exports more appealing. However, Americans responded in one simple respect: by spending that wouldn't even more foreign goods. It is still encouraging that exports have risen at all, though. It is a sign that there is still hope.

What about the failing American auto industry? Unsurprisingly, there are no markets in which the United States does not have a comparative advantage. For decades Japan, Germany, and others have been producing cars with more advanced technology and quality than our own. During the same period, Americans developed the Hummer. Additionally, General Motors and Chrysler received billions of dollars from the federal government to try to save the jobs of the people who have employed. That represents a huge investment that the auto manufacturers are unlikely to return in full. This was a monumental waste. We should simply relinquish the auto market to other countries and move on to other manufacturing sectors such as renewable energy production.

If we become too insular, our trading partners may look elsewhere for their equipment and materials. Also, the price of consumer products would drastically increase. They make up almost a third of our expenses and are often manufactured in countries where labor is far more plentiful than in the United States. The cause minimum wage is so relatively high in the United States, the costs associated with making things like clothing, electronics, and toys would skyrocket if they were created here. In turn, the price of these goods would go up and fewer people would be able to afford them—lowering both the economy and the standard of living for millions of Americans.

So what can we do? Buying American-made products would likely help with the immediate recession by creating more jobs. But, in the long term, it will damage our economy badly. The rest of the world needs us to create goods, a solid financial backbone, and we need them to produce the tools and merchandise that we rely so much on. Buying American is only mismanaging our future. Trade is the route to salvation.

\$33 Billion: Deal or No Deal?

Stephanie Fortin

*Most skeptics claim
that it's a short term
solution that doesn't
offer enough of an in-
centive for businesses
to hire more people.
Will \$33 billion put
hiring more people on
the employers' indif-
ference curves?*



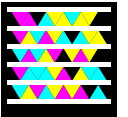
More than 10% of the population unemployed, employers are encouraged to start hiring more people. However, in the current economy, what will make them want to hire more people? This is where the indifference curve comes in. Indifference curves show the options that people would be willing to take: options over which they are indifferent. What makes it worth spending the extra money to employ more people? President Obama seems to think he has the solution.

President Obama recently announced that \$33 billion would be put to work, offering incentives for employers to hire more people. Under the president's proposal, businesses will be given \$5,000 in tax credit for every new person who the business hires in 2010. The maximum a business can receive in credit is \$500,000, to ensure that the majority of the benefit goes to small businesses. President Obama described this as, "an incentive to hire more people and a little bit of extra money to pay higher wages, to expand work hours or invest in their company." An estimated 1 million small businesses would benefit from this proposal.

Much skepticism has been expressed over President Obama's plan to decrease the unemployment rate. Most skeptics claim that it's a short term solution that doesn't offer enough of an incentive for businesses to hire more people. Will \$33 billion put hiring more people on the employers' indifference curves? President Obama's proposal to lower unemployment puts \$33 billion onto business owners' indifference curves. At \$5000 in tax credits per every new employee, some businesses are bound to take the deal, but for how long? The proposal does not offer an eternity of tax credits and benefits. What happens when there is no longer an incentive for employers to continue employing? Does the creation of new jobs move up an indifference curve? And without the incentives for employers, where does the job market stand?

Economics Illustrated

Dan Wise, Humanities, High Tech High
Jeff Robin, Art, High Tech High



Tenth grade students in Humanities and Digital Imaging created a book on economic concepts and their applications. Each student created two pages: the first defining an economic term and providing examples of it, and the second applying the term to a current event in an original article. For each page, the student created a linoleum block print to illustrate the content.

Teacher Reflection

I wanted my students to see the world through the lens of economics. We began with whole-class instruction and shared readings before breaking into literature circles and, eventually, individual research topics. I was pleased with the variety of content that students chose to address: international issues like donations to Haiti and AIDS in Uganda, national concerns like foreclosures and unemployment, and local ones like disputes over local beaches and fear of shark attacks.

—Dan Wise

Student Reflection

Economics is called the Dismal Science, but with *Economics Illustrated* it was anything but. In this project we balanced writing, social science and art. Beforehand we may have had a basic understanding of economics, but nothing really beyond the clichés of the stock market. We learned about dozens of economic principles, ranging from everyday inflation to more cutting-edge regression analyses. We tried to get each article just perfect; my article on the Theory of Comparative Advantage is probably my most heavily edited piece to date. Some people had difficulties with the linoleum block carving, both in what to carve and how to carve it. In the end, though, we managed to create a stunning book that we can be proud of.

—Kai Wells

To learn more, visit www.hightechhigh.org and the authors' digital portfolios at

danwise.googlepages.com and jeffrobin.com

To buy the book visit www.blurb.com and search for *Economics Illustrated*.

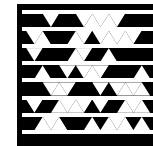
To see coverage of the project on The New York Time's Freakonomics Blog, visit: <http://freakonomics.blogs.nytimes.com/2010/06/24/economics-for-and-by-10th-graders/>





Get Bent

Jeff Robin, Art, High Tech High
Andrew Gloag, Math, High Tech High



The idea for “Get Bent” came from us working together in the past, where we combined art and calculus in a project called “Calculicious—making calculus delicious.” This year, students used three-dimensional geometry, calculus, physics, art, and wood working skills to design, explain, and construct chairs and lamps people would actually want in their homes. Students meticulously documented the process—from inspiration to design to construction—and wrote books about the experience. Our idea was that on exhibition night, people could sit in the chairs and read students’ books by the light of their lamps.

Teachers’ Reflection

Making bent wood furniture seemed cool. It still does. To get started, we looked on the internet to find ways people had steamed and bent solid wood, and we started experimenting. It was fun and exciting and very expensive. We found several barriers to steaming wood in a reasonable way. In particular, we never really found the perfect length of time to leave the wood in the steamer. The wood would often peel apart, split or simply not bend at all. We eventually came up with a good proof model using laminates. Doing the project ourselves first was an important step. We needed to know that the project was possible and how difficult it would be for students to complete. For example we learned that we would need to use laminates and that books made with one web-based publisher looked better than those with another. If we had not tried these steps first, we would have been left flat-footed with 50 students. In the end we were pleased with how everything came together in time for exhibition night.

Student Reflection

Get Bent was a unique project that got me into the senior mood. The other three years I have gone here I have always seen seniors working hard in Jeff’s class, making outstanding works of art and powerful projects. The resources we had in class allowed us to create a professional final product. Our final chair/lamp demonstrated high-level skills that we acquired over the course of the semester.

—Zac Wendroff

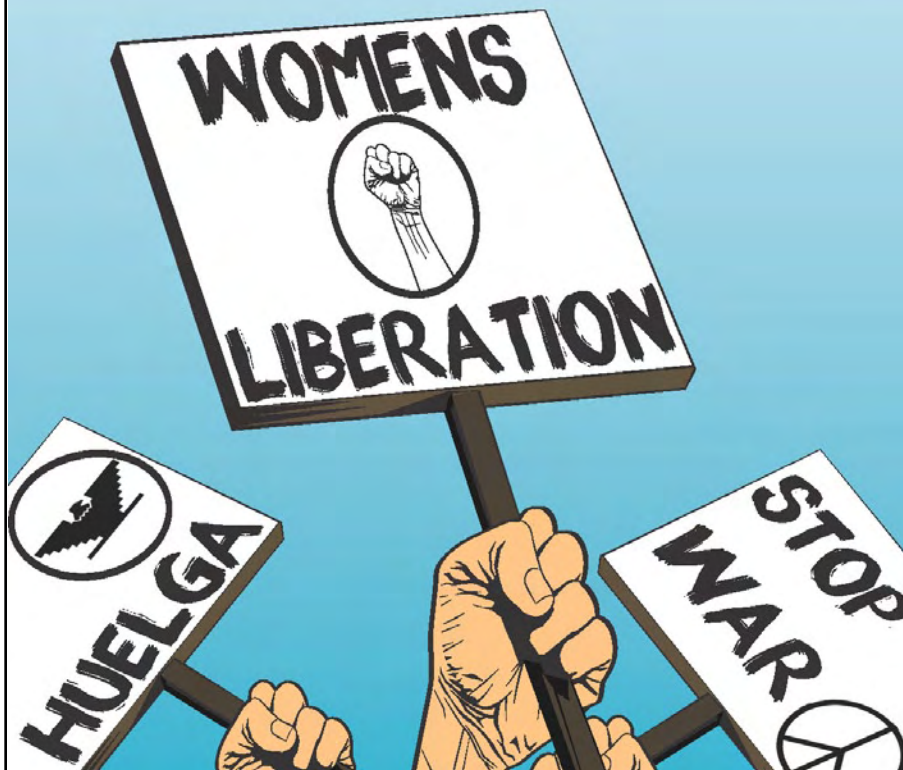
To learn more about this project visit
jeffrobin.com or <http://dp.hightechhigh.org/~ajgloag/>

Viva La Revolución:

The Times They Are A' Changin'

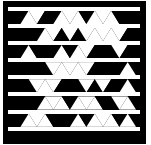
A narrative & theatrical exploration of the impetus, events, and impact of social movements in the United States

December 9, 2010 — 6-8 PM



Viva La Revolución!

Manuel Paul Lopez & Patrick Holder
Humanities, High Tech High



In a semester-long collaboration between two Humanities classes, students researched social movements in U.S. History and worked to create a single production drawing on the talents of the team. The movements ranged from the Black Arts movement of the Civil Rights era, to the Second-Wave Feminism inspired by Betty Friedan, to the work of Cesar Chavez and the United Farmworkers. Each student wrote an original play embodying the ideals/impacts of their chosen movement, as well a personal narrative exploring their own relationship with the issues (e.g., class, race, gender, state-authority) that inspired these moments of social and political engagement. The exhibition was a mixed-media performance of three student-authored plays, with audio recordings of students' personal narratives embedded throughout the performance.

Teachers' Reflection

A great moment, for both Paul and me, was seeing our team choose and produce the plays of students with such diverse voices and experiences. We loved how our kids came together and combined their talents to create a great production.

Student Reflections

I believe the importance behind this project was for us students to really go in depth about a social change that we wouldn't normally study about and learn about how an inspired group of people can change the world we live in.

—Robert Bannasch

[It] was one of those projects that made me think. In order to be successful, you had to become a mini-expert on your topic. It was a creative way to get us to learn about history and why our society is the way it is today.

—Pauline Velas

I learned so much from this project. Not just about the anti-World War I Movement, or the institution I wrote about. I learned about my peers' movements and all of the work that goes into the production of a play. For this project we had many students at our disposal, and something that could have taken months was accomplished in weeks because of the way we were able to work together to get the job done.

—Lindsay Felice

To learn more visit Patrick's and Paul's digital portfolios at
<http://dp.hightechhigh.org/~pholder/> & <http://dp.hightechhigh.org/~plopez/>

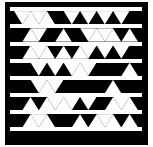
Cultural Encounters

The 10th Grade Family History Project

Dan Wise / Julio Delgado Team
Class of 2013, High Tech High

Cultural Encounters

Julio Delgado, Spanish, High Tech High
Dan Wise, Humanities, High Tech High



Our students explored how historical events such as immigration and war affected their families and the evolution of cultural traditions. Students read historical novels related to their families' unique histories, presented on corresponding historical topics, and wrote creative pieces related to their families' stories, significant moments and traditions. Each piece went through extensive critique and revision so that students could not only learn about each other, but also help each other with their writing. The final pieces were compiled and published as a book, *Cultural Encounters*, available at <http://www.blurb.com/bookstore/detail/1934355>, with each article accompanied by a family photo.

Teacher Reflection

When I first came to the United States from El Salvador in 1989 I had the opportunity to work with the homeless children of immigrants in Los Angeles. I spent a great deal of time listening to those kids' stories. They helped me realize that everyone has an incredible story to tell and that their stories are part of a larger story: the story of people who have come to this country at different times and from different places. Our book continues that story, written with the ink and sweat of our students.

—Julio Delgado

Student Reflections

During this project, we all had the chance to interview our family members and write a story based on one moment from their lives. This project didn't just turn out to be a school project. It became a project for us, a way to discover a part of ourselves and get connected to our families. Nothing says more about your family than to actually write a fascinating story and know that you were somehow part of it!

—Karina Davalos, 10th grade

I found out tons of little anecdotes about family members that I had never had the chance to know. Taking those stories and embellishing them was fun and interesting. I also got to refine my skills on Microsoft Publisher, a program that I realized could be used for a plethora of different jobs.

—Carly Flowers, 10th grade

To learn more visit Julio's and Dan's digital portfolios at
<http://dp.hightechhigh.org/~jdelgado/> & <http://dp.hightechhigh.org/~dwise/>

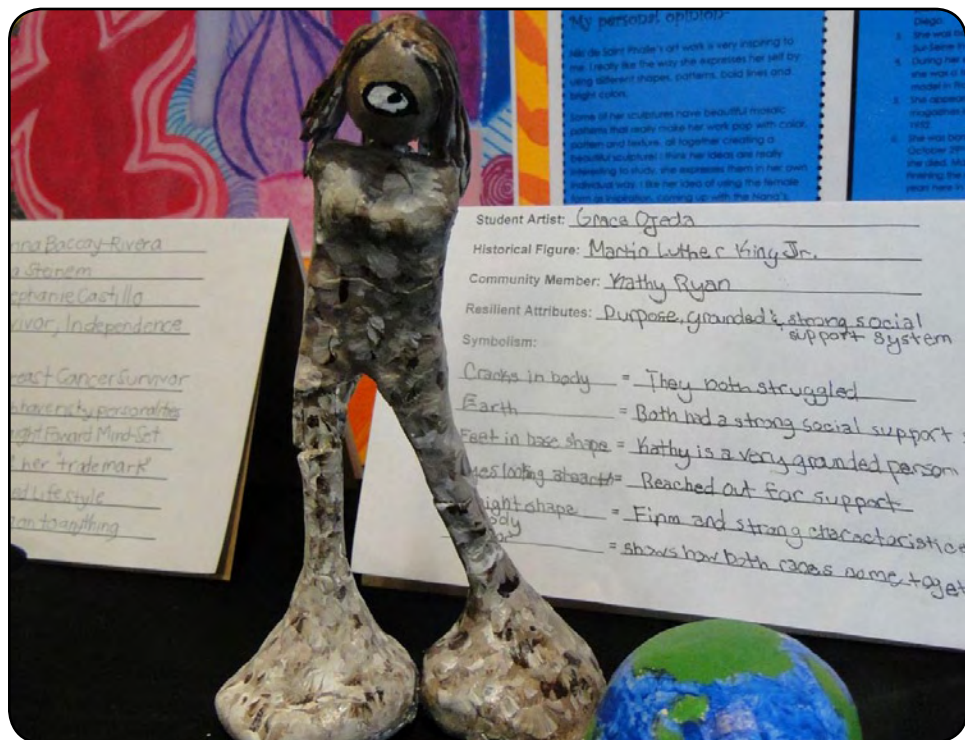
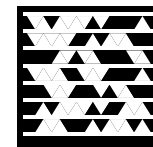


photo by Joseph Hoang

Resilience Café Project

Isla Kerr, Art, High Tech Middle Media Arts
Cady Staff, Humanities, High Tech Middle Media Arts



During the Resilience Café Project, 8th graders learned about resilient heroes from the past and present, and explored together what it means to be resilient. Students identified specific attributes to celebrate and communicate through their work. They connected a resilient historical figure, a resilient community member and their own personal story of resilience through writing and by creating an art piece full of symbolism. They honored their resilient community members by inviting them to a night of celebration through music, spoken word, poetry and artwork.

Teachers' Reflection

Students took the basic concept for the project and made it their own. The elements of choice, and the fact that students were working on this project in two out of their three classes, allowed for creativity and personal connections to emerge. Throughout the project, the energy was high, the creativity was buzzing, and the students were empowered to honor the resilience all around them!

Student Reflections

During this project I learned about the Civil War, *Brown vs. The Board of Education*, The Civil Rights Movement, and the Blues. I also learned that resilience is the ability to endure and be strengthened by the hardships you face. Basically, learning about resilience teaches us to go out of our comfort zone and to know that the struggle will help us become a better person.

—Andrew Sanchez

I loved exhibition because I felt proud of all of my pieces. Everybody liked my art piece and I felt like it represented my community member and historical figure. I was able to have in-depth conversations with other parents about my art.

—Hannah Hoang

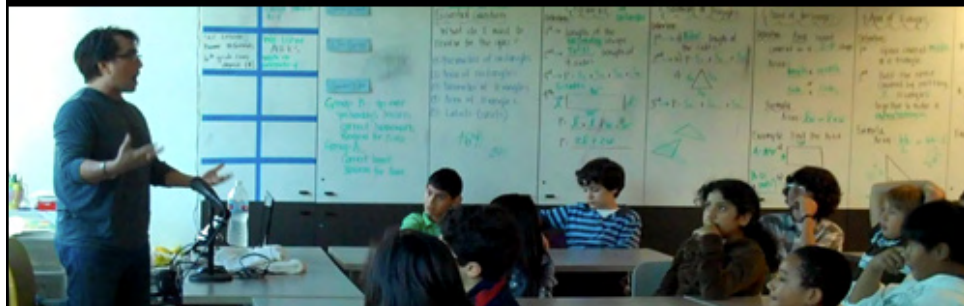
I felt so good about this project! I was in my element considering we could do music. People were blown away by our song and that meant a lot to me. We got so many compliments that night. My grandmother said that she felt honored by our performance and was so proud of me.

—Lizzie Mooney

To learn more visit Isla's and Cady's digital portfolios at
<http://dp.hightechhigh.org/~ikerr/> & <http://dp.hightechhigh.org/~cstaff/>

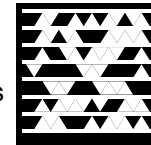


Digital Storytelling @ HTMMA A Multimedia/Humanities 6th Grade Project



Digital Storytelling

Zoë Randall, Multi-Media, High Tech Middle Media Arts



Students created digital stories about a defining moment, a message, or a lesson learned from their own lives or the life of someone they know. Through writing, storyboarding, and multiple cycles of critique, students developed their stories and hopefully discovered something new about themselves and others in the process. They collected images, recorded voice-overs and used digital movie-making software to produce their final films, which they shared on their digital portfolios and presented on the big screen for peers and parents at a Digital Storytelling Exhibition Night.

Teacher Reflection

Digital Storytelling has opened up doors to understanding my students better. I thought it would be all about them, their learning, their experience, but I see now that with storytelling, it's a collective experience. Storytelling is a personal journey and it provides a lens through which to examine how we see ourselves, others, and our world.

The students' stories had an effect on both the viewers and producers. Many perspectives on the same subject can emerge in these personal accounts of defining life moments. We become witness to one interpretation of a very complex shared story. In the end, these stories are gateways into seeing our students, and learning from and about one another. As we share our stories, we built a community where students are heard and where they listen.

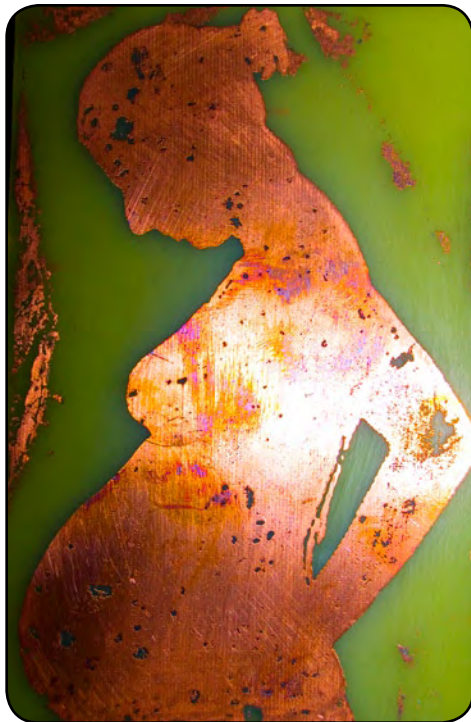
Student Reflection

Over the time we have been studying how to make digital stories, I have learned a lot about myself. The purpose was to really learn who you are and what your milestones or defining moments are. I also learned how to write scripts, use pictures, record my voice, edit, and be a good producer/co-producer. I'm now more comfortable using iMovie and other applications like it. I learned to use the power of digital story telling to get my stories out there. Now I have the ability to show who I am, and express my stories in a whole new way that I never knew existed.

—Rebecca Markowitz, 6th Grade

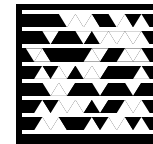
To learn more visit Zoë's digital portfolio at
<http://dp.hightechhigh.org/~zrandall>





Chemistry and Conflict

Peter Jana, Humanities, High Tech High
Daisy Sharrock, Chemistry, High Tech High



The inspiration for this project came from a “thing biography” display at a Los Angeles bookstore, exploring topics ranging from salt to political ideologies, written from various disciplinary perspectives. We asked ourselves, Why not have students create ‘thing biographies’ that integrate chemistry and history, where they study elements and chemical compounds that played a role in historical and contemporary conflicts, and produce a beautiful book?

Working in pairs, students explored connections between a historical and a modern conflict. They explored a variety of topics, from the use of uranium during the Cold War arms race to the exploitation of coltan in the Congo today. They created copper etchings, conducted library research, wrote lengthy history chapters, and developed their own mini-projects related to a contemporary conflict. They also engaged in an extensive critique and editing process and had to satisfy a student-run editorial board before teachers even read their drafts. The book was displayed at exhibition night and is available at: <http://www.blurb.com/bookstore/detail/1841770>

Teachers’ Reflection

Having an early deadline allowed us to produce physical copies of the book in time for exhibition night, and gave us a couple of weeks to conduct oral exams that served as preparation for their exhibition night presentations.

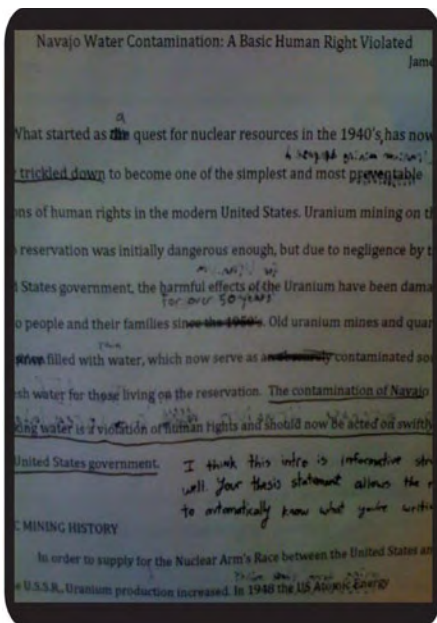
Student Reflection

My favorite part in the process of creating our final product was the editing phase. While some would find the task tedious and annoying, I found it interesting to read about the topics that the other students were exploring, watching the information in each paper grow and grow after every draft.

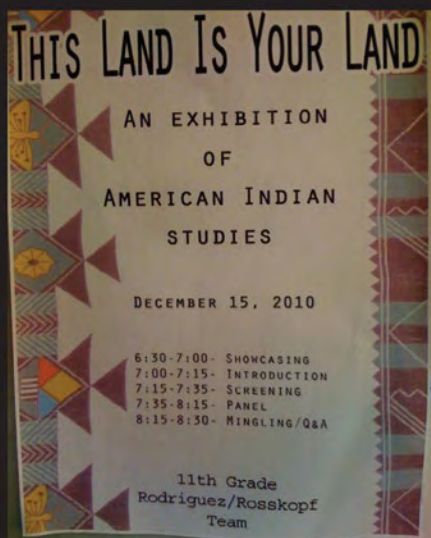
The amount of knowledge required to write an informed, detailed book chapter was immense. Absolute mastery of the content was necessary to meet the gold standard and get your work published. The challenge to draw connections and find lessons from a historical conflict and apply them to solve a modern day conflict was difficult, but it was satisfying to know that your solution was valid and rooted in well-researched facts.

—Wade Bruffey, 10th grade

To learn more visit Peter’s and Daisy’s digital portfolios at
<http://dp.hightechhigh.org/~pjana/> & <http://dp.hightechhigh.org/~dsharrock/>



SOARING EAGLES: THE DOCUMENTARY



Soaring Eagles

Sarah Rodriguez, Humanities, High Tech High Media Arts
Chris Roskopf, Multimedia, High Tech High Media Arts

In this collaboration between the San Diego Unified School District's Indian Education Program, American Indian members of the High Tech High community, and our Humanities and Multimedia classes, students explored the culture, history and current issues facing American Indian communities through literature, guest and teacher lectures, documentaries, and their own independent research. Through interviews and filming for our documentary, we bore witness to the San Diego inter-tribal community's efforts to pass their traditional cultures and identities on to their youth. The documentary won an award at the San Diego Indie fest.

Teacher Reflections

Aware of the tendency of non-Natives to appropriate, skew, or erase the lives and cultures of indigenous people, we challenged ourselves to center the voices and narratives of the Soaring Eagles members, a Native American cultural youth group active in San Diego. One of the highlights of this project was the warm appreciation that we received from many of the Native American people that attended and participated in the exhibition. One community member and HTHMA grandmother wrote "thank you for 'seeing' us, and helping others hear our voices."

—Sarah Rodriguez

To enable 50 students to contribute meaningfully to a single film, we broke students into crews, each with a specific assignment (e.g., an individual to interview, a performance to film, or taping B-roll at a Soaring Eagles meeting). A member from each crew then edited their footage into a master timeline, which the class watched and critiqued, until it was revised to its final finished state.

—Chris Roskopf

Students' Reflection

There's an enormous difference between learning from books, documentaries, and the internet, and actually going in and being able to ask questions to a genuine Native-American. At Soaring Eagles, we met and interviewed many diverse Natives, all with their unique stories.

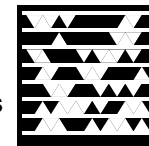
—Ahsaki Hawkins and Taylor Cook, 11th grade

To learn more visit Sarah's and Chris' digital portfolios at
<http://dp.hightechhigh.org/~srodriquez/> & <http://dp.hightechhigh.org/~crosskopf/>



Life: The Book

Brandon Davidson, Biology, High Tech High Media Arts
Randy Scherer, Humanities, High Tech High Media Arts



In this project a humanities class and a biology class collaborated to explore the growing role of genetic engineering in American life. From conception through birth, childhood through adulthood, students examined the social, economic, political and historical implications genetic engineering has had and may have on American life. They also explored how these ideas connected to broader issues relating to healthcare in American society.

In Biology, students studied genetics, DNA, and biotechnology, using the same methods to produce and isolate proteins as those used by biotechnology companies to develop protein-based biopharmaceutical drugs. In Humanities, each student wrote an article about the impact of genetic science on a specific stage of human life. Articles ranged from the science and economics of cord-blood banking to personally relevant cases of genetically inherited diseases. In their exhibition of learning, students demonstrated the genetic engineering techniques used to create biopharmaceutical drugs, discussed their articles with the public, and sold the first copies of *Life: The Book*.

Teacher Reflection

The lab series was possible through a collaborative program with Miramar College and Amgen. They helped to transform the classroom into a biotechnology lab. As a teacher, I value daily, rigorous lab work. The process makes abstract concepts crystallize for students, and helps our exploration of complex scientific ideas feel authentic.

—Brandon Davidson

Student Reflection

My article was about HPV vaccines and why they are an issue in society today. I presented the perspectives of senators, doctors, parents, and even young women who had the vaccination. I interviewed associates from Planned Parenthood and got their opinion on the controversy. This project taught me more about something that is affecting young girls like myself, so the article was not only informative and helpful for the readers, but also for myself.

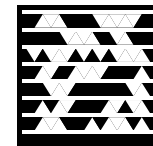
—Siarah Loyd, 11th grade

To learn more visit Randy's and Brandon's digital portfolios at
<http://dp.hightechhigh.org/~rscherer/> & <http://dp.hightechhigh.org/~bdavidson/>



Inventions

Diana Glover & Marissa Funk, Second Grade,
Explorer Elementary Charter School
Jeff Major, Math/Physics, High Tech High International



What would second graders invent to make the world a better place? A trash machine that converts all the garbage on the planet into marshmallows. A flying car powered entirely by solar panels. A gizmo that translates animal speech to human talk, so that animals can tell us when they are sick. The “nice” machine, where people can stick one of their fingers in a hole and the machine will count how many times the person has been nice. For this project, students approached the engineering process through a creative lens. In science, they studied and created simple machines. In literature studies, they read *Cloudy with a Chance of Meatballs* and *The BFG*, which both involve creative inventions like machines that rain meatballs or that catch dreams. Inspired by these ideas and their own imaginations, they dreamt up their own machines to help our society. They then investigated different materials and collaborated with 9th grade students from High Tech High International to design and build models of their inventions.

Student Reflections

This project was kind of frustrating because you had to design it and build it. The teenagers were cool. They helped me find the materials and use the hot glue gun.

—Donnie, 2nd grade

Making our invention was fun. It was hard to design it and make it. The big kids were nice and they helped us a lot.

—Gigi, 2nd grade

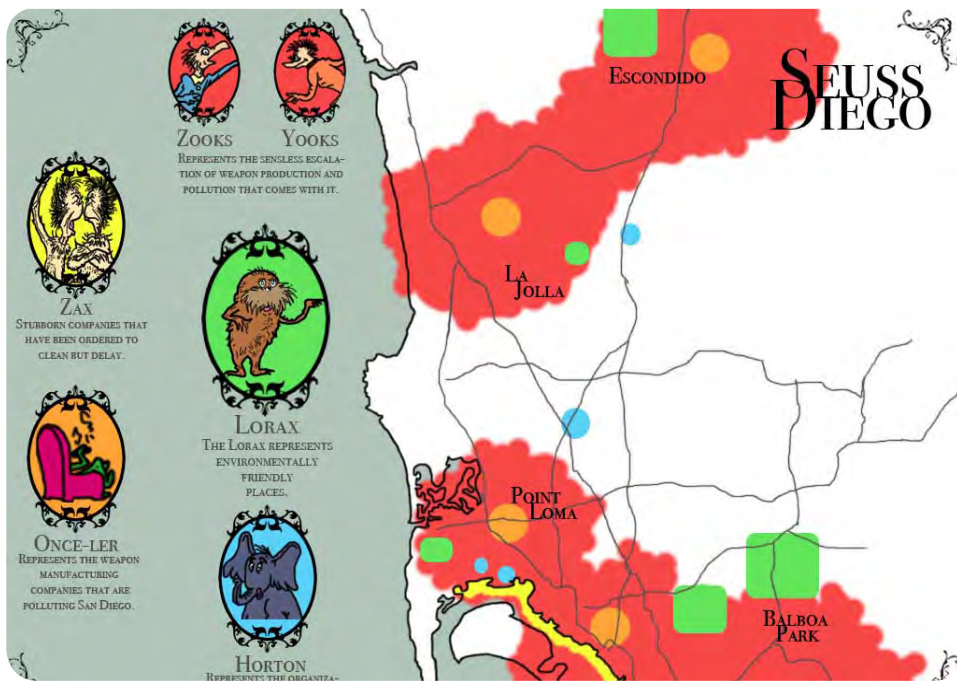
The experience was really enlightening for me, I loved working with the students to help them bring their imaginations into reality.

—Heather, 9th grade

My partner wanted to make a bed that automatically woke you up by springing you from a horizontal sleeping position to an upright nearly standing position. She told me she didn’t want her parents waking her up anymore so she invented this bed. I helped her put together the bed with cotton balls, bottle caps, popsicle sticks and other supplies. I liked her idea. Hopefully she will officially invent something like this when she gets older.

—Keana, 9th Grade

For more information, visit <http://www.explorerelementary.org/>



Complexcity

Margaret Noble, Digital Arts & Sound Production

Rachel Nichols, English, HTH Media Arts

Working in pairs, students conducted research and created idiosyncratic maps depicting familiar aspects of San Diego and were challenged to rethink the reality of the built environment around them. They became more invested in their communities because their new knowledge implicated them as involved citizens. By exhibiting their digital maps in multiple venues, students invited their communities to participate in this project of making San Diego a complex city. Students chose an object of study, devised an essential guiding question, and decided how to communicate their findings in words and symbols (maps). They conducted interviews, bringing community members into the process of knowledge production. Later, students participated in several rounds of peer critique and writers' workshops to sharpen the message of each map, clarify the accompanying essays, and articulate a critical thread that would link all the maps together for a coherent and provocative end result.

Student Reflection

My partner and I created a map comparing the number of banks and check-cashing stores in Logan Heights versus Coronado, two communities in San Diego that are separated only by a bridge. We discovered that Coronado has three times the number of banks as Logan Heights does, yet Logan Heights has double the population of Coronado. After plotting the bank locations on our map and seeing the imbalance, we turned to Dr. Natalia Molina, from UCSD, who helped us understand why. In the past, only white people were allowed to buy in places like Coronado, and minorities could only buy in places like Logan Heights. And businesses, like banks, wanted only to build in white neighborhoods. Over time, Coronado was able to build a solid foundation of economic access. Logan Heights was not, because banks and businesses refused to invest in communities of color. In sum, we believe that the banking imbalance seen today and shown on our map is the legacy of the institutional racism and redlining of San Diego's past.

—Victoria Anderson

To learn more visit: <http://margaretnoble.net/educator/complexcity/> & <http://rnichols.org/>

The project book of maps and essays is available at: <http://www.blurb.com/bookstore/detail/291829>



The Lascaux Cave Project

Gina Drago, Humanities, High Tech Middle Chula Vista

Our Lascaux Cave Project explored the essential question, “What makes us human?” Working in groups of four, 6th grade students researched and recreated different panels within the caves. Students compiled their research on Google Docs, which helped them collaborate on the written portion of this project. They investigated the history of the caves, the lives of the Magdalenian people, the purpose and significance of the paintings, and what it means to be human. In addition to each group’s expository writing piece, each student wrote a creative piece from the perspective of a Magdalenian artist. Each group then completed several drafts of the cave panels they were to recreate, eventually recreating the panels on 2’ x 4’ pieces of wood. To give the cave walls a rock-like appearance, students used insulation foam to create a cavernous texture on the wood. The final exhibition took place in the evening and the classroom was transformed into a dark cave, lit only by the flashlights or lanterns students carried. Students acted as tour guides, leading each tour group around the caves while describing the history and significance of the paintings.

Teacher Reflection

The vision for exhibition night was the driving force. Students were motivated by the presentation element of the exhibition and felt responsible to their audience to learn as much content as possible. One student summed-up the collective feeling of the class, “We really had to know our information, because the people we were talking to didn’t know anything about these caves and if we told them something that was wrong, they would believe us and leave thinking it was true!” Students took their responsibility as knowledge-sharers seriously. This was a great lesson in how crucial an authentic audience is for students.

Student Reflection

I enjoyed this project because we got to present our hard work to our principal and other adults. They saw how good we are and they got to see how professional we are in the real world. My favorite part of this project was giving people tours and answering questions.

--Isabella Modelo

To learn more visit: <https://sites.google.com/a/hightechhigh.org/ms-drago-s-dp/>



Immigration Podcasts

Beth DeLuca, Humanities, High Tech Middle North County

Eighth grade humanities students explored historical waves of immigration, focusing on these essential questions: Why do people immigrate to the United States? What challenges have immigrants faced throughout history? How do immigrants navigate between two cultural worlds? Sources included fiction, nonfiction, and guest speakers ranging from United States Border Patrol to Border Angels, a non-profit organization that helps ensure the safety of undocumented immigrants. We also visited Border Field State Park, on the beach between the U.S.A. and Mexico. In the end, students created Podcasts about the struggles of immigrant groups, past and present.

Teacher Reflection

I think my biggest learning moment from this project was when my students shared their feelings about the disconnect between the United States and Mexico. I don't think they really saw that disconnect until they looked first-hand at the prison-like fence that divides our two nations.

Student Reflection

Near the border, a hawk circles the empty fields that begin San Diego. The scene evokes the loneliness you feel as you walk through the muddy landscape of Friendship Park. Passing over the bridge that separates the mud and the sand, a tower comes into sight. The border fence, made of tall metal rods, radiates feelings of sadness. When the talks begin, I dive deep into my thoughts. The presenter says that those who only want to start a better life end up deported, back where they started. They have even less money from paying their smugglers. How can people be so cruel as to divide people through a fence? In the early 1970s, when the park was established, did anyone think to split it down the property line? What was it like then? And what would have become of the park, and America, if not only this border, but all borders, were destroyed? I look back on the fence, and hear voices of migrants. "Hurry," they would say, "Almost there." Who would know if I walked among migrants searching for the American Dream? Who would know if they found it?

—Shea Saulino

To learn more visit: <https://sites.google.com/alhightechhigh.org/ms-deluca-s-8th-grade-humanities-class/>

Moral Courage Project

Deanna Driscoll, Drama, High Tech Middle



In this project my middle school students go on a self-exploration journey through original poems and stories, studying the civil rights movement, bullying and cyber bullying, and the bystander effect. They create personal shoe art to represent who they are as a person. Through these exercises they begin to get a sense of their own power to change things simply by standing up for what they believe. In the end, they demonstrate their understanding of moral courage and historical events by writing and performing original moral courage plays for the community.

Teacher Reflection

My students have lots of questions and contributions to make when it comes to the concept of moral courage. Their ability to share who they are, what they fear, what they believe, the things they wonder about, and their own level of moral courage is astonishing to me. The thing that made me the proudest was the fact that there were situations happening in school during this project where several of my students made the deliberate choice to share their moral courage with others and change a situation simply by speaking up for what was right.

Student Reflections

I learned how one person standing up for someone or something they believe in can really make a difference. Also, being a moral bystander is as bad as being a bully, because you are basically telling the bully that what they are doing is okay with you. . After studying the effects of bullying we learned more about moral courage by writing our own “All About Me” book in which we shared original poems and monologues and answered a series of questions that helped us understand more about who we really are.

—Liz Egler

In the Moral Courage Project we learned how to find the bravery in us as we grow and not to doubt ourselves and our own level of moral courage.

—Emily Olmeda-Smith



To learn more visit: <https://sites.google.com/a/hightechhigh.org/deanna-driscoll-dp/>

Staff Class to the Past

Cady Staff, Humanities, High Tech Middle Chula Vista



Have you ever wanted to go back in time to meet someone from the past? Fifty-six eighth graders at High Tech Middle Chula Vista had the opportunity to do just that. First, we had a Socratic Seminar to determine the sixteen most significant events in U.S. history. Students then grouped themselves by events that interested them. Within groups, each student chose a historical figure and researched his or her life. Then, we “constructed” a wormhole to travel back in time (via time-traveling bus) to experience our chosen events firsthand. Students wrote multiple drafts to document their mind-blowing adventures throughout U.S. history. The result was a 164-page published book full of time-traveling escapades. The 8th graders also created an exhibition for elementary students where the younger kids boarded a cardboard bus, crawled through a wormhole and emerged on the other side to meet 8th graders dressed up as their historical figures.

Student Reflection

What inspired us to write a book about time travel? On a Monday morning our humanities teacher, Ms. Staff, came into class more excited than usual. She began to explain a dream she had over the weekend. In her dream, the entire eighth grade class went back in time with her to visit the 16 most important events in U.S. history. At first we thought she was kidding; then we realized she was serious! She was serious about making this our next history project. Thus, the time travelling began. We split into groups and chose our important events in history. Through careful and deliberate research, each person in the group wrote a vignette about their “experience” with an important historical character from the past. We put them all together and... Voila! Our book was ready. Ready for editing that is. We spent countless hours re-reading and editing, looking for grammatical errors, accuracy and clarity. Each one of us read and edited rough drafts countless times before we felt it was perfect.

Kyla Getzel, Phyllis Kuroda Crawford, Juan Sánchez, Nayeli Diez de Bonilla, Alexis Azhocar and Jessica Guevara

(Excerpt from Staff Class to the Past Student Editors' Introduction)

To learn more visit: <http://blogs.hightechhigh.org/cstaff/>

Link to published book: <http://www.blurb.com/my/book/detail/3005982>



Self Portrait Relief Print: Patterns of our Existence and Beyond

Meredith Frederick, Art, High Tech Middle Chula Vista



Patterns of our Existence and Beyond was inspired by Dia de los Muertos, a Mexican holiday that came from an Aztec tradition, which takes place on November 1st. This holiday, the Day of the Dead, focuses on the celebration of life as well as remembering and rejoicing the lives of the ones we have lost. For this project, students thought about why and how certain people leave an impression on our lives. We also brainstormed characteristics, attributes, and achievements we would like to be remembered for, and known for now and in the future. Each student then created a symbolic self-portrait by taking a picture of themselves and compiling found images of the characteristics they brainstormed using Adobe Photoshop. We transferred this design to a foam block, carved it out, and printed it on heavyweight paper. The final products were amazing relief prints that symbolically represented our own Patterns of Existence and Beyond.

Student Reflection

What I want to be known for and remembered by is my love for my family, my music and talent, and my happiness. I want to be known for and remembered as a person who tried to achieve and succeed, someone who loved people, and as a person who left their mark on our world. The imagery I included in my print represents these attributes. The message that I wanted to communicate to my audience was that no one is the same. Everyone has their own circles of life. Why circles? Circles are whole, and never ending. This represents my pride in myself, and everyone around me. The circle of my life represents everything important to me. My Circles of Life represent me, myself, and I.

There are lots of things that I enjoyed about this process including the hands on work and learning about symbolism. I would love to have the opportunity to do it again! I liked how our class worked together to help each other with the print and carving process and the feel of being in Art class, in general, was memorable.

--Alexa Gil, 7th grade

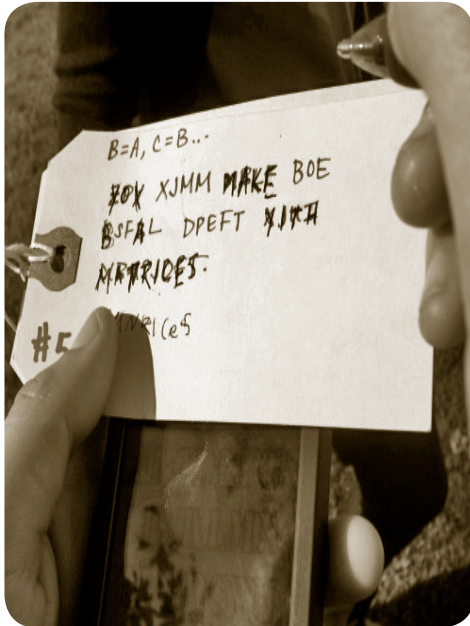
To learn more visit: <https://sites.google.com/alhightechhigh.org/ms-frederick-s-dp/home>

Mystery Code Project

Nicole Hubbard, High Tech High International

Pam Baker, High Tech High International

Jeremy Farson, High tech High International



The Mystery Code Project was a collaboration between 11th grade English, math, and art classes. In English class, students read detective fiction by authors such as Edgar Allen Poe, Sherlock Holmes, and Dan Brown and then wrote their own stories using math codes as part of the solution to the mystery. Students were put into peer editing groups and used googledocs to give and get feedback from their peers during the composition and revision process. In math, students used backwards planning sheets and peer revision to create the codes and mathematical references for their stories, which included matrix encryption, function notation with symbols, shift ciphers, counting principles and “cryptarithmic.” In art class, students created cover art for their stories. The art and stories, along with hyperlinks to a “how they solved it” section showing the math workbehind the codes, are published on our project website. Finally, as part of exhibition night, each group chose one story to record in the style of an old time radio show, complete with sound effects.

Teacher Reflection

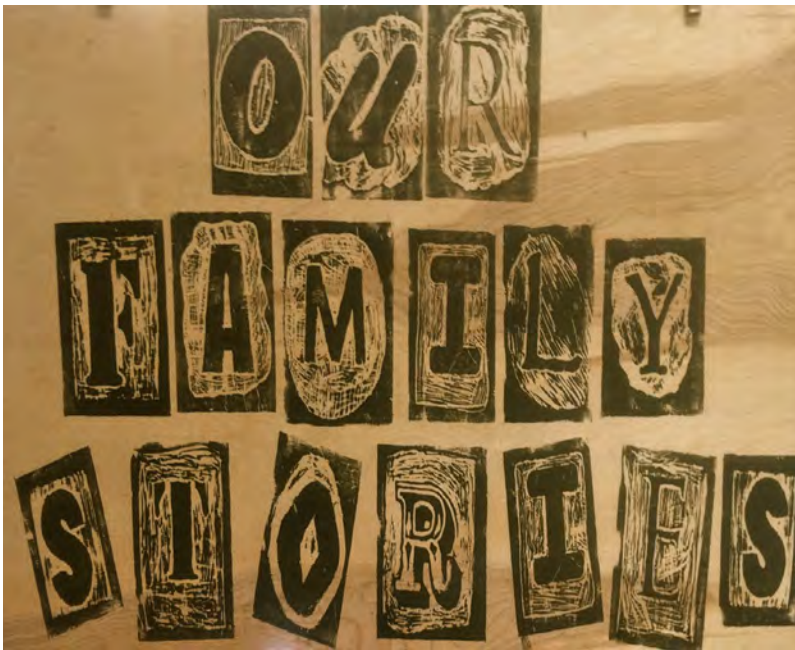
There were several things I loved about this project. First, although many students struggled to smoothly and authentically incorporate the math codes into their stories, through the extensive feedback and revision process and with the help of their peers, they all ended up with something they felt proud of. This project pushed them beyond what they thought they were capable of. Second, students were passionate about their stories and their characters, many of them going beyond the required page limit in their development of characters who became real people to them, with real personalities and quirks.

Student Reflection

I loved writing the story! I’ve always enjoyed creative writing and this was a great opportunity to work on that. Incorporating the math was hard but I am so proud of my complete story and art!

--Ashlen Sepulveda

To learn more about this project go to: <https://sites.google.com/a/hightechhigh.org/rejectsportycomedy2012/home>



Choose Your Own Adventure

Stacey Lopaz, Julia Jacobsen, Kim Tsai
High Tech High Elementary, Chula Vista



Students explored examples of risk taking from personal and state history, through a variety of literary contexts. Students then selected a risk that was meaningful to them to develop into “Choose Your Own Adventure,” interactive stories that they exhibited to parents and other students. They assessed the probability of possible outcomes to make the choices in their adventure simulate a realistic risk. This project was designed to help students explore history in a manner authentic to their own lives and experiences, as well as to learn more about the motives that brought settlers to their state or country, exploring the decisions that were made and risks that were taken in the process. There was also an intentional connection to the students themselves and the risks that have been taken for them and also the risks they have taken and would like to take in the future. One of our primary goals was for students to understand risk taking, both positive and negative, and to be able to assess risks in their own lives. This conversation helped foster a culture in class where students felt comfortable taking academic and social risks.

Student Reflections

This project got me interested in learning about my family history and genealogy. I was already interested in history, but this project gave me a base to learn more and dig a little deeper. I like that we learned a lot about probability and about real life consequences that were related to our risk taking.

—Aiden Ramirez, 4th grade

One thing that I was not expecting to learn was that we got to learn about our family history. I think it was cool because I really never knew that my ancestors were pirates, so that was really interesting to find out! I learned that pretty much every day people take risks, whether they’re small, like deciding whether or not to read this book, or deciding whether or not to go to a new country to live!

—Alberto Rosas, 4th grade

Ruby Bridges was black and wanted to go to a white school, so she did and if Ruby Bridges didn’t do what she did we would probably be in separate schools now.

—Gracie Suarez, 4th grade

To learn more visit: <http://dp.hightechhigh.org/~slopaz/>

Psycarnival

Dan Wise, Humanities, High Tech High
Gary and Jerri-Ann Jacobs High Tech High



For this 10th Grade Humanities project, students studied the basics of psychology, reading various non-fiction texts and interacting with guest speakers, before choosing individual topics to explore in depth. Based on these topics, each student had to create an original (and ethical) experiment to perform on sixth-grade students, create and illustrate an explanatory handout so that the subjects would understand the concept that was tested, and write and illustrate an original article about the concept's real-world applications.

Teacher Reflection

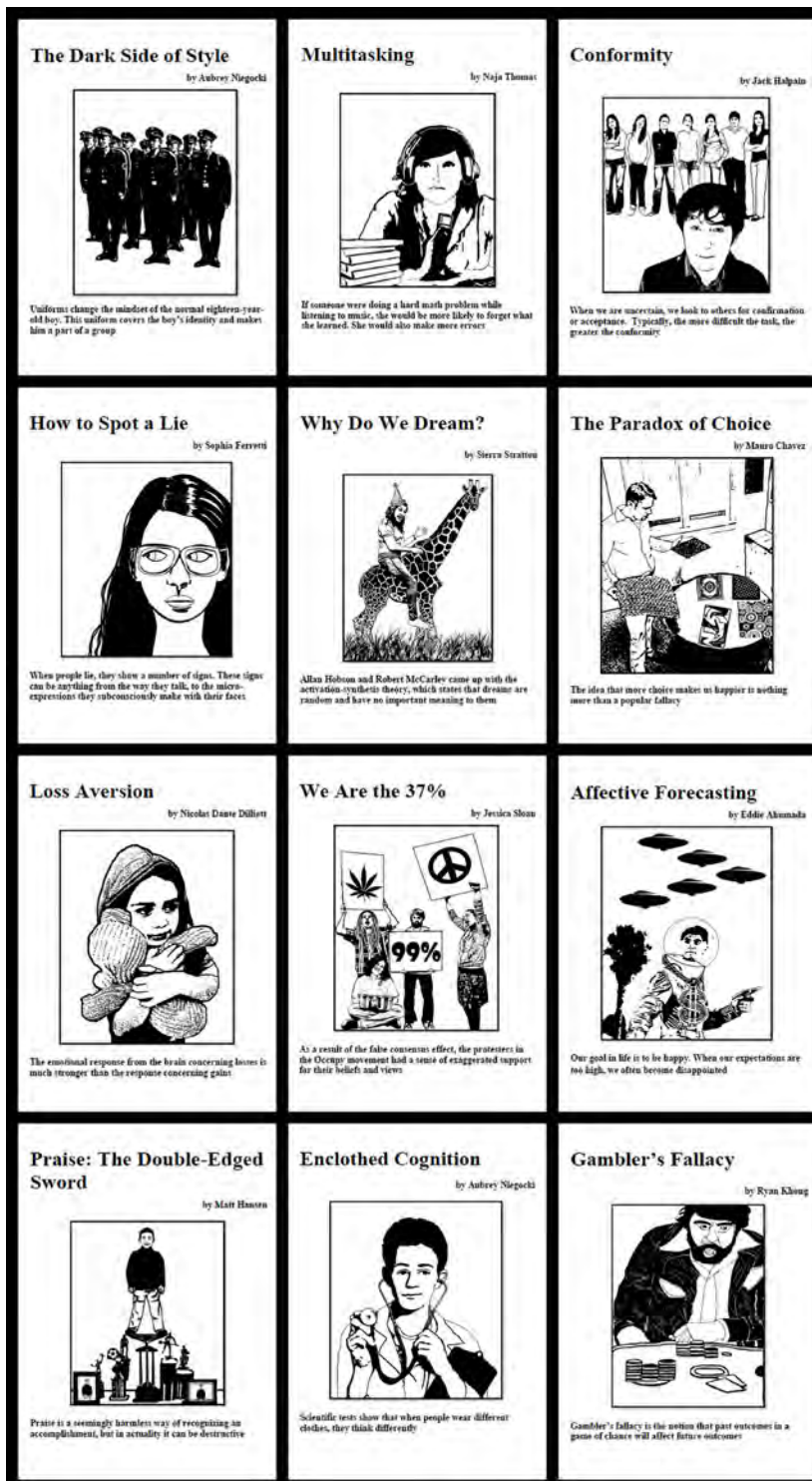
I remember how excited I was to take a psychology course during my first year of college. The discipline tapped into my adolescent curiosity, and it supplemented so much of what I had learned in my “core classes” in high school. Similarly, my high school students loved any psychological concepts I discussed in my class. So, I decided to design a project with psychology at the core. The topics that they chose, such as conformity, stereotyping, multitasking, dreams, morality, motivation, and so on, made them reflect on their own lives and on content from other subject areas. Their experiments also allowed them to creatively play with the scientific method and learn about ethical experimentation.

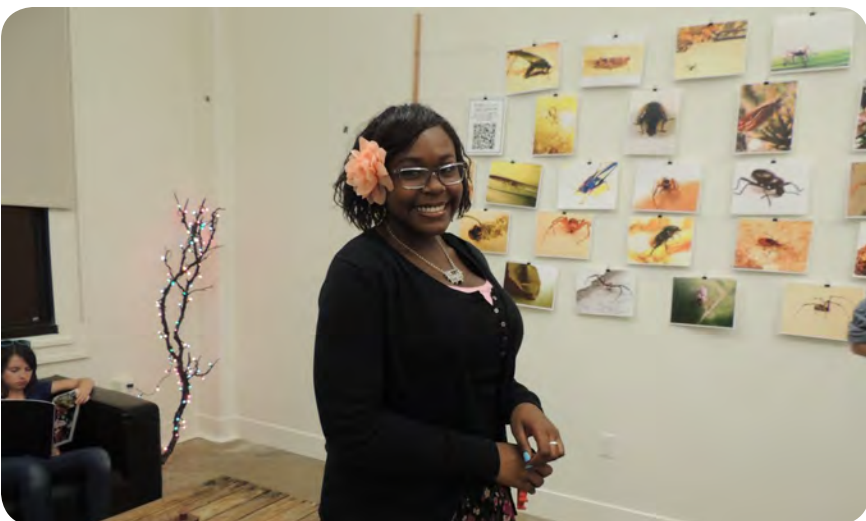
Student Reflections

During the Psycarnival project, the class learned about psychology and how it relates to our lives and to current events. We put on a carnival in which we conducted experiments that we created. We then collected data from our experiments and analyzed them. I looked into different mindsets and how they affect people's motivations. I came to school every day excited to work. I learned a lot about mindsets and Carol Dweck's theory of how they affect people's motivation.

—Matthew Hansen

I researched a psychological theory called the Paradox of Choice. It sheds light on the issues we face when trying to pick one option from a group of many choices. To study this topic, I read a book written by Barry Schwarz, the creator of the theory and took notes on his TED talks. In the end, I was left with very useful information that I get to apply to my own life





A Fly on the Wall

John Santos, Biology, and Pam Baker, English
High Tech High International



A Fly on the Wall Project was a collaborative project between 11th grade biology and English where students collected a diverse array of arthropods from their respective homes and then in English class wrote two creative pieces that incorporated facts that they had learned about their insect through their research in biology class. At the same time, students learned to identify, categorize and describe insects and arachnids and then worked to take impactful photographs of their insect that captured the uniqueness and beauty of these creatures. Ultimately, the photography and writing were displayed at Friday Night Liberty, a local arts event in the community of Point Loma.

Teacher Reflection

We wanted to push the idea of putting together a collaborative/integrated project where BOTH of our subjects were able to hit a depth of content that felt uncompromised and valuable for both of our classes. I was interested to get back to basics, to remember that feeling of being drawn to insects and spiders and fascinated by insect collections and their mechanical physiology. I also wanted students to experience a “collective work,” where they collected arthropods individually, that contributed to a larger perspective of the diversity of arthropods found in our community. Pam and I were both happy with how persistently and passionately our students worked to capture something impactful and beautiful about their arthropods through their photography and their writing—and then how we were able to display their writing in an easily accessible way.

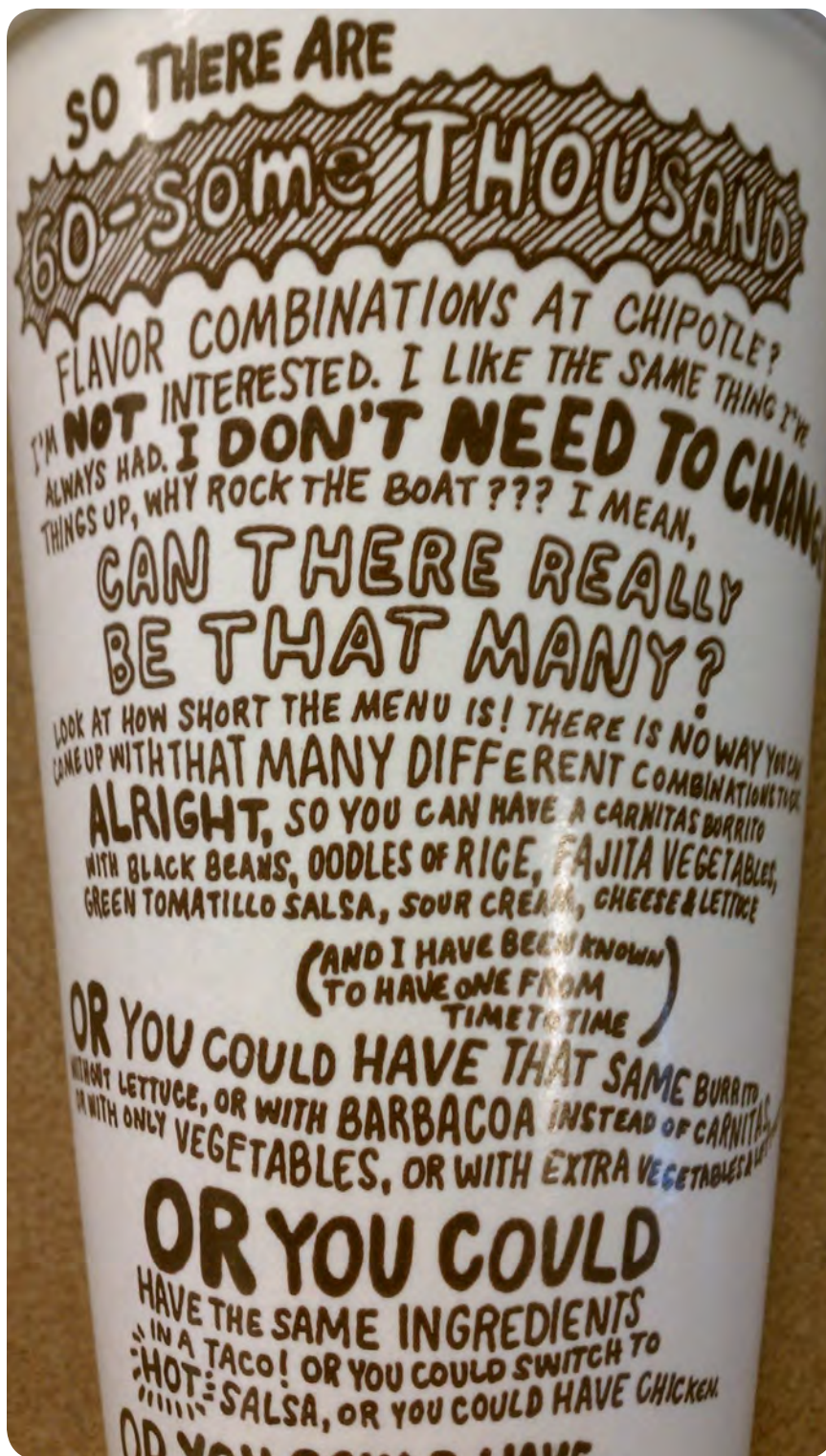
Student Reflections

I used to be really afraid of bugs but once I started learning about them I became not so afraid of them. I liked that the whole project gave all students a way to express their interest. It seemed like it was really for us – not to just exhibit but to explore things we were interested in. We caught bugs that interested us and then used our own imaginations to see things from their perspective.

—Kaysia Stewart

I was able to take some of the things I learned about arthropods in biology and then look at an actual arthropod and visually and tactilely discover it myself. I was also able to share some of my experience with photography, which I enjoyed.

—Tom Dunnion



Chipotle Challenge

Bryan Meyer, Mathematics, High Tech High North County

"So there are 60-some thousand flavor combinations at Chiptole..." This simple message written on the side of a drinking cup from Chipotle started our whole investigation. Could there really be this many? Could there be more? We were determined to find out if they were right. Students studied smaller problems and created rules about combinatorics that they could use to piece together this huge problem. In the end, we came up with an answer of our own and exhibited our work as a Chipotle-esque assembly line where we explained our ideas to visitors (and, of course, served burritos).

Teacher Reflection

From my perspective, this project was a success mostly because students were doing and creating math together. The solution to the problem was exciting for all of us, but how we came to that solution was far more powerful. Students were collaborating, looking for patterns, being systematic, persisting through difficult tasks, and creating mathematical rules. This type of thinking is, at least in my opinion, what makes mathematics powerful and important.

Student Reflections

This was not only a fun project involving food, but it opened my eyes to so many similar problems we are faced with on a daily basis. We first started out by learning how to create combinations from small groups and find different patterns we see in these combinations. After working with smaller problems, we used the patterns to figure out equations that could be used to make the problems a little simpler. Our final project was looking at the Chipotle menu and trying to find how many different combinations could be made. There were so many! Everyday, I see a similar problem and it reminds me about how much I truly learned just by doing this project.

—Julian Guzman

The Chipotle Challenge was a great experience. I learned so much about how to think like a mathematician. Learning how to view results and draw conclusions. This project showed me how math can be applied to real life. I will always remember this project because of the memorable connections we made our fellow students. Also, who can have a problem with a project completely centered around burritos? Seriously guys!

—Desirae Lizcano

In 1,000 Words

Liz Perry, Spanish and Andrew Lerario, Chemistry
Gary and Jerri-Ann Jacobs High Tech High



FRIDAY NIGHT LIBERTY

NOW: CONTEMPLATIONS ON CONTEMPORARY SOCIETY IS A THOUGHT-PROVOKING EXHIBITION OF CONCEPTUAL PHOTOGRAPHIC ART. THROUGH THE EYES OF 49 YOUNG ARTISTS FROM HIGH TECH HIGH, YOU WILL HAVE THE OPPORTUNITY TO SEE WHAT THEY CONSIDER TO BE SIGNIFICANT ABOUT SOCIETY TODAY, WHETHER IT BE A TRANSITION OR TRANSFORMATION IN THEIR OWN LIVES OR AN EVENT OR PHENOMENON IMPACTING A LARGER POPULATION. PRINTS ARE IN BOTH COLOR AND BLACK AND WHITE AND HAVE BEEN DEVELOPED DIGITALLY OR USING A SILVER GELATIN EMULSION.

A SPECIAL THANK YOU TO NTC PROMENADE FRIDAY NIGHT LIBERTY, AJA PROJECT, ALAN ZITER, ASHLEIGH STARKE, JOHN THURSTON, BRYAN MILLER, MARV SLOBEN, SHAWNEE BARTON, HIGH TECH HIGH STAFF AND FACULTY, AND FRIENDS AND FAMILY.

date	location	time	
6/3/2011	NTC COMMAND CENTER 2640 HISTORIC DECATUR ROAD	5-8 PM	Thank you for coming to our exposition. Please enjoy yourself as you view the photographic works the students have created. Have a good time and enjoy the evening.

Students developed visual literacy skills to analyze historical photographs and document their own perspectives and experiences through photography. Their analyses and artistry were bolstered by workshops conducted by local artists and by photographs and curriculum developed by San Diego's Aja Project, a photography-based youth program. The final assignment and exhibition, entitled NOW: Contemplations on Contemporary Society, included a photograph and audio excerpt of their final narrative, which captured a contemporary idea, concept, or event each student deemed to be significant. The exhibition took place during Friday Night Liberty, a night of open art galleries, cultural performances, and events at Liberty Station in Point Loma.

Teacher Reflection

Throughout the semester, students recognized the connection between one small transition and the next. However, in the end, students recognized and were excited by the big picture. For me, education is about these big picture connections. One of our connections was about communication. Effective communication, be it through photographs or prose, is an art form, and through that art form, students found they could empathize with and learn from the experience of others and share with the world their own experiences and perspectives.

Student Reflections

This project taught me how photography can be one of the most effective tools to convey ideas and feelings. Since a picture is worth 1,000 words, one picture should be able to convey as much importance as a well thought out short story or a well-constructed essay.

—Jordan Edmunds

I have learned a lot from this project, but I think it has influenced me mostly by teaching me about different people's views on things that are important to them. This helped me to better understand others in my class and ultimately, helps our class become closer. Not many projects could have done that.

—Sophia Thomas

To learn more, visit <http://lizperry.weebly.com/projects.html>

The Boneyard Project

Nick Ehlers, Biology, High Tech High Chula Vista



This eight week project between Nick Ehlers' junior biology class and Patrick Wilcox, a former HTHCV student, began with in-class dissections to discover the anatomy and physiology of rats, snakes, and lizards. By removing all organs we prepared organisms for our colony of flesh eating beetles. The beetles were recorded as they ate the deceased animal remains right before our eyes, leaving behind only the bones. Students then recovered the remains and reconstructed the skeletons. We wanted to answer the essential question: "How do anatomy, physiology, and skeletal structures of small mammals and reptiles compare and contrast to the human body?" Students also prepared presentations including photo displays, videos, and posters documenting the entire process for display at Dia de los Muertos (Day of the Dead) fall exhibition.

Teacher Reflection

My main goal was to stimulate all five senses of my students for long-term deeper learner. I can confidently say that this was accomplished. Warnings: your students will be disgusted at times (e.g. odor, sights), but that is an important part of the experience. You also have to take close care of your beetle colony. I would recommend a reliable offsite backup beetle colony just in case you have issues with yours. In addition, if you have the chance to partner with a local osteologist and/or beetle expert this is ideal. I did, and without Patrick's expertise and background as a former High Tech High student, I may not have been able to complete this project. Thank you Patrick!

Student Reflections

We had three projects within one. We not only had to dissect our animals, but we had to skin them, feed them to flesh eating beetles, take apart and bleach the bones, and lastly reconstruct the skeletons. And apart from all that we had to put together our presentations which included creating posters or videos and setting up the room, which was designed to look like a haunted house that had a giant rib cage in the entrance. There was always a horrid smell of rotten snakes, lizards, and rats in the room which meant this project was the real deal.

—Marissa Boyer and Lorenz Alfiler

Are You Fitter Than a 5th Grader?

Tara Della Roca, 5th Grade

High Tech Elementary, Chula Vista



Over the course of 11 weeks, 5th grade students studied the human body, learned about types of exercise that support healthy growth in kids, and worked diligently to improve their own fitness levels. Most importantly, the class developed a solution for motivating their school-mates to exercise more frequently. They designed and built a parcourse for the school—a permanent fitness circuit consisting of 13 exercise stations including a climbing traverse, tire run, balance beam and log jump.

Teacher Reflection

In addition to giving students a chance to study the body and explore children's health, this project provided opportunities for students to develop their decision-making capabilities as they made the many choices required in designing and constructing the parcourse. The class also learned to manage hurdles that arose at various times related to the installation of their work and additionally, challenged themselves to pursue and surpass their own fitness goals throughout the project.

Student Reflections

It was challenging deciding among a lot of ideas from the class. It was hard to come up with one thing for how the signs should be designed to how the climbing traverse should be painted. But after making all those choices we ended up with a parcourse we're really proud of.

—Raymond

In this project I learned that if you make a mistake then learn from it because when I painted the signs for the parcourse I made some mistakes and figured out how to fix them. It was challenging to make them look just right!

—Alex

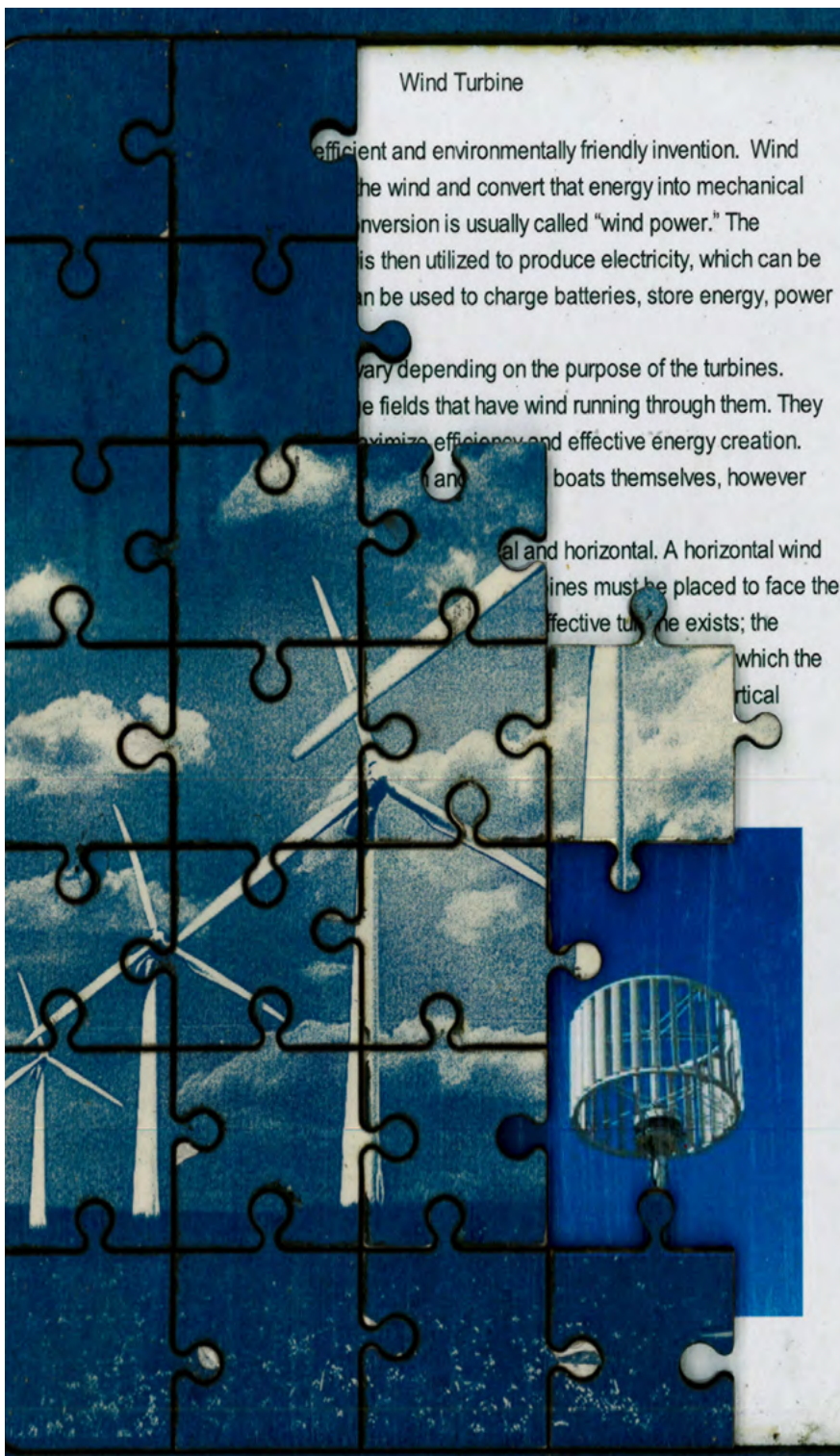
The measurements for the frames was challenging because you have to be exact. If you're not, then pieces won't fit together!

—Jaddin

Kids need to get fit and if they're not it might not seem bad now, but it can lead to diseases in the future. I learned to not only stay healthy, but help others stay healthy.

—Jessica





Energy Puzzles

Don Mackay, 12th Grade Science

High Tech High International

Our senior engineering students created jigsaw puzzles to introduce energy concepts to elementary age children. Each puzzle picture depicted a source or application of energy and included an age appropriate explanation laminated beneath the puzzle. The students printed their pictures using a cyanotype process and photosensitive paper prepared in class by mixing iron salts that react to form a deep blue dye (Prussian blue) when exposed to sunlight. The developed pictures were decouped to hardboard and cut into puzzle pieces with a laser cutter. A one page description of the energy represented by the picture was decouped to the puzzle frame under the pieces. During this project, students used their knowledge of how light interacts with matter to both create (with sunlight) and cut (with a laser) their puzzle pictures. They also learned to reframe a complex energy concept into a narrative engaging to a 5th grader. Students chose one of four roles: a researcher, an artist, a carpenter, and a chemist. Students assessed each other's product for quality of workmanship, technical accuracy, and adherence to the theme. The ultimate assessment however was the level of engagement on the part of the elementary school students to whom the puzzles were presented.

Teacher reflection

I was most surprised by how much more seriously the students took the project once they realized the final product would actually get used by 5th graders. There were many glitches that could have derailed the project but they repeatedly came up with creative solutions to make sure their puzzle would get delivered. The authenticity of the deliverable was the key. I also appreciated how this project integrated so many ideas and skills, from light to energy to chemistry to writing to carpentry.

Student Reflections:

It was interesting to try and explain wind turbines to a fifth grader. It made me think about exactly how a turbine works, and how to explain it in a simple way.

—Daniel

What I found most interesting was the way that light transfers energy based on the frequency of the light. I now think of this when I think of sun burns, plants, and photos. I enjoy learning things I can use to explain things in my life.

—Madison



Food For Thought

Ali Hernandez, 6th Grade Math/Science

Deirdre Kehoe, 6th Grade Math/Science

High Tech Middle Chula Vista

The Food for Thought project focused on why and how to make healthy food choices. Students researched the food industry in America and the deceptive nature of fast-food advertisements. They learned how to read food labels and discovered the many benefits of vitamins and minerals. Students selected a vegetable to grow and research, designed a kid-friendly recipe that included their vegetable, calculated the nutritional content of their recipe, cooked their recipe many times, and took professional photos of the results. Ultimately, the students compiled a professional cookbook of healthy vegetable recipes for kids. During exhibition, students in chef's hats stood by their cookbook pages and educated visitors about the benefits of their vegetable, how they calculated the nutritional value of one serving of their recipe, and the importance of making healthy food choices.

Teacher Reflection

This project stretched beyond the classroom to connect school and home. I was struck by how powerful it was to involve parents in the critique process. Many parents told me that their child had never cooked before, or was now more appreciative of the food on their table. When you hold the cookbook in your hands, and flip through its beautiful pages, it is clear that 56 children cared deeply about their work.

Student Reflections

We made our recipe at home with the help of our family and then they tried it and gave some critique. They gave some celebrations and suggestions. We took the suggestions into consideration and changed our recipes. This was a very unique form of critique because it allowed for our families to get very involved with our project and truly get an inside look at what we were learning in class. —Sarina

Eating fresh and balanced meals make a big difference in one's well-being. When you eat what you choose, ask yourself, "This tastes good, but how does this affect my health?" —Izadora & Aleia

Find our cookbook on Blurb: <http://www.blurb.com/b/4063342-food-for-thought>

Historic RAP THROWDOWN

Historic Rap Throwdown

Ross Roemer, 10th Grade Humanities

Chris Mutter, Multimedia

High Tech High International

In pairs, students chose and then researched a controversial historical figure that had both a positive and negative impact on history. Students created a fact sheet and eventually wrote a persuasive essay. Next, the names of the historical figures were randomly selected out of a hat to create the rap battle pairings. Teams of four students now worked together to create lyrics for a rap battle. While the majority of the research and writing was being done in Humanities class, students worked on creating a beat suitable for a rap battle in their Multimedia class. Students then recorded their written lyrics over their beat, created costumes, and filmed a music video in front of a green screen and then edited to create an entertaining video that was exhibited on YouTube.

Teacher Reflection:

We both share an affinity for the YouTube channel Epic Rap Battles and, while the original content may not be appropriate for school, we thought it would be a great place to start for a project idea. Our goal was to support our students in creating rap battles that were not only school appropriate, but that were more historically accurate than our inspiration on YouTube. It was a great opportunity to have students demystify historical figures, seeing that even heroes have flaws and villains aren't complete monsters.

Student Reflection:

The most useful aspect that I learned from this project was something that wasn't intended. I did learn a lot of history and multimedia, but the biggest thing I got out of this project was how to not care about looking silly. At first I held back and was afraid of making facial expressions and doing funny dances. As I got more comfortable, not only did the clips become better but I felt better and had more fun while being filmed. After completing this project I feel extremely proud and satisfied about my final YouTube video.

—Hana

To view videos go to <http://www.youtube.com/multimediahthi>



Matter All Around

Meaghan Leahy and Trisha Magoon, 1st Grade

High Tech Elementary, Chula Vista



First Grade Scientists explored the world of matter all around them! They wondered...

- What is matter?
- How can we change matter?
- How can we use this knowledge to help others?

Investigating solids, liquids, and gases led to several fun creations such as play dough, chalk, goo, and bubbles. Our scientists had so much fun exploring and learning about matter that they decided to share their creations with others; they each prepared a Matter Activity Box to donate to children at San Diego's Ronald McDonald House.

Teacher Reflections

Going into this project we wanted to tap into first graders' natural curiosity and excitement, so we built the learning around hands-on, messy explorations. Our instincts were right. First grade scientists couldn't wait to see what each day had in store for them! Their enthusiasm became a natural bridge linking their initial curiosity to authentic learning. As scientists, they wondered, tested ideas, discovered new ways of thinking, and made connections between matter and the world around them. Our students understood the importance of helping families at The Ronald McDonald House and empathized with what it would be like to be away from the comforts (and toys!) of home. Our scientists knew they weren't making bubbles, play dough, and chalk just for themselves—they were excited to give their Matter Activity Boxes away. As teachers who work with the littlest of learners, we were proud this project included so much excitement and learning, and benefitted the community.

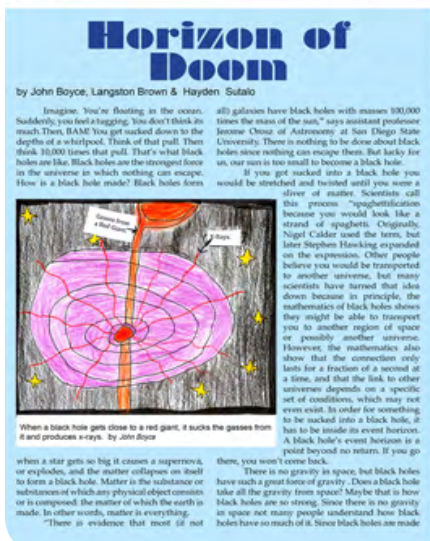
Student Reflections

This project was awesome because I learned what matter is, how it works, and how it changes to other kinds of matter. —Zuri

I feel happy because the Ronald McDonald House kids have something to play with so they won't be bored. —Khalel

Now that I donated my activity box I'm so proud of myself. I feel like a party is in my heart! —Carlo

'THE END OF THE WORLD UNCOVERED



The End of the World Uncovered

Bobby Shaddox, Allie Wong, and Mike Vasquez

6th Grade Integrated Project

High TechMiddle

Students and teachers built this project from scratch. We started with students' questions about the world and themselves. From those questions, an overarching theme for a semester project emerged: The end of the world. After brainstorming and selecting doomsday topics, students conducted authentic research on a wide variety of topics, stretching across academic disciplines. Each group arranged field trips and interviews with local organizations and experts in order to get answers to their essential questions. Finally, they wrote, illustrated and designed a magazine to reveal their findings. The published piece was accompanied by Flash animations. Our magazine launch party (exhibition) took place the day before the supposed Mayan apocalypse (December 21, 2012). We sold 65 copies in just two hours!

Teacher Reflections

The democratic design of this project has shifted my mindset about project design and learning. I watched my class tackle complex issues in their research, interview college professors and take the lead on scheduling field trips. Together we found natural connections between science, mathematics, English, technology and social studies. The project proved to me that a democratic approach to learning is definitely a way to deepen learning.

—Bobby Shaddox

Throughout both the design and execution of this project, I was continually blown away by students' ideas, effort, and collaboration. Students stressed over how important it was for them to make their own choices and work with others. In this project, I definitely felt more like a facilitator or even a participant than a teacher. One of the best parts was watching students make decisions about how to design a project that were similar to decisions I would have made.

—Allie Wong

Student Reflection

I remember the satisfaction that I felt when I was presenting my work at exhibition. They were amazed that a group of 6th graders could do this type of work. When we actually have a say in the project, it makes it more fun for all of us. We had design input which made it more interesting. I would definitely want to try this again.

—Langston

To learn more (or to buy a magazine) visit: www.bobbyshaddox.com or mswongsdp.weebly.com



The Great 9th Grade Odyssey

Marra Smith, Math/Physics

High Tech High International

Students worked in groups of three or four to create boats made solely out of cardboard and packing tape. These boats were 6 feet by 4 feet (or larger) and two or more people from each group would set sail in them in the bay. For six weeks students explored the concepts of buoyancy, density, volume, and mass, and how engineering design and scaled drawings could be applied to further their understanding. They built one-eighth scaled models of their designs, tested their models, and then revised their designs on paper before embarking on a week of building their full-scale boats. The project concluded with a daylong exhibition where students showcased their learning of the concepts through demonstrations and displays, and then put their boats to the ultimate test as they sailed away in the bay.

Teacher Reflection:

For two weeks during building, my students continually told me that there was no way that this would work. They didn't even believe me when I showed them pictures of people in cardboard boats. They especially didn't believe me when I told them to check their calculations—they just figured that they did something wrong. They weren't convinced until race day was upon us, and they pushed their boats out into the water for the first time. There was this magical moment and transformation that happened when they truly understood what those calculations and drawings represented. Figuring out the required volume for their boat was meaningless unless they could take those calculations and build a boat they could actually sail. What was even better was that these boats seemed to defy all odds, proving to the students that even when it doesn't seem possible, there is always a way.

Student Reflection:

This was my favorite physics project I've ever done. I really enjoyed learning about density and buoyancy and all of the factors that go into things that float because it gave me a better understanding of how things around me work. It was awesome that we got to design and build our own boats using the information we learned. Testing and racing our boats in the bay was a really fun way to celebrate the end of the project.

—Agustin

The Learning Landscape

Lindsey Ott, Language Arts;

Eric White, Social Studies;

Ben Williams, Science

The G School, South Carolina



Students often complain about their learning environments, whether it's comfort, mobility, or the aesthetics. They often describe their schools as feeling like a warehouse or even a jail. These oppressive and sterile surroundings are just not conducive to learning. In response to this need, we issued our students a challenge: design a piece of furniture better suited for the 21st century learning environment.

Throughout the project, our students learned how to empathize, synthesize data, brainstorm ideas, and prototype solutions that met engineering, humanities, and design specifications. The project culminated with students designing and building eight innovative pieces of classroom furniture to meet the needs of their clients: a class of fifth grade students that were dissatisfied by their learning environment.

Teacher Reflection

This ambitious project was led by STEM and supported by humanities. As an anthropologist, my favorite part was when our students gathered data to understand and empathize with their fifth grade users, because students are not often provided with enough opportunities to think outside themselves. The most challenging portion was engineering the students' ambitious designs. We empowered them to pursue wild ideas, but we still had to engineer them to meet safety and durability specifications. The most satisfying part of the challenge was delivering the newly constructed furniture to our unsuspecting users. The looks on the fifth graders' faces made every moment of this challenge worth it.

—Lindsey Ott

Student Reflection

We learned core concepts in math, science, and humanities while producing new and innovative designs for furniture. My team designed a Ferris wheel bookshelf that not only stored materials on the shelves, but also had rotating bins where the students could place their belongings. That idea allowed us to tackle a key science concept, rotational mass, in an engaging way that provided us with a great education and the elementary school with a great bookshelf.

—Jon

To learn more visit: <http://vimeo.com/35233751> or www.thegschool.com



Depiction of Woodstock

Turning Points, Toy Theatre

Margaret Noble, Multimedia

Rachel Nichols, 12th Grade English

High Tech High Media Arts

The goal of this project was to recreate and interpret critical historical turning points from the last 150 years in the hopes that these creative stories would stimulate new dialogue about old stories. In order to tell the story with puppets, each student group picked their own topic to investigate, and each member of the group wrote a research paper investigating a unique aspect/angle of their turning point topic. Building on each individual student's knowledge, groups were able to create interpretive toy theatre shows with hand-crafted originally designed paper puppets. With help from the professional puppeteer company, Animal Cracker Conspiracy, students learned to manipulate their puppets in relationship to custom animations, sound, and video works (all produced by the students).

Teachers' Reflection

Experimental projects are the toughest to facilitate. It's impossible to predict what the outcomes will look like as different students create work in their own unique styles. Consequently, the work is very exciting because the students and teachers wander into unknown territories. During this project, students became more and more comfortable with the steady process of critique and revision over a period of eight weeks. By the end of the project, students asked for more rehearsal time and more critiques because they knew these processes strengthened their work. The greatest lesson seemed to be that students learned to trust in the process of experimentation and believe in their capacity to produce beautiful work.

Student Reflection

The take away message of our piece, based off the life of Harvey Milk was that anyone has the power to make or inspire social change. I've learned that while it's important to make change so that people's lives can be lived honestly, it's also important to make change in one's perspective so that new knowledge and ideas can be shared and appreciated.

—Spencer

To learn more go to:

<http://margaretnoble.net/educator/turning-points-toy-theater/>



Building a Better Athlete

Ryan Gallagher, 9th Grade Science

High Tech High North County

“Everyone deserves to feel the power of crossing a finish line,” says the Challenged Athletes Foundation. Our driving question was: What do athletes need to do to compete at their optimum level? This interdisciplinary project examined the physics behind athletic training through the lens of challenged-athlete Kyle Maynard’s book “No Excuses.” We looked at how athletic clothes affect heat transfer, the interplay of torque and prosthetic limbs, designing a better athletic shoe, and products that allow completion of simple tasks without the use of a limb. Students also interviewed classmates, teachers, parents and community members about overcoming struggles, recognizing that adversity does not discriminate and can always be faced with bravery and courage. In addition, the class visited the Olympic Training center and met with challenged athletes. Finally, students volunteered at the San Diego Triathlon Challenge, hosted by the Challenged Athletes Foundation, and created an exhibition at Road Runner sports.

Teacher Reflection

This project created an opportunity for students to really integrate physics and humanities in an authentic way. Students learned about the way the human body functions and how those functions can be augmented by technology in the form of prostheses. They were also able to explore the ethical and emotional considerations of challenged athletes through Kyle Maynard’s book and by interacting directly with challenged athletes.

Student Reflections

Challenged athletes want to be treated like everyone else. They don’t mind if anyone asks them about their “obstacle.” They want to prove that they can do what anyone else can do. —Frida D

This project has changed my perspective of those with physical differences by seeing how they are not really disabled at all. They may have lost a limb or have autism but they go to the Olympics. These people are not disabled in my opinion. They show to millions that they can do regular things that people think would be impossible for them. —John D

To learn more visit: hightechhigh.org/mr-gallagher-s-dp/

Airwaves of Identity

Ashley DeGrano, 8th Grade Humanities

High Tech Middle North County



Airwaves of Identity focused on the media's effect on cultural thinking and action. Students wrote and produced live radio shows on topics that were deemed important by them (music, pop culture, politics, etc). Students reached out to businesses in our local community for donations, advice, and participation in the event. We partnered with local radio station 102.1, KPRi in order to learn from working professionals in the business. To document the process, students kept weekly blogs that allowed them to post pictures of each week and reflect along the way. Students had a job that was developed and carried out by them for the entirety of the project, including host, script writer, director, DJ, and social networking guru.

Teacher Reflection

Airwaves of Identity built in a tremendous amount of student voice and choice. The students were motivated throughout this project, reaching out to members of the community and pushing each other to meet deadlines and perfect their live shows. The design, process, and products were completely student driven. The final products reflected the students' dedication and pride for the project.

Student Reflections

I had many doubts going into the project about how we were going to pull it off, but after our first meeting with our group I gained a lot of excitement towards our exhibition. I felt comfortable being able to choose what role I wanted to be in. There was no point where we weren't using communication in order to complete our jobs and end the project as a collaborating radio show team.

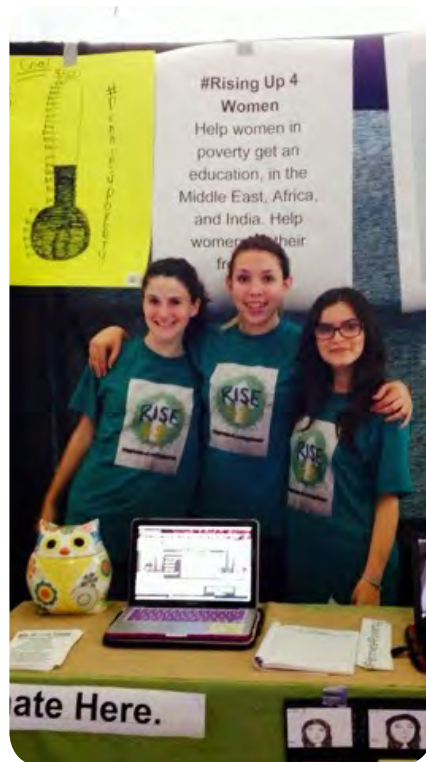
—Ashley S

The project taught me more than I realized. We didn't just learn history and literature, we learned to appreciate one another and look past everyone's flaws. Unexpectedly, the whole project brought life to the classroom culture. No student was outcasted, and we became a family.

—Leni A



To learn more visit: msdegrano.weebly.com



#Hashtag Film Project

Chris Olivas, 8th Grade Math/Science

Melissa Cochran, 8th Grade Humanities
High Tech Middle North County

Students examined the role of the media in their lives and how they can use the media to positively influence others. They learned the process of creating a film: writing a script, creating a storyboard, conducting interviews, filming scenes, and editing footage. Students who created public service announcements partnered with local organizations and featured them in their films. Those who created mythbusters-like videos researched specific scientific questions that interested them. All students completed weekly blogs reflecting on their learning, successes, and challenges. At exhibition they showcased their films in a student-designed movie theater and shared reflections on the process in our “behind the scenes” room.

Teacher Reflections

Earlier this year we had been struggling with student engagement and motivation. We wanted students to have more voice and choice in this spring exhibition project. Allowed to choose their own topics and video formats, students showed more enthusiasm and ownership of their work. Students were all over the map when it came to choosing a project democratically. We didn't want to force any specific topic, and they ended up coming up with genuine inquiries that really mattered to them. I believe they were impressed with what they were capable of doing as a team.

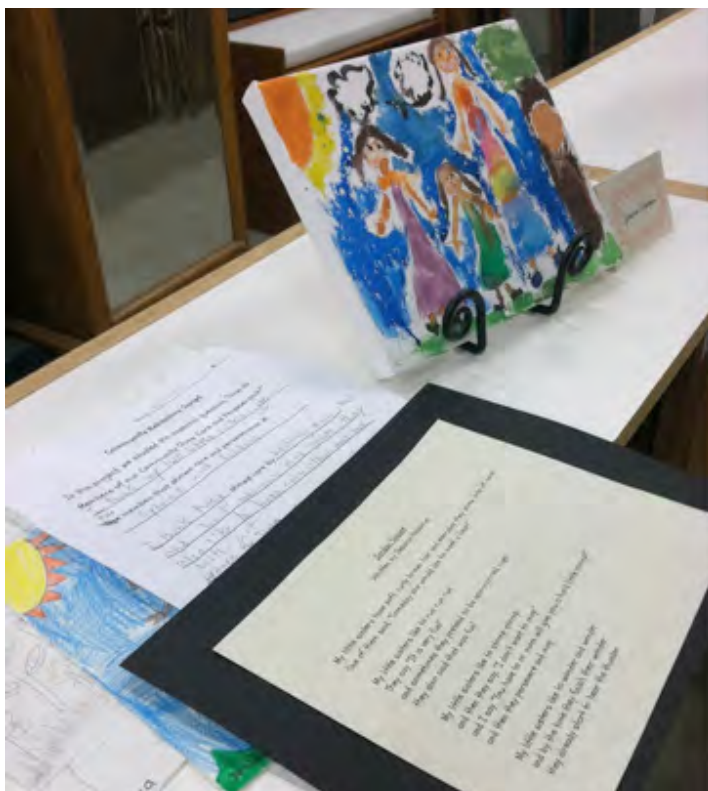
Student Reflections

Anyone can make a difference, no matter how young or old. As long as one person takes a stand, others will follow. —Hanna

Self-harm is a big issue that affects teens and young adults. The video was a way to let others know that there are people who care about them and are willing to support them. —Elizabeth

I learned how to become more professional in working in a group, and I learned how to investigate and test my ideas in a scientific way —Micah

To learn more visit: sites.google.com/a/hightechhigh.org/cochran/



Understanding Habits of Heart and Mind through Our Community

*Kim Tsai, Second Grade
High Tech Elementary North County*

Second graders investigated the question, “How do Members of Our Community Show Care and Perseverance?”

Throughout this project, students engaged in fieldwork to show care and perseverance within their community. To begin, we brainstormed people who showed our Habits of Heart and Mind: care and perseverance. Next, we asked various experts to visit us to teach us about these traits and how they show this in their personal life and in their job. During the process of speaking with experts, students generated interview questions, took notes, and debriefed about what they learned.

Finally, the students selected one member of their community who inspired them and taught them about our Habits of Heart and Mind. Students wrote creative biographies and created Norman Rockwell style artwork, developed through multiple drafts. These pieces of work were exhibited at a local non-profit art center in San Marcos called Charity Wings.

Teacher Reflection

I was inspired and amazed at the efforts the students made to help their community. It was tremendously rewarding to see the outcome of our fieldwork as well as how accomplished the students felt. I hope that this project will be an inspiration for students to continue to help others outside of their school and persevere to make a difference in their community.”

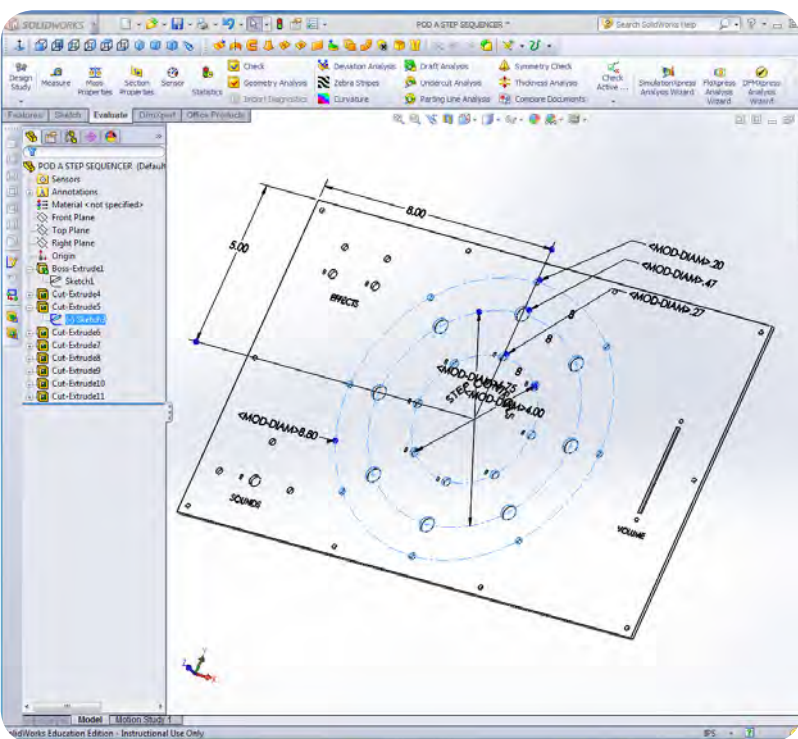
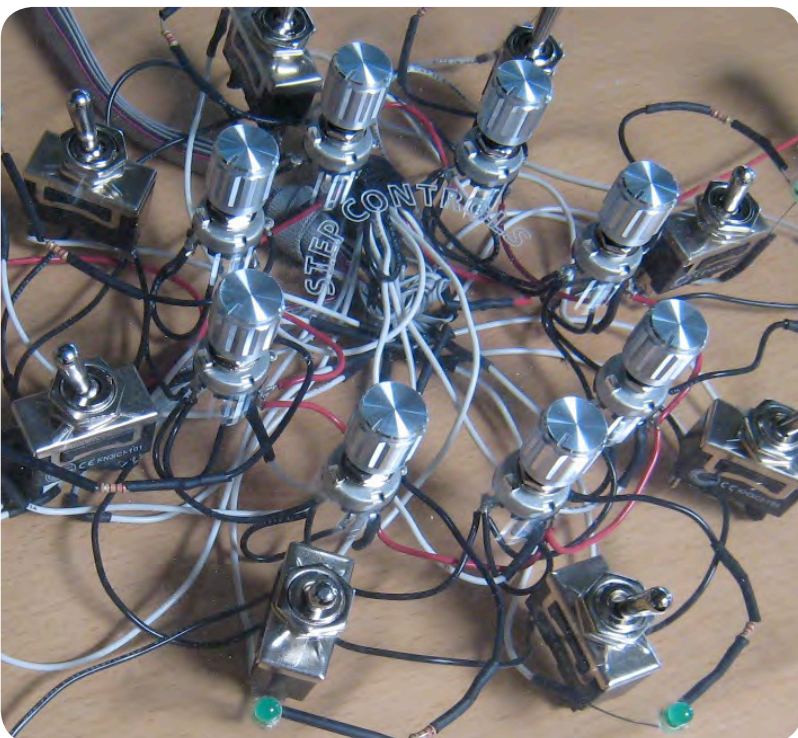
Student Reflections

My highlight of the project was going to the beach because we got to pick up trash.
—Grant

My highlight of the project was getting to help the community.
—Matteo

To learn more visit: mskimtsai.wix.com/htesecondgrade





Jambox Project

Mark Poole, 12th grade Engineering
High Tech High Clula Vista

Plato once wrote, “Music is the movement of sound to reach the soul for the education of its virtue.” Through music, we express who we are. It is an almost universal experience that connects us all. To explore how music can bring us together, students designed and constructed a MIDI (musical instrument digital interface) controlled Jambox. A Jambox is a social music creation device with which people of all musical abilities can come together, manipulate sound, and create music naturally. Our goal was to design an intuitive MIDI device that people of all musical abilities can use. Our essential questions were 1)How can a social music creation device encourage people with a range of musical abilities to create musical art?2)How can the engineering design process be used to coordinate the efforts of many individuals? Concepts and skills covered included Electricity and circuitry, computer-aided-design (CAD), Pugh chart analysis, and soldering/wiring.

Teacher Reflection

Music is a passion of mine and it was great to be able to share that passion with my students through a music-based product. I planned this project to start with a lot of individual designs that came together to create a single product and it required a lot of structures to support collaboration. Once the building phase came, it was amazing to see students supporting each other and independently distributing work. This project most definitely allowed individual strengths to flourish. I also used digital fabrication in this project. This meant that the build phase was optimized and allowed for more time to be dedicated to the design phase, which I consider to be where the meat of this project lies.

Student Reflection

Not only was I able to learn new skills like soldering and computer-aided design, but I was able to get into the user’s mind and determine what would be best for them. During exhibition, it was very obvious that the visitors were having a great time and enjoying their interaction with the Jambox. Overall, this was one of the most rewarding projects I have done at High Tech High.

—Austin

To learn more visit: markpoolesdp.weebly.com



LEGO Carnival

*Alicia Crump, 6th Grade Engineering
High Tech Middle Chula Vista*

Everyone loves a good carnival, especially the rides! In addition to adrenaline, fun, and excitement, carnival rides provide us a perfect example of simple machines in action. In this project, students combined their understanding of simple machines, motorized mechanisms, LEGO construction, 3D modeling, and engineering design thinking to create their own LEGO Carnival. In groups of four, students designed and constructed “Carnival LEGO” rides, each including a motor and a mechanism using gears or pulleys. Each team also designed and built a unique, scaled LEGO piece to improve the functionality of their ride, as well as an architectural feature scaled to minifigure size to be placed in our carnival. Students designed the LEGO piece and architectural feature on Google SketchUp, and printed them on our 3D printer.

Teacher Reflection

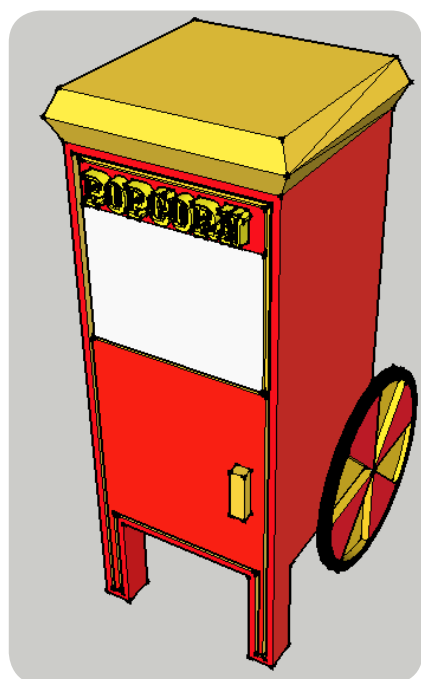
It is important to me that the students make connections between engineering design and real-life applications, such as the use of simple machines in amusement rides, and the ability to create unique, useable parts on a 3D printer. I enjoy presenting open-ended design challenges so the students can witness the creativity and variety of final designs. The excitement and enchantment of the final carnival exceeded my expectations as guests entered the room, hearing carousel music mixed with the whirring of LEGO motors and exploring the colorful LEGO rides, the beautiful architectural features, and computers displaying the students’ SketchUp designs.

Student Reflections

I am proud of my architectural feature because I put a lot of hard work into my Churro Stand. I am also proud of our ride engineer for making our ride happen. The best part was watching it function in our exhibition.
—Rosy

Before the start of this project I didn’t even know what SketchUp was! I also learned a lot about gears, pulleys, and levers. It was also very interesting learning about how the 3-D printer worked.
—Paula

To learn more visit: sites.google.com/a/hightechhigh.org/acrump



What's the Story – an Art Project

*Lucy Williams, Year 1 Students
School 21, Stratford, London*

This project was designed to develop children's painting and drawing skills as well as critiquing and redrafting skills. We started with a visit to the National Gallery in London and looking at a variety of artworks. We then explored how to use colours and textures when painting. The children read a story called Beegu and created an artwork using different colours and textures to represent the feelings in the story.

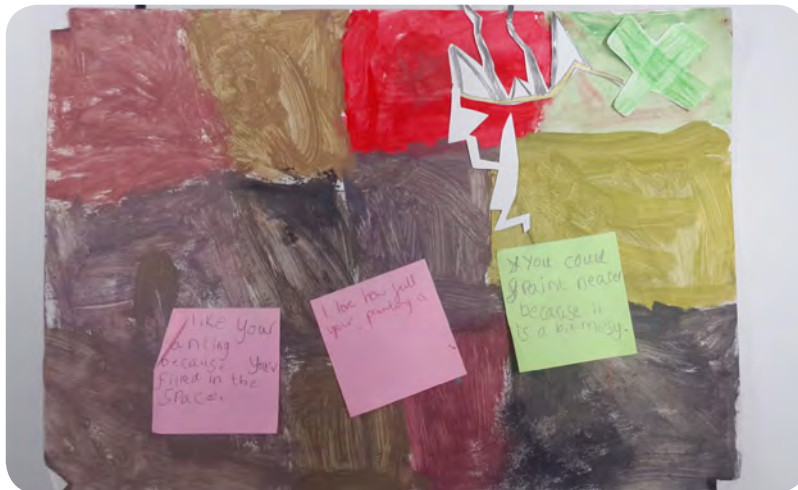
Teacher Reflection

As a new school and new in my role as Project-Based Learning leader this project was a chance to really develop the children's core skills of critiquing and redrafting. We felt it was important to begin our project with discussions and questions about various artworks so children could explore what they liked about art and how to talk about a work of art. This was a crucial stage as it allowed them to develop reasons for their own choices in their work. Our main dilemma was how to get children so young to produce something beautiful and thoughtful and we hoped this would come through critiquing and redrafting. We taught the children the three rules of critique, which they found easy to recall and put into practise. It was great watching the children feedback their ideas to each other and improve their work from that feedback with each draft. The final products were beautiful and each child could explain their choices and reasoning behind their artwork.

Student Reflection

I enjoyed going to the art gallery because when I looked at the paintings they were better than mine. The feelings I chose from Beegu was when she was tired with the puppies—I liked that part. I used green and blue splats in my first draft because they were confused colours. On my second draft I didn't do the same. I filled all of the gaps—that's what my partner wrote. I agreed with my partner and was interested in what she said. She helped me do it neater on my third draft because my second draft is not as neat. I didn't mind the critiquing. I've learnt how to paint more carefully.

—Noah (age five)





Raptors for Rodents

Jeff Govoni, Fifth Grade
High Tech Elementary Chula Vista

We were literally seeing mice run across our floors during our morning meetings. Custodians were spending valuable time trying to trap and remove the endless stream of field mice besieging our school from the open landscape surrounding the building. This was one of those projects that had an “in the moment” purpose which set up the kind of authentic product that we project based teachers are always seeking. After researching the local predators of rodents and carefully considering the impact each might have on the school environment, students decided that owls would be the safest and most effective choice for natural reduction of the rodent population. The students researched, designed, and built their own unique owl nesting boxes. Each team of students created three separate prototypes before building their final products. They also created power-point presentations and wrote persuasive letters that successfully raised more than half of the funding necessary for materials.

Post Script: The owl boxes did indeed attract nesting owls and the school's rodent population was substantially decreased.

Teacher Reflection

I was thrilled and surprised at the variety of skills this project touched. In math—measurement, conversion, fractions, mixed numbers, area, perimeter, 2-dimensional nets into 3 dimensional products. In writing, research-based persuasive letters to raise funds revealed the deep knowledge students had gained about local predators as well as the owl boxes themselves.

Student Reflections

My favorite part was the actual exhibition because it was fun to show everyone our work. The most challenging step for me was the building because it was hard to get all the measurement right and I had never done anything like it before. —Yasmin

My favorite part was making the prototypes because we made a miniature owl box. —Heriberto

To learn more visit: sites.google.com/a/hightechhigh.org/mr-govoni-s-dp/projects-2012-2013

Re-inventing Romeo and Juliet

Carol Cabrera, 9th Grade Humanities
High Tech High North County



Students created theatrical design elements—lights, sounds, costumes, set—for *Romeo & Juliet*... but set in a completely different time and place. What if *Romeo & Juliet* were Israeli and Palestinian? Cro-magnon and Neanderthal? Irish and North Irish? How would these design elements look different? What does it take to create a design pitch that would be funded by a producer?

Teacher Reflection

The idea for this project came from a thesis I wrote for theatre school that set *Romeo & Juliet* inside the French-Vietnamese Conflict. I realized then that the story could be applicable to any world conflict, and I decided to bring that to my students in this project. Working with Kurt Schwartz on the Physics aspect of this project was one of the easiest integrations in my co-teaching career. When I mentioned “War,” Kurt began talking about the money spent on war machines and the physics of different weapons. The idea of re-inventing these weapons of war into tools for good paired well with re-inventing *Romeo & Juliet* into this new time and place.

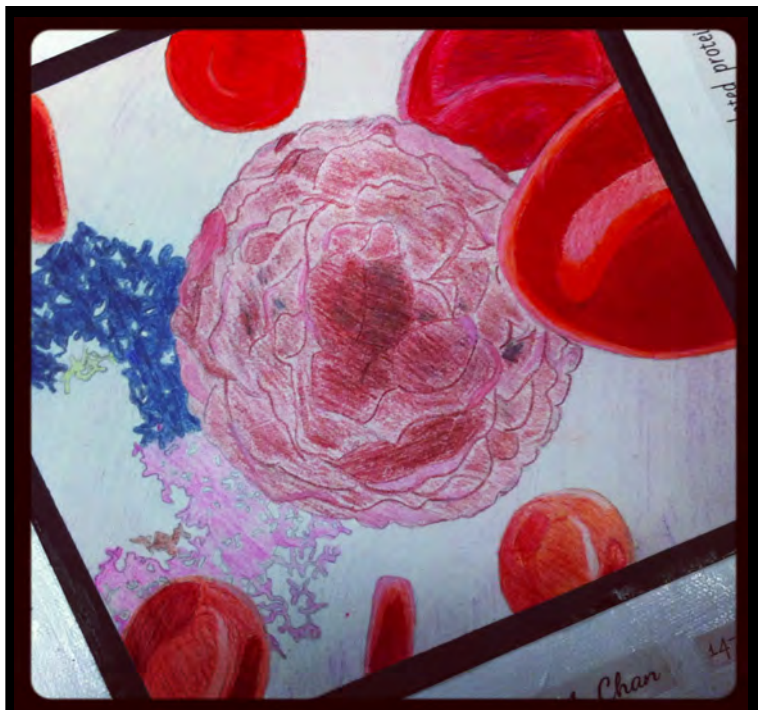
Student Reflections

I learned that a problem between two people can create a war of politics and later, when it is declared “over,” people will find another reason for hate. I will take away with me from this project to be tolerant and do my best to cause change. —Johanna

Researching the conflict was the best part of it. I got to learn so much about the culture of Israel and Palestine when drawing the costumes or sketches. I was fascinated by the war and how long it has been going on. One thing I will take away from this project is that if you let conflict and hatred go on, it spirals into a rivalry that lasts for generations and cannot be stopped. —Bonnie

I’ve learned about the meanings of evil, the mistakes of the past and the possibilities for the future during this project. Learning about these conflicts and finding connections between them allowed us to see why conflicts are often started. —Gabriela

To learn more visit: carolcabrera.weebly.com



In Sickness and In Health

*Shani Leader, Matt Leader, Alec Patton and Danjuma Quarless
High Tech High North County*

This 11th-grade interdisciplinary project used art, biology, and humanities to pursue the essential question “How can I take control of my health destiny?” All classes and curriculum centered around the theme of personalized medicine and personal empowerment in a modern world. Our commitment to real world application and introduction to experts was a central piece of the project. Through a National Science Foundation funded program we were allowed the opportunity to partner with a researcher for the duration of this project as well as working with other researchers from Scripps Translational Science Institute and UCSD. Project tangibles included art, oral history videos, life maps, research and interviews with scientists.

Teacher Reflection

For two months students were engaged in an in depth learning experience about health and well being. Students created multiple drafts of projects in all classes. They were also engaged in critique sessions that were cross discipline. Across the board, students were excited and proud of their final products.

Student Reflection

The moment that summed up this exhibition project for me, was when I got to talk to another student’s father for a long time about our project work. He was extremely excited to be talking about cardiovascular disease. I think the reason why this moment summed it all up is because the point of exhibition is to exhibit our work to the public and teach them something. But at the same time I think it is an equal opportunity for us to learn more. We can never have too much information or know everything about a topic. In addition, showcasing my art was one of my biggest accomplishments. I have never felt that I am good at painting or art, so for my piece to be put up on the wall, I was really proud.

—Daniel

To learn more about this project and others, visit sleader.weebly.com/ or alecpatton.weebly.com/ or steamprojectleaders.com/



Water We Doing?

Aliza Cruz, Math II/Chemistry

Laszlo Folks, Humanities

High Tech High Chula Vista

Tenth graders stepped into the shoes of scientists and became stewards of our environment by implementing solutions to local water issues. Students learned about the history of the world through water, collaborated with local and regional organizations, and engaged in scientific research to test solutions to issues such as water pollution, lack of clean water access, overuse or waste of water supplies, and endangered marine life. Students submitted their action plans to the Siemens We Can Change the World Challenge, a national K-12 environmental sustainability competition, and created a documentation panel and interactive exhibit to showcase their work.

Teacher Reflection

The Siemens competition challenged our students to think like scientists and tackle real problems that affect real people. By providing a rigid but broad framework, we were able to incorporate student voice and choice in the design and execution of each group's action plan. Solutions included a solar-heated water bag, a three-step filtration for our school's reclaimed water supply, and a quantitative study of the impact of hand sanitizer on water usage and bathroom resources.

Student Reflections

The research and hours of time that we spent working have changed me. Every day brought me closer to my group and my planet, giving me a strong understanding of why I should care and what I can do to help.

—Aine P

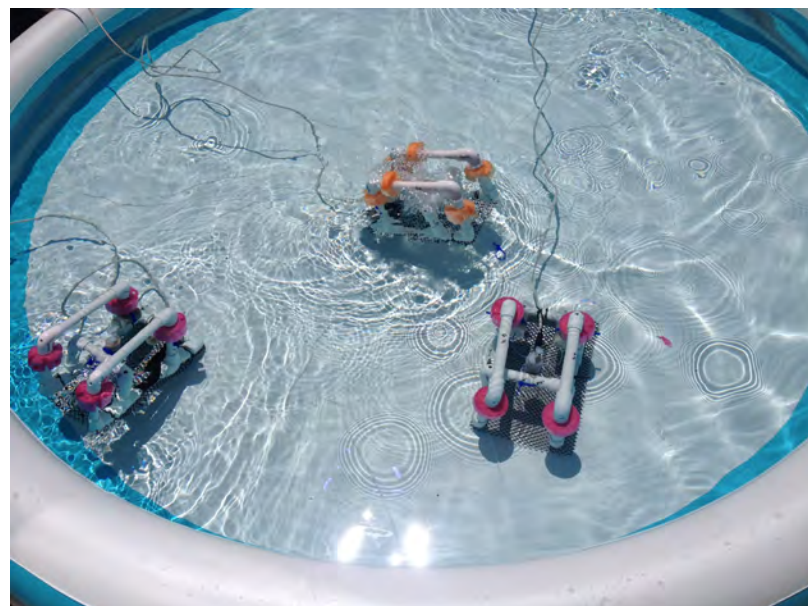
This project helped us construct an idea of our issue based on the expertise of professionals in the field. The Siemens challenge made us realize that the work we were doing would have an impact on the community that would transcend HTHCV.

—Rafael R

The level of learning was incomparable to anything I've ever done. Giving back to a community and knowing that your hard work is currently serving a purpose and benefiting a family might just be the best feeling in the world.

—Erika A

To learn more visit: zurcazila.weebly.com/projects



Creating Ripples with Underwater Robots

*Kara Quinlan, 9th Grade Physics
High Tech High Chula Vista*

This project took students from robotic ideas, engineering designs, structural, electrical and mechanical systems, to a final assembly of their Underwater Remotely Operated Vehicle (ROV) robot. Students used their ROV to understand buoyancy forces and density acting on a submerged object. Once the ROVs were complete and tested, the students entered the SeaPerch Tournament and competed against other Southern California schools in two separate missions: an underwater obstacle course challenge and a heist mission. In the heist mission their ROV slid an underwater gate open, went through the gate and recovered a block of wood on the pool floor at depth of six feet. Throughout the project, professionals from the United States Navy, SeaPerch, Exploring STEM Careers Initiative (ESCI) and SeaBotix served as resources for the students in their ROV assembly and troubleshooting. The project lived on after the competition at Living Coast Discovery Center (LCDC) to complete research for the coastal region, and add sensors to the ROVs.

Teacher Reflection

This project encouraged students to think outside the box in how they viewed physics and robotics. My students could not believe they built their own controller from breadboard electronics. I saw my students' attitudes change and become excited as their robots took shape and came alive. I stood back and saw 54 excited, engaged students flagging down their friends to show and teach them about their ROV. I overheard students saying they never knew they could "do" robotics and now they want to study robotics and engineering.

Student Reflections

The most memorable moment was when all the pieces of the robot came together. I am more excited to be an engineer.

—Jacob

I am more interested in robotics now than before and realize I can build a working robot! Imagine what you can do when you have more parts than just what was in the high school. —Rosy

To learn more visit: quinlank.weebly.com



Keana Lock's reproduction of Adam Lupton's Butterfly Effect

A Picture is Worth 1000 Words

*Jeremy Farson, 12th grade Art
Pam Baker, 12th grade English
Chris Trompas, English Student Teacher
High Tech High International*

This was a collaborative project between 12th grade Art and English classes where students chose a piece of art to reproduce and then wrote the 1000 word story that emerged from the painting as they studied it. Although the story didn't have to be biographical, students (and teachers) researched their artist, asking the following essential question: *How does an artist's life show up in his/her art, and what kinds of stories might emerge from a close reading of the artist's art, life, and environment?* After multiple workshops and revisions, the finished products were collected in a book that is available for purchase through Amazon.

Teacher Reflection

By linking a creative writing assignment to an introductory painting exercise, we noticed the students' efforts become deeper and more purposeful, giving greater significance to the experience and effectiveness of reproducing a work of art. The writing informed the reproduction of the painting and vice versa. Researching the artist, the time, the history behind the work and the era, helped students to become more familiar with the context in which the artist worked, thus allowing students to make use of the stories that naturally emerge after spending a significant amount of time with an image. Very few students had trouble coming up with an original story based on their painting.

Student Reflections

It was hard to get 1000 words but it challenged us to develop a story within those limits and tested our writing skills. —Teta C

I enjoyed the freedom to write about and create my own world around a piece of art that I found interesting. —Vincent S

The fact that I had to keep my story at a thousand words challenged me to figure out what was actually crucial to my story.

—Jon B

To buy the book on Amazon visit: <http://goo.gl/kOYNNoU>



Toy Story

*Janna Steffan, Ruby Rodrigues, Jami Saville, 2nd Grade
High Tech Elementary, Chula Vista*

In the Toy Story project, second graders explored the essential question, “What is the magic of toys?” To investigate this idea deeply, our students visited a local preschool and became buddies with these young children. They surveyed their new friends to learn about the types of toys they like, their favorite colors, favorite characters and so much more. After finding trends in the data collected, the students used this information to design the perfect toy for their preschool buddy. After many drafts, critiques, revisions and prototypes the students took their designs to MakerPlace (a DIY workshop in San Diego) in order to professionally create the toys. Students also studied story elements by reading a variety of stories that have a toy as the main character. They incorporated the elements they learned into a story about the toy they created for the preschooler. And then they learned the writing process in order to publish their story in a board book for their buddies. Finally, our second graders returned to the preschool to give both the toy and the book to the preschoolers.

Teacher Reflections

When designing this project, it was important for us to have a product that was minds on, hands on, and hearts on. Since every second grader loves toys we thought that would be the perfect fit. This project felt like a great blend of allowing the students to have choice and be creative while learning many essential math, reading, and writing skills. Throughout the project, we wondered if our students would be upset to give away a toy and story they had worked so hard on but we were pleasantly surprised at their eagerness to give a gift to another child. We felt like the authentic audience in the project was also another driving force in its success.

Student Reflections

“The magic of toys is they can come to life. They encourage kids. They’re adventurous. They help kids imagine.” —Joshua

“The magic of toys is that they have feelings too. They can talk!” —Zuri

To learn more visit:

<http://jsteffan9.wix.com/digitalportfolio#!toy-story/c5ic>



Practicing English by Playtesting Games

*Jonathan deHaan,
University of Shizuoka, Japan*

In this project, 85 university students in Japan, all of whom liked board and card games, were supported for three 90-minute classes through the process of playtesting a card game for an independent designer on the Board Game Designer's Forum (www.bgdf.com). Groups read the game rules and the designer's questions about his game, then prepared the components and played several times. After a short lecture and exercises on giving polite suggestions in English (e.g., "you might not want to...." and "it would be really great if you could..."), students collaboratively wrote feedback and a short message. Their feedback was sent to the designer, who wrote an extensive response to the class expressing his gratefulness for the amount, variety and quality of their feedback. Each student reflected on the tasks and brainstormed how they could use their English skills to communicate and contribute in their personal areas of interest.

Teacher Reflection

Each stage of the project seemed meaningful: the students read carefully in order to play; they had a great time exploring a new game together; and they thought and wrote critically. I think the success of playtesting projects depends on matching students with the right game (length, complexity, language). Students could be asked to use online analysis tools like <http://www.lexutor.ca/vp/eng/> or http://www.lexicool.com/text_analyzer.as to find new and important language. Video game playtesting using sites such as <http://www.betawatcher.com/>, <http://massively.joystiq.com/category/betawatch>, <http://gamingbetas.com/> or <http://www.deathbybeta.com/> might also work well. I want to do more to help students use their language skills to communicate and collaborate in other (self-chosen) niche Internet communities.

Student Reflection

Some said that the project was "really fun," "a little difficult, but got easier," and "it improved my critical thinking skills." Other said it was "rare and meaningful;" "the years of studying English bear fruit. English enables us to have connection with many people in the world."

To learn more visit: <http://jonathandehaan.net/>



Wild Pond Protectors

Shelley Glenn Lee, *Science Exploratory*; Kari Shelton, *Kindergarten High Tech Elementary North County*

At the beginning of the year the kindergarteners learned about their own community and how individuals depend on one another, and then their attention turned to the communities around them. Through an interdisciplinary, collaborative project that lasted five months, the students tackled these essential questions: How are plants and animals helpers in their communities? How can we help protect our local ponds? To build content knowledge, students studied the wildlife at several locations in the local watershed, built and observed their own pond models in science exploratory, and became an expert on one local pond animal with the help of students from Matt Leader's 11th grade biology class. In the end, each student created three distinct products:

- 1) A "Wild Pond Protectors" television episode using a combination of stop motion animation and live action video to teach viewers about how pond animals use special features for survival.
- 2) A conservation poster featuring their animal that will be displayed in the San Dieguito River Park.
- 3) A page for our collaborative children's book, *Protect Our Ponds!*

Teacher Reflections

We exhibited our project work with a Pond Discovery Center in the spring and intended to move on to a new project, but the students were more dedicated to their work than ever after exhibition. They really wanted to spread their message of conservation to an even bigger audience, and it was their idea to create a television show and posters, so we followed the interests of the students and continued the project for two more months. In addition to teacher collaboration, having community partners, an authentic audience, and meaningful work in the classroom can really inspire students, even kindergarteners, to make a real difference!

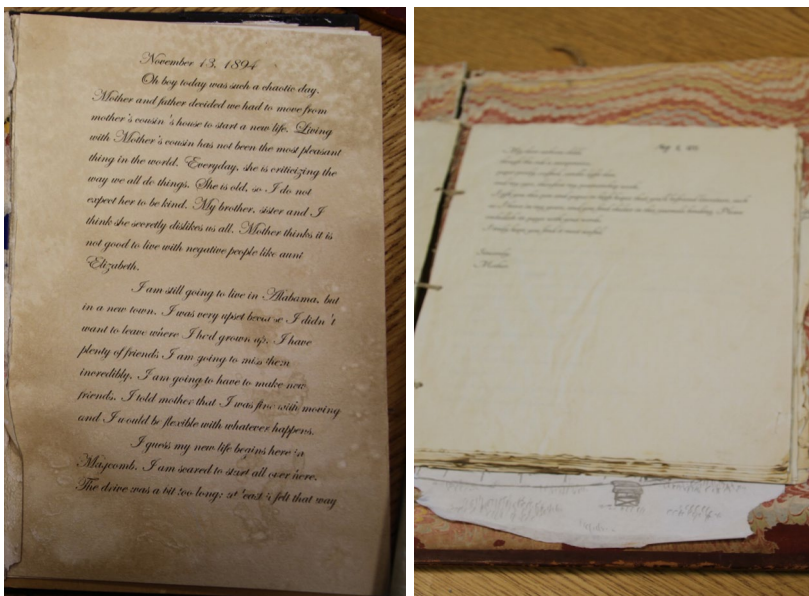
Student Reflections

"Don't kill bees because they pollinate the flowers" —Bryan Ramirez

"I felt good about exhibition because we got to celebrate ponds."

—Desmond McDonald

To learn more visit: <http://sglennlee.weebly.com>



In Their Skin

Karly Robinson, 8th Grade Humanities
High Tech Middle Media Arts

In Harper Lee's *To Kill a Mockingbird*, Atticus Finch famously encourages his daughter Scout to try to see things from other people's points of view, to "climb into (their) skin and walk around in it." All too often we focus on our immediate impressions when considering other's perspectives, forgetting that there is a world and a history that tails our every move. During this project, students examined three major themes in 1860 - 1960 American history: racism, modernization, and youth culture. The class read *To Kill a Mockingbird* and students chose a book with similar themes to read in a group. Using these readings as guide, students wrote a work of fiction based on a character's journey in *To Kill a Mockingbird*. In order to be able to fully inhabit their characters, students needed to do significant research about their character's world.

Teacher Reflection

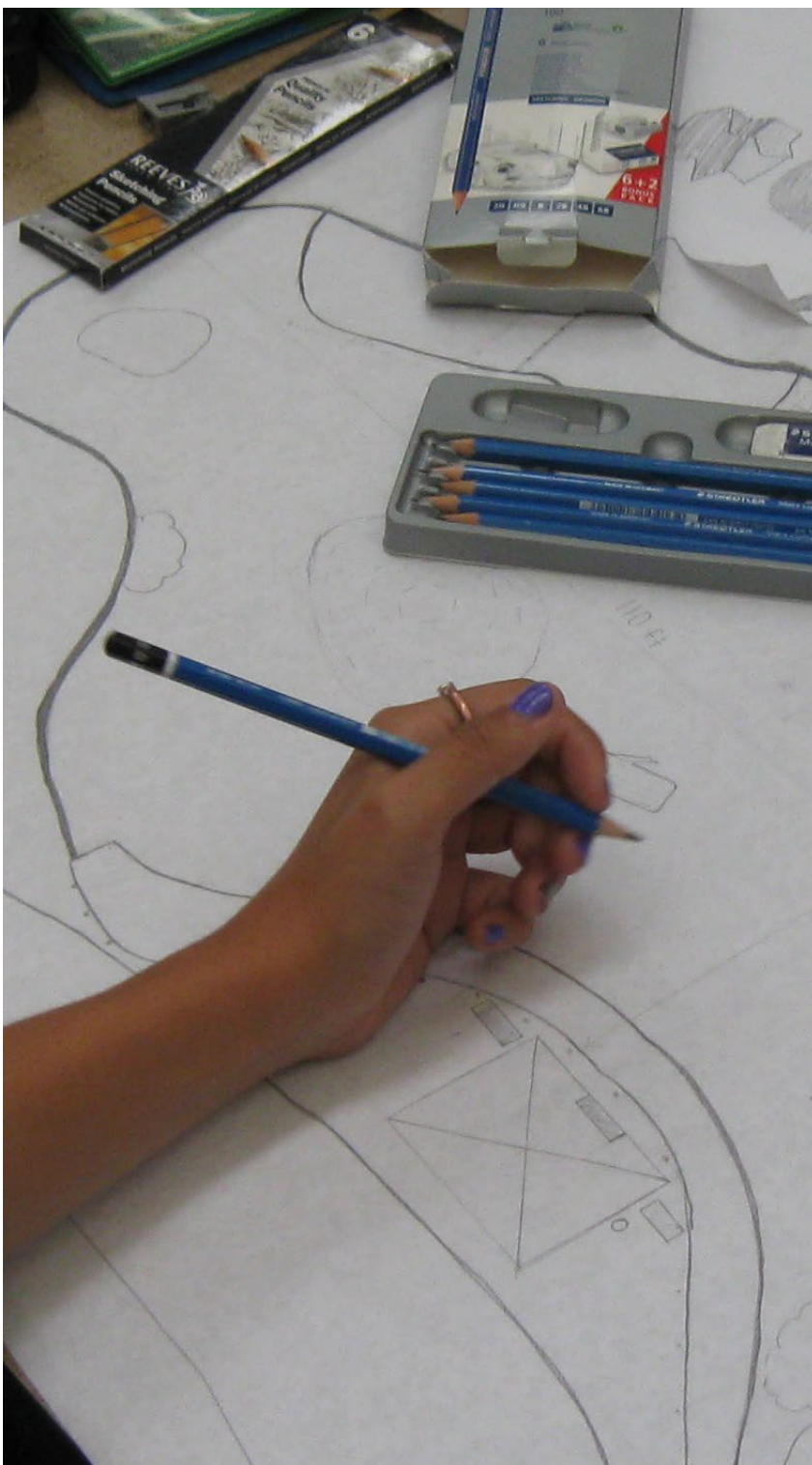
This project is now in its third iteration and each year I find new entry points to make this classic novel relevant to a modern audience. This project is about so much more than reading, writing and research. It's about understanding the motivations that drive individuals and society. Through the research and the fictional writing, students are forced to consider these forces as they construct character stories that fit with the time periods and development within the book. Parents who hated this part of the required reading when they were in school are often surprised to see how much their kids (some of them reluctant readers) thrive in this project.

Student Reflection

I learned a lot about the past from *To Kill a Mockingbird*. I thought it was a well portrayed story of a terribly true time period. Every time I read a well written story it helps my writing improve. *To Kill a Mockingbird* gave me a knowledge of that time that I really needed to make a good character. The research process helped me find reliable secondary and primary sources.

—Rose Wilson

To learn more visit: <https://sites.google.com/a/hightechhigh.org/krobinson/home>



Zoomanity

David Gillingham, Leily Abbassi, Maggie Miller, Mary Williams
High Tech Middle 7th Grade

In this nine-week project, students worked in groups of four to design an enclosure for a soon-to-be-renovated section of the San Diego Zoo called Africa Rocks. Using the actual shapes and dimensions for the planned enclosures, all group members offered input on what the enclosure should contain (structures, vegetation, viewing areas, etc). Each group member had an individual job within the project: Site Plan Designer, Project Manager/Blogger, Education Expert, or Sketch-Up Technician. Throughout the process, students utilized critique from adults in the field (architects, zoologists, landscape designers) to work through drafts/designs of their enclosure. Eventually, each group presented their designs to a panel of volunteers and employees from the San Diego Zoo.

Teacher Reflections

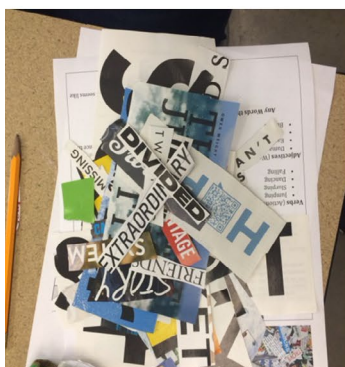
Having the students design an enclosure in the Zoo's Africa Rocks using the actual architectural site plans was a stroke of luck that led to a natural "buy in" for the project. The students became passionate experts about the animals in their enclosures—often having heated debates, based on their research, about design decisions such as water depth, sleeping locations, and number of play structures. When they moved into their individual job for the project, students were able to demonstrate their own strengths, either perfecting an area in which they had previous experience, or pushing themselves to learn a new skill. Having a final audience of actual zoo experts was a powerful experience for 7th graders, which they took seriously. The zoo panelists were able to give authentic feedback and ask probing questions about each group's design choices.

Student Reflections

I could put all of my artist talents in the illustration part of the project, and it showed me how architects draw up buildings and how they work. It was cool to get critique from real architects. —Simran

I liked how we got to use real dimensions and got to see the layout of the zoo. It was really a challenge creating an enclosed space in 3-D, but I really enjoyed it. Now I can design my dream home... —Guy

To learn more visit: <http://millerwilliams.weebly.co>



Creative Collective: An Integrated Project of the Arts

Charlie Linnik, Art; Mike Vasquez, Multimedia
High Tech Middle

Our 6th and 7th grade students collaborated to create an art piece that combined the digital and visual arts. Each group created one unified piece that showed how design choices, color schemes and imagery would enhance and support the overall emotion and tone of the piece. Students learned how color psychology helps artists understand the power of color, and students applied color theory to help them develop color schemes and palettes. Students designed custom fonts by hand which conveyed the tone of their piece, then used Adobe Illustrator to create a vector graphic version of their typography, necessary for use with a laser cutter.

Teacher Reflections

Students take separate visual and digital arts classes over the course of their middle school experience. This project offered students an opportunity to see how it is possible to blend different types of media in the creation of an art product. The integration of our classes helped students to see how the arts are composed of multiple styles, mediums and techniques; no longer was hand made art and technology separate in the art process. Creative Collective helped students to understand the process involved in solving creative problems/challenges and how art can be a beautiful by-product of this process. Students were more open to the art process and engaged in finding solutions as a result of being given these creative challenges.

Student Reflection

It was fun to combine these two types of art classes, and to work with the 7th graders. I used to think art was either on the computer or hand-made. Now I see how they can be used together to make one stronger art piece. At first the creative challenges were hard, but after a while we worked together and came up with good ideas and solutions. The project ended up being so much bigger by mixing the classes and the grades.

—Giselle, 6th grade

To learn more visit: <http://dp.hightechhigh.org/~mvasquez/> or <http://charlielinnik.weebly.com/>



iWeek CHALLENGE



Roosevelt Innovation Academy

Making New Members Feel Welcome: A Design Thinking Challenge

Corey Topf, William Cotter, and Joseph Bonnici
Roosevelt Innovation Academy, Peru

To kick off the school year, a mix of grade 10, 11, and 12 students were given a design challenge in the form of a question: “How can I help new people feel welcome to Colegio Roosevelt and make their transition to our secondary school better?” Students were divided into three mixed-age groups. Each group was assigned a different target audience that included new teachers, new students to the school, and new students entering middle school. Using methods of design thinking, along with the Lean Startup “Learn, Build, Measure” cycle, students had three days to design a solution. They presented their proposed solutions to an audience of parents, counselors, board members and fellow students, who judged the projects for desirability, feasibility, and viability.

Teacher Reflection

Rather than begin the school year with the traditional syllabus and “rules of the class,” we wanted students to feel what the Roosevelt Innovation Academy was all about by experiencing its core principles for one week. In this design process project, students learned how to define project roles, set deadlines and understand the needs of an authentic audience, while developing empathy and a real world solution.

Student Reflections

I learned the importance of having everyone on the “same page” during the project and how communication is much more effective in smaller groups. Also, I learned the importance of having a good prototype so that you can get good feedback on your idea. —10th grade student

I learned that we don’t always learn by listening; it’s achieved more effectively by doing. This is because when taking action, we go more in depth and this drives motivation. —11th grade student

We were able to overcome the distrust that held us apart by clarifying what kept us together: our passion towards learning. We learned that “group work” was most effective when we found out each other’s strengths and organized ourselves around them. —12th grade student

For a video summary of the process visit: <https://www.youtube.com/watch?v=FlyBrZXBOA0>; To learn more about the Roosevelt Innovation Academy visit: <http://www.rooseveltinnovationacademy.com/>



Food for Thought

Mariah Mellinger, 9th Grade Chemistry

Colleen Green, 9th Grade Humanities

High Tech High International

The goal of this project was to create a 100% sustainable aquaponics garden that the school community could enjoy and use. Students learned how urbanized gardens positively affect the community, how the aquaponics system itself works and is regulated, and how other sustainable garden practices, such as vermi-composting and use of heirloom seeds promote sustainability. In humanities, students wrote OpEd pieces and created original political cartoons on topics relating to controversial food topics (such as fat shaming, false advertising, misleading nutrition, etc.). In chemistry students learned the science behind what fat does to our body as well as the chemistry of aquaponics.

Teacher Reflections

This project was truly student-led and student-driven throughout. They made daily work plans for themselves (and followed through), encouraged each other, problem solved together, and made connections within their communities to make this project a success. They also articulated their vision in their writing and political cartoons, revising their work five and six times, for no grade, to make sure they were proud of their finished products. At exhibition, all students were fully engaged, passionate, and eager to share what they had learned and what they had worked so hard to build. At every step, the students showed resilience and tenacity, completely driven by their passion to make the world a better place. In the process, we felt much less like teachers and more like mentors, working to support the vision and excitement of our students.

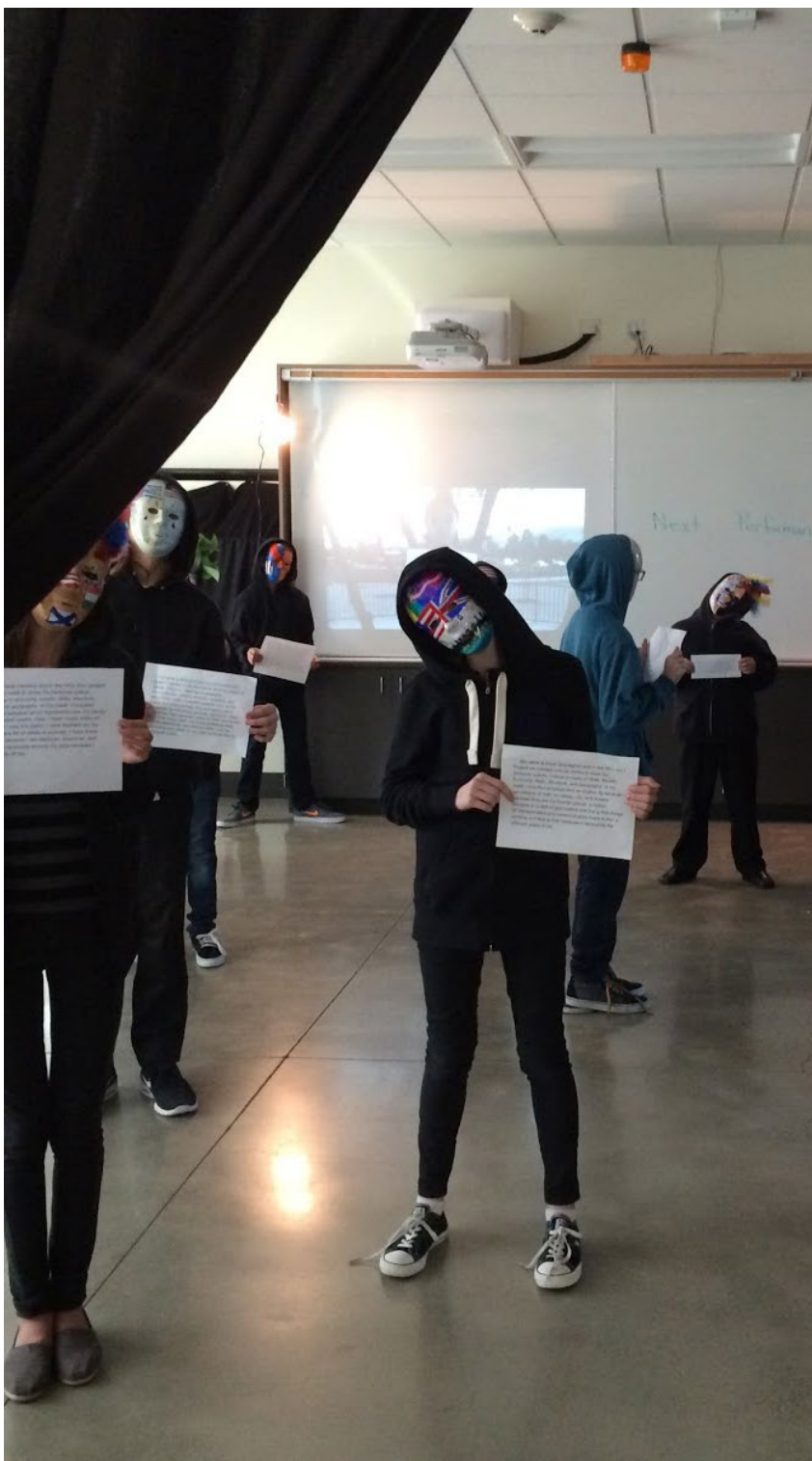
Student Reflections

I really liked how we took a serious look about what comprises the American food diet especially the industrial side of it. It has made me conscious about what I eat. I enjoyed seeing this project come together and seeing everyone working as a well-oiled machine. —Will

I enjoyed building the aquaponics system and learning that we can use environmental resources to make a sustainable garden —Rebecca

I learned a lot about wood building, chemistry, writing OpEd pieces, aquaponics, gardening, and most of all friendship. —Connor

To learn more visit: <http://cgree4.wix.com/colleengreen#!projects/cm8a>



Who Am I?

Corey Clark, *Humanities* and Kristen Voss, *Math/Science*
High Tech Middle North County

In this interdisciplinary project, students examined several different facets of their identities through multiple lenses and explored the implications of their identities and the prejudices that exist in the world around them. By exploring how their genetics shaped their identities, they were able to further understand why they are the way they are. The students put together several different products for exhibition; they created infographics highlighting how they received one of the traits that make up their identities, used photoshop to alter iconic images to change the public's perception, wrote short narratives in the form of their actual fingerprints describing pivotal, defining moments in their lives, and created masks to represent aspects of their culture. The classrooms were completely transformed into a gallery/performance space. Along with their other final products, the students collaborated to create a performance piece exhibiting some of the aspects of social injustice that they explored throughout the project.

Teacher Reflection

This project turned into such a meaningful experience for us all. Because the project was completely interdisciplinary, connections were made that wouldn't have happened otherwise. We launched this project by visiting the Museum of Tolerance and discussing what causes social injustice, which led to our exploration of identities. The timing of the project allowed us to bring in difficult issues like Michael Brown and Eric Garner which gave the entire project a larger sense of significance.

Student Reflections

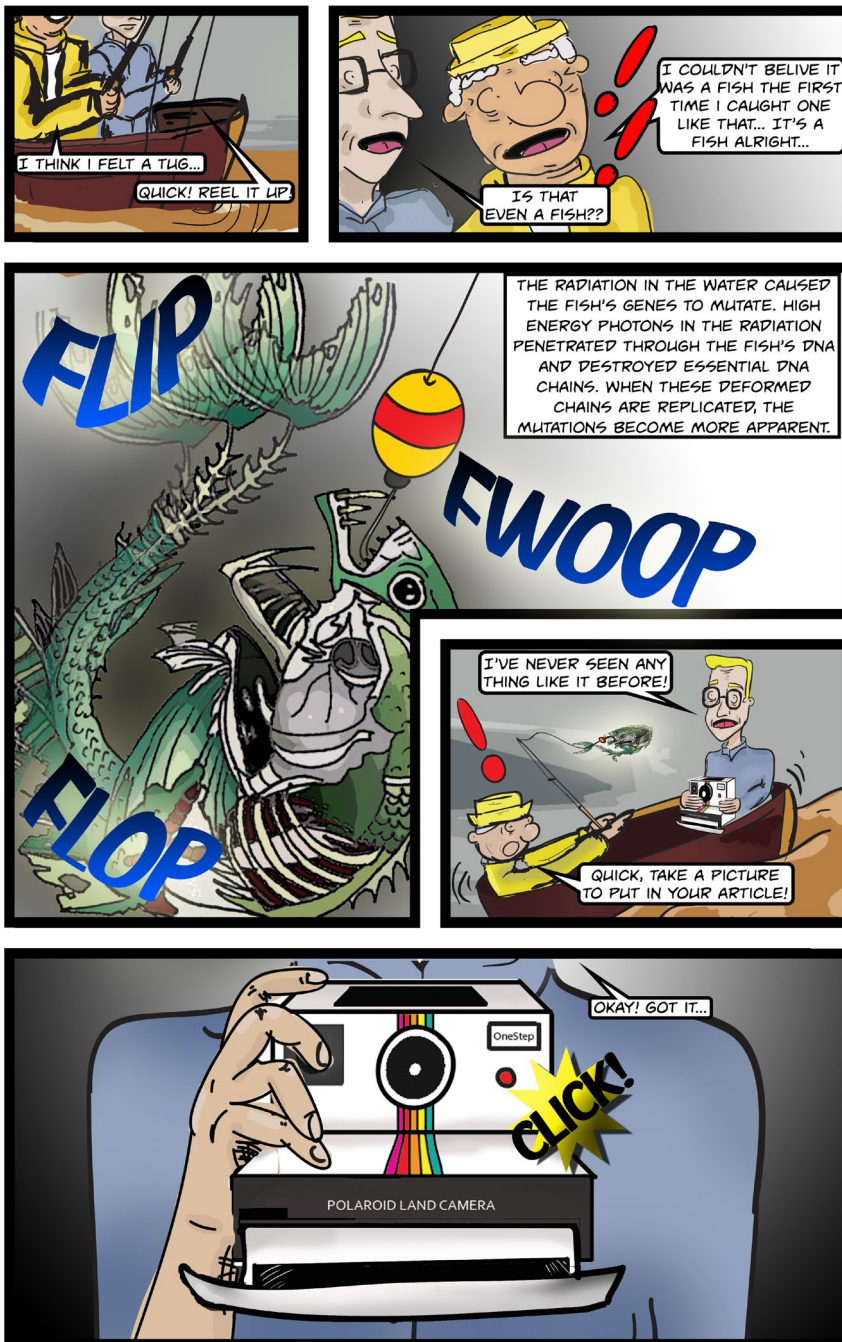
The most impactful experience was learning about social injustice past and present and how it is still affecting us now. It was something close to heartbreaking for me. —Henna Hall

This project was very impactful, defying stereotypes in a way that put you in awe...it opened my mind. —Matthew Mau

To learn more about this project and others, visit <http://knvoss.wix.com/digitalportfolio>

Subatomic Black Hole Soup: A Graphic Novel Project

Andrew Gloag, Physics and Kelly Williams, English
Gary and Jeri-Ann Jacobs High Tech High



For this project, seniors explored the task of teaching a complex physics concept in a compelling way through the medium of a graphic novel. Students began by investigating various modern physics topics ranging from time dilation to black holes while simultaneously studying storytelling and the graphic novel. Students read nonlinear texts like Vonnegut's *Slaughterhouse Five* and then studied various graphic novels like Moore's *V for Vendetta*. We also partnered with a local comic book studio and had a comic book artist mentor students throughout the process. Our team ultimately created four graphic novels that taught difficult physics concepts in an accessible and engaging manner.

Teacher Reflection

A unique aspect of this project was the grouping. Students were in larger 'graphic novel' groups of twelve where they had to develop a story based upon their physics concept. The exchange of ideas during this phase was amazing to watch. Students then paired up within those larger groups and were responsible for creating one of the graphic novel chapters, which forced them to communicate, critique, and have a sense of responsibility to the larger group. We liked how this mimicked working collaboratively in the real world and allowed for student voice and choice. Getting hands-on with the big concepts in modern physics is a challenge, and we wanted to create an authentic project based around them. By becoming experts on their topic and creating their novel, students were able to demonstrate knowledge and teach others through the work they created.

Student Reflection

This project allowed us to produce an enthralling scientific graphic novel. We learned the fundamentals of comic book writing and how to draw action packed scenes using a variety of shots. Overall, students had to work alongside their neighboring chapters to create an engaging, cohesive story.

—Delilah Nichols

To learn more about this project and others, visit <https://sites.google.com/a/hightechhigh.org/test-site-17/home/projects>



Run Like A Girl: Don't Judge Me

Jeremy Manger, 3rd grade

High Tech Elementary North County

Recently, I asked my 5-year-old son “what does it mean to act like a girl?” He told me that girls play “nice things,” and boys play “bad things, like rough games.” I brought these issues to my class. Students observed and interviewed their peers from kindergarten through high school to study the social norms and common stereotypes that exist within our school community. Through reading and reflection, students explored their own identity and the stereotypes that define (or don't define) them. Each student kept a blog and wrote a memoir about a time she felt mistreated. A mixed media artwork was created and students wrote several six word memoirs that conveyed a message or a final reflection. As a culmination, students were challenged to teach their community the lessons that they learned. The class decided on four final products: producing and presenting a play, raising money to fashion their own t-shirt design and silk screen printing them, inventing Friendship Fridays and creating a short film about the process, and building a website to streamline our products (www.htencsocialstereotypes.com).

Teacher Reflection

I am proud of my students' ability to ask difficult questions: How should girls act? How should boys act? Are boys and girls really that different? What is gender, and why do we separate girls and boys? Yet surprisingly, this work did not bring us closer initially. We bickered more. For example, one day, a game of tag turned into a fierce game of girls versus boys that ended with several injuries and lots of crying and calls home. It seems as though our thoughts changed and became better articulated, but our behaviors remained unchanged for the time being. The process was indeed messy, but our questions were answered and our work continues to change the negative stereotypes that exist in our community.

Student Reflection

What I learned during this project is that we shouldn't judge other genders. We're all humans.
—Matteo

I learned that it is hard to make a website by yourself, but easier with friends.
—Matias

To learn more about this project and others, visit <http://mrjeremy-manger.weebly.com/project-descriptions.html>



Response-ABILITY: Empathy in Action

*Michelle Sadrena Clark and Shani Leader, 11th Grade
High Tech High North County*

Few people recognize or understand the conflict and crisis that result in refugee populations, and fewer still know what challenges refugees face in their adopted country. Students had an opportunity to intimately learn about the refugee experience and demonstrate empathy in action. They read autobiographical narratives, listened to refugee guest speakers, and conducted in-depth interviews of high school-aged refugees in San Diego county, then utilized that knowledge to create professional quality art, spoken word poetry that culminated in an arts and poetry festival. Refugee students shared their testimonies, HTHNC students performed their poetry, and their artwork was auctioned to the highest bidder. All of the proceeds from the silent auction were donated to the International Rescue Committee's Peacemaker Scholarship Program.

Teacher Reflection

I can honestly say that this project has been the most meaningful of my career. It involved transformative learning for all participants, and fostered visible and lasting empathy among students. This was a special project because pride literally emanated from the room the night of our exhibition. There was not a dry eye in the room, including mine. Students knew that their work had an authentic purpose, one that affected real people, which impacted their motivation.

Student Reflection

Before this project I wasn't aware that there are refugees living in San Diego. I always assumed that San Diego was full of middle-class people, not refugees from war-torn countries. During the exhibition, I purchased one of the paintings of the refugee I interviewed, Myo, and gave it to him as a gift. I've given tons of gifts in my life but none felt as good as giving the painting to Myo. I learned a true sense of what it means to give and I think that is more valuable than any factual knowledge out there. —Grady

To learn more about this project and others, visit <http://thedifferencemaker.weebly.com/response-ability-empathy-in-action.html>



2084: Junk Puppet Theatre

*Jeremy Farson, Art and Pam Baker, English
High Tech High International*

The novel 1984 is considered by some to be prophetic, but in many ways it was just Orwell taking some of what was happening in his world to a logical extreme. Often in dystopian societies, the original intent is good, but when taken too far becomes harmful. Our project goal was to challenge students to think about the current controversial issues they were researching, while also reading Orwell's novel and then to imagine how these topics might develop in the coming future, whether good or bad. Next, they collaborated to create a future world and characters who exist in this fictional setting as the basis for their own short story. Finally, in small groups, students chose just one of their stories from which to create a screenplay for a narrated, "Dystopian Junk Puppet Theater Video" where they constructed the environment and characters mostly from recycled materials.

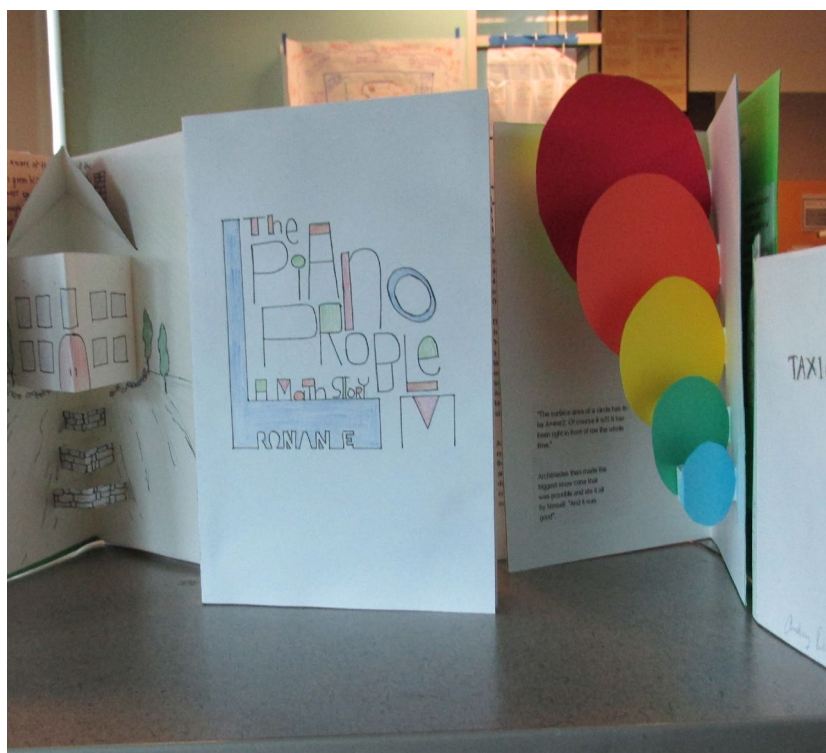
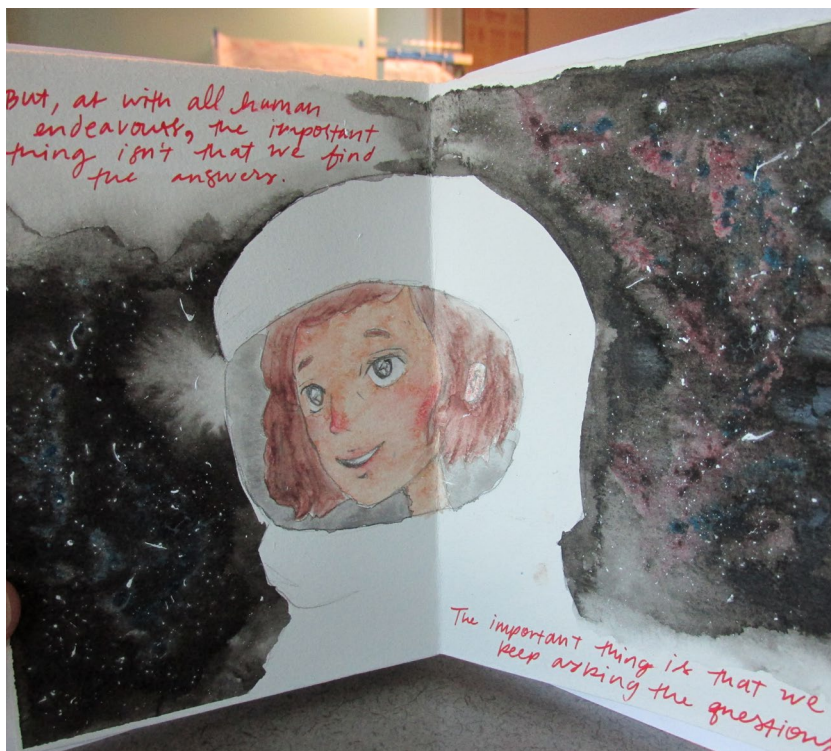
Teacher Reflections

Through the multiple layers of the process, this project built upon and pushed student understanding of dystopian societies and how and why they occur. By laying a foundation of understanding through our reading of 1984 and bringing like concepts into contemporary society, students came to view current topics through a different lens, one which allowed them to place a current issue in a sci-fi world with a cast of characters of their own making. Additionally, the level of student engagement in writing was heightened by concurrently creating and producing their puppet theater. Both imagining their story and seeing it come to life as a physical artwork helped to push and strengthen their vision, ultimately deepening the conceptual aspects of the project's goals.

Student Reflection

Have a great idea is one thing, but reenacting it and making the puppet show look professional was a challenge, requiring time, effort, and patience. I really enjoyed the collaboration, creativity and freedom we had in designing our puppets and backdrops. —Eric

To learn more about this project and others, visit <http://jfarson.weebly.com/junk-puppet-theater.html>



Once Upon A Prime

Mele Sato, 11th grade Mathematics
High Tech High Media Arts

What role did mathematics play in defining history? How did war, famine, and social revolution shape the lives, creations, and advances of mathematicians? How did these events change their perspective of their work and how did they play a part in shaping our history? Students offered answers to these questions in the form of short, narrative non-fiction stories which were glimpses into major moments in the lifespan of mathematics and in the lives of the mathematicians whose innovations catalyzed those moments. After studying paper folding and circle related theorems, students learned the basic elements of creating pop-ups before then teaching these newfound skills to HTMMA 7th graders. Combining pop-ups with their own illustrations and original stories, the students handcrafted books that brought their characters, history, and mathematics to life.

Teacher Reflection

The biggest motivation for this project is my love of storytelling and learning about mathematicians during their most defining moments. I have heard so many fascinating stories of mathematicians. To help shape their writing from an essay to a story I asked questions like, “What was it like living at that time?” “How would she have gotten from Berlin to London to speak at the symposium?” or “How would you have felt if your life’s work was considered blasphemy?” Every year I learn something new from reading my kids’ stories that pull me into the often esoteric world of mathematical history. Through their narrative skill, thoughtful research and perspective-taking, the work of my students hooks me every time, and makes me wish the story would never end.

Student Reflection

Math projects don’t always have to be about showing your work to a really complicated word problem, they can be about learning the history of math, learning how to apply the concepts, and having fun with the stories behind the concepts.

—Frida

To learn more about this project and others, visit <https://sites.google.com/athightechhigh.org/math3/projects>



Town Squares: A San Diego Neighborhoods Project

*Maggie Miller, Mary Williams, and Gary Gould, 6th grade
High Tech Middle*

Students at HTM are selected through a lottery system and come from every zip code in the city. Our team chose to use photography and writing to explore the wonderfully diverse neighborhoods that make up our school and town. We learned about elements of photography from Outside the Lens, researched the history of our neighborhoods, took many photographs of where we live, interviewed several residents, and wrote our “One Neighborhood, Three Things” to describe three places that are unique and special to our neighborhood. Our final artistic piece was a canvas “square” of our favorite photo accompanied by a unique phrase both carefully chosen to represent our neighborhood. We exhibited our work at the Outside the Lens gallery for the “Friday Night Liberty” art-walk where students were able to share their photography and writing with the public.

Teacher Reflection

It was interesting to see the students explore their communities and capture some amazing perspectives through photography. We all learned a lot about the history of San Diego through their research. Many students really took the opportunity to see and describe familiar places in new ways. It was awesome to see students’ pride as they exhibited their photography in a “real” gallery space, and the wonderful diversity of our school and city was evident in the collection of final photographs.

Student Reflections

I found out a lot of good things while I was writing about my neighborhood because before I had always thought my community was a bit boring.
—Natasha

I learned a lot about OB’s past and I also saw my neighborhood with different eyes as a photographer.
—Elle

What I liked about this project was how we got to see where everyone lives in San Diego.
—Regan E

To learn more about this project and others, visit <http://millerwilliams.weebly.com/projects.html>



A New Life

*Tony Spitzberg and Emily Mayer, 7th Grade Humanities
Innovations Academy, San Diego, CA*

“How can we tell an interesting story that helps people understand our community?” was the essential question that drove the creation of the student-produced documentary, *A New Life: A 7th Grade Video Journalism Project*. Students began by researching the countries of the refugees and immigrants that they would be interviewing at La Maestra Community Health Center, an organization that assists refugees and immigrants who are new to the United States. The students then analyzed the techniques of professional interviewers, formulated interview questions, conducted interviews and studied video editing to produce the film. They held a premiere of their powerful documentary for a large audience, and saved the front row for the subjects of their film who attended as the evening’s special guests.

Teacher Reflection

What began as interest from students to produce a documentary of familiar people in their lives quickly morphed into something much more profound: a desire to tell the stories of others with very different backgrounds from their own. The students sought to explore and understand the challenges these individuals experienced in an attempt to seek a better life. Students transformed into photographers, interviewers, authors, journalists, sociologists, researchers and documentarians as they sought answers. Their film—the culmination of countless hours of research, practice interviews, and editing—became secondary to a deeper understanding and appreciation for the plight of those who come to America in search of a new life.

Student Reflection

I want people to watch our documentary and take away how lucky we are. There are a lot of people in other countries who don’t have nearly as many opportunities as we have, as much stuff as we have, and as much education as we have. We can really do great things with the opportunities we’ve been given in our country.

—Julia



The Upcycle Project

*Pat Holder, Humanities and David Bergren, Engineering
Gary and Jeri-Ann Jacobs High Tech High*

This project had the broad goals of recognizing and confronting our environmentally adverse consumption and production cultures that are entrenched in practices of planned obsolescence, materialism and disposability. Our team worked in groups to identify and design products for local non-profit organizations, each conceived as a response to a real problem they had. Upon finalizing our designs, each group gathered waste materials and adjusted their plans to integrate them before prototyping and actually building the upcycled products. From benches to cat trees to cabinet doors, each group was successful in making a socially and environmentally positive contribution to a group working in our community. Further, each group worked to archive the process of their work by contributing a section to our team-wide publication highlighting the design processes, environmental considerations, community interactions and physical and philosophical practices that we explored.

Teacher Reflection

Having local non-profit organizations as our customers lent real authenticity to our project. Designing around real problems that they had created genuine purpose for the diverse things that we built. It was also a great motivator to know that they were counting on using our products for the work that they do. Documenting the entire process of our work offered a thorough look at what is involved in pushing back on some of the detrimental norms of our culture, like how we build things to be disposable or replaced.

Student Reflection

This was the first project I've done where it was really crucial for every group member to work together to create our final product, a bench for the Ray and Joan Kroc Center. Everyone in my group had different skills that were extremely important to constructing a bench that worked for our customer. It was really lovely to not only create a product that I was proud of, but to also feel that I'd been able to assist a local nonprofit organization. —Abigail Tull

To learn more about this project and others, visit http://dp.hightechhigh.org/~pholder/Digital_Portfolio/Project_Archive.html



What is your Everest?

Natalie Alli, Grace Maddox, and Christine Sullivan, 5th Grade
High Tech Elementary Chula Vista

After reading the novel *Peak*, by Roland Smith, fifth grade students studied the geography, culture and history of Mount Everest. Fieldwork for this project included visiting a Buddhist temple, hiking Cowles Mountain, and rock climbing at a local gym. Students interviewed an anthropologist about her travels to the Himalayas and Skyped with a climber who summited Everest in 2011. This project was carried out in three classrooms over the first trimester of the school year. While all three teachers worked together to plan the project launch, lesson sequence, and field work, each teacher was able to design her own final product and class exhibition. Christine's students crafted their own adventure short stories that were published together in a class anthology, Grace's students created prayer flags, and Natalie's students wrote and performed spoken word dedications to someone who had overcome their own Everest.

Teacher Reflections

Typically, climbers leave colorful prayer flags at the summit of Mount Everest. Throughout this project, our students discovered that bravery comes in many forms, and the one does not have to climb a mountain to be considered brave. For one of their final products, they created prayer flags and dedications in honor of someone brave. They were motivated and inspired to create multiple drafts of their design and then cut, stitched, stenciled, and appliqued the most beautiful flags.

Student Reflections

My personal Everest is to be an OB/GYN because I want to help save little babies
—Christian Flower

My Everest has to do with being an animal advocate and volunteering at shelter when I grow up. I want to do this because I think all animals are cute even the ugly ones like naked mole rats.
—Lauren Alatrisme

To learn more about this project and others, visit <http://htecv.weebly.com/>



Project IDEATE

*Kimberly Cawkwell, 4th Grade
High Tech Elementary North County*

Students explored the essential question, “How Can Innovative Ideas Make a Difference?” Based on Google’s concept of Genius Hour and the Stanford Design School, our classroom was transformed to a place where students could dream big. Students interviewed five different organizations in our community: 1) Pacific Preschool, 2) San Marcos City Hall, 3) Vallecitos Water District, 4) San Marcos Police Station, and 5) Escondido Humane Society. From these interviews, students discovered dilemmas that the organizations were having. They were tasked by the organization to create a product that could help provide a resolution. Using a delegated budget, students worked in groups to build a business plan around this innovation. They designed websites, mission statements, logos, business cards and more for their businesses. Throughout the project, students collaborated with their organization to receive critique and feedback on their products. Their final prototypes and products were showcased in a business pitch for audience members to purchase and possibly invest in.

Teacher Reflection

I was so impressed and inspired by how professional the students were when given the trust to engage in these short internships. They were great listeners and proposed thoughtful ideas that could help resolve their organization’s dilemma. For example, the group who visited the local preschool learned the preschoolers had trouble reading. So they created non-fiction interactive books for the preschoolers to read. The group who went to the San Marcos City Hall learned that there was a trash problem in the community parks. They invented a trash robot called “Trashbot” to clean up our city.

Student Reflections

I learned that no matter how young you are, you can dream big.
— Peyton

I learned to keep persevering with your ideas and don’t give up on yourself.
— Sinqi

To learn more about this project, please visit Ms. Kim’s digital portfolio: mskimcawkwell.wix.com/htefourthgradeourthgrade



Choose Your Own Adventure Through U.S. History

Tim Briggs, 11th Grade Humanities

High Tech High Chula Vista

For this project, students researched, wrote, and self-published a collection of choose your own adventure stories based on U.S. History. To create their story, each student researched a historical time period and created a story map of possible choices for their character based on the significant events in their era. In writing their stories, students incorporated dialogue, sensory details, and narrative techniques to create gripping second person narratives. Each narrative was then edited by a student editorial team while other students created original art and designed a layout to format our book for publication. At our final exhibition, students presented their work to teachers, students, and community members at the Grossmont Literary Arts Festival.

Teacher Reflection

This project far exceeded my expectations for the depth and complexity of the students' narratives. What I had envisioned as a 200-300 page book sprawled to nearly 600 pages as the students dug deeper into their historical periods and created pathways for their character to explore different events. Students were invested in the creation and publication of our book. Every narrative was reviewed and edited by a team of students for content and historical accuracy and then formatted for publication by our design team. It inspired me to see students work hard to prepare our book and take pride in completing such a large task as a team.

Student Reflection

Being a member of various groups helped me develop new skills. As a member of the editing group, I improved my understanding of grammar and writing by reviewing the work of other students. I also learned how to use Adobe Acrobat to publish our writing in a professional format. Being a part of the leadership and exhibition crew made me step out my comfort zone and practice my communication and leadership skills. Overall, the project helped me not only to become a more creative writer, but it also let me improve how I work with other students.

—Rafely Palacios

To learn more about this project and others, visit <http://timbriggs-dp.weebly.com/>



Apocalypso

Scott Swaaley, *Physics & Engineering* and Mike Strong, *Humanities*
High Tech High

Human history is punctuated by the prolific rise and inevitable collapse of civilization after civilization. In this project, students formulated hypotheses for these fluctuations, compared their hypotheses with historical evidence, mapped quantitative changes throughout history, then created a narrative and mechanical representation of their findings. The final product was exhibited on the eve of the Mayan Apocalypse.

Teacher Reflection: *See article on the next page*

Student Reflections

Working on Apocalypso was the first glimpse into what I would later define as a “real” project: a project in which the students choose the scope, method, and design. If a student made a mistake on one of those three, it was up to him or her to fix it. In this project, failure wasn’t an option; it was simply a means of reaching success.
—Sharon Tamir

Taking on the role of mechanist felt like a lot of weight on my shoulders. However, as I put in more and more work, I started to see progress towards an end goal, which made me even more tenacious. After months of hard work, seeing the final product on the wall at exhibition was one of the greatest feelings I’ve ever had. I had created a masterpiece and all of a sudden, the many late nights and fatigue-filled mornings felt worth it.
—Josh Ortega

As one of the students who had to go through the humiliating experience of telling exhibition-goers that my piece belonged in one of the gaping holes of the exhibition’s centerpiece, I can now say that it was perhaps the most significant experience I’ve had in high school. My failure to have my mechanism ready on exhibition night along with the overall project made me so much more resilient and calm which would prove to be very important during my next three years of high school.
—Maya Ervin

To learn more about this project and others, visit <http://pbl.scottswaaley.com/apocalypso-project-summary/>



Colonies, Clusters, and Classrooms

*Shelby Fuentes, Grace Kegley, and Chelsea Pasfield, 2nd Grade
High Tech Elementary North County*

Students researched a variety of animal communities through fieldwork, experts, non-fiction texts and online resources and then applied their knowledge to our own class and school community to create school-wide norms. Our essential questions were: 1) How do animals act in their communities to help and protect each other? 2) How can we use those characteristics to build guidelines for how we should care for each other in our classroom? Students had three final products. First, individually, students wrote informative paragraphs connecting research on animal communities and how it could apply to our classroom culture. Next, in small groups, students established school norms based off of a researched animal behavior and data collection within our school, and then designed a banner to be hung throughout the halls. Finally, the 2nd grade classes collaborated to design and create a kinetic 'school of fish' art installation comprised of scientifically-inspired ceramic fish that represented the school community. A student-designed kinetic prototype became the basis for final large-scale kinetic mechanism, produced by Mike Amarillas' HTHNC Engineering students.

Teacher Reflection

This project was exciting because it brought all three 2nd grade classes together. Students built quality relationships across the grade level as they worked together. As teachers, we designed this project as a way to collaborate across the grade level and incorporate engineering, art, and science in meaningful ways. As challenging as it was to collaborate with six separate teachers, we think the final project was well worth the effort.

Student Reflection

I like the project because I like to see how animals work together. Also I like to see how animals move, swim and hunt together. My favorite part of the project was when we did our field work. I learned that animals stick together and help each other. —Nethra

To learn more about this project and others, visit <http://cepasfield.weebly.com/> ; <http://mskegley.weebly.com/> ; <http://shelbyfuentes.wix.com/shelbyfuentes>



Roland Barthes' Mythologies

*Margaret Noble, Digital Art & Technology, 12th Grade
High Tech High Media Arts*

In 1957, an extraordinary work of literature was published detailing concepts far ahead of its time. Roland Barthes wrote *Mythologies*, a game-changing look at the way humans built the lore around them, and turned the world they knew into a place of fictional characters. A look at stereotypes before stereotypes were a widespread notion, 12th graders contemporized Barthes' ideas into a live multimedia showcase. This one hour, theatrical event was packed with monologues, skits, music and performance art.

Learning goals for this project included researching visual meaning and cultural signs through the semiotic lenses of Roland Barthes. Using this knowledge, students exposed a contemporary problem perpetuated by society and the media that is personally significant. Students then coded a computer program that was visually or sonically experiential and that reinforced their research concept. Finally, students performed a two-minute, rehearsed stage piece that engaged an authentic audience using their research and audio/visual program.

Teacher Reflection

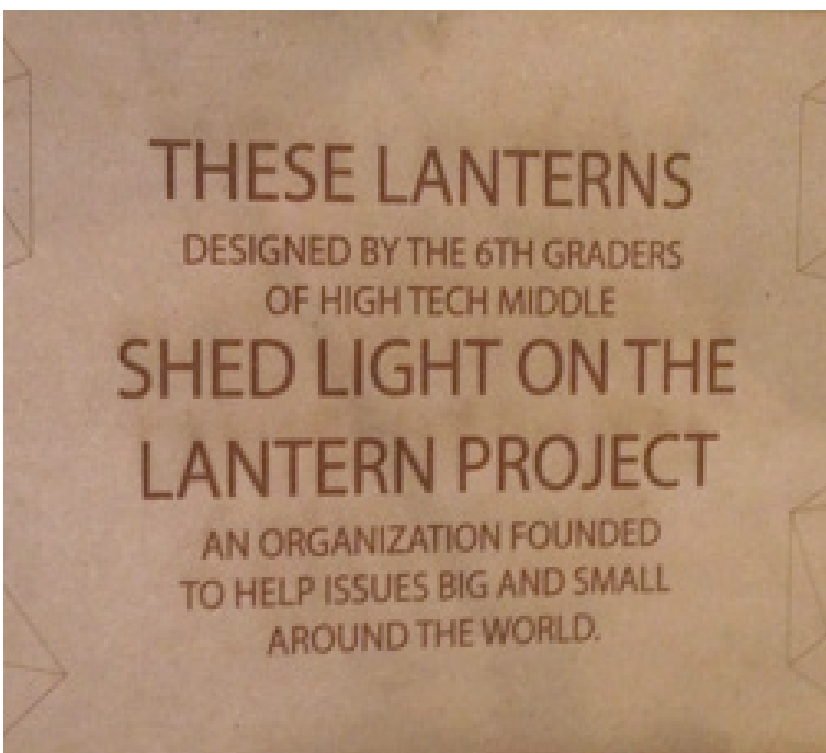
This project was highly experimental and challenging to manage because of the deep interdependence students needed to sustain in order to produce a unified performance in concept and form. In the end, I am proud to say that these 48 students engaged their audience deeply and provoked thinking about what is important to the teen experience and beyond.

Student Reflection

Being introduced to coding was challenging enough but combining it with research, performance and personal perspectives of the real world pushed us to think more creatively. In the end, the exhibition was a lot fun.

—Angela Marie

To view the student work visit: <http://margaretnoble.net/educator/mythologies>



The Lantern Project

*Maggie Miller, Allie Wong, Gary Gould and Mary Williams, 6th Grade
High Tech Middle School*

In this project, the entire 6th grade learned about geometry, unit rate, expenses and revenue by designing and creating their own paper lanterns. At the same time, students explored various cultures around the world through the lens of important global issues. Their final product was an original paper lantern that was to be part of an auction to raise awareness and funds for a community improvement project of their choice through the non-profit organization, Lantern Projects. The exhibition took place at Centro Cultural de la Raza in Balboa Park.

Teacher Reflection

It was so exciting to see students motivated to learn math so they could use it to create something beautiful. This project incorporated so many academic and non-academic skills from pre-algebra concepts of profit analysis, to persuasive writing, to craftsmanship, and even empathy building. At exhibition the students were proud of their work and the learning behind it.

Student Reflections

My favorite part about this project was how diverse the lanterns were, whether in size, color, or shape. Individually each one came out creative!
—Ajok T

The Lantern Project was based around the organization The Lantern Project, which lists countries, each with their own problem and solution. The problems ranged from human trafficking in Cambodia to starving mothers and children in Kenya. The Lantern Project is original in the sense that each student got to choose their part of the world that they want to help. At the same time, students got to learn about geometry by designing their own paper lantern. The students of the team collectively loved how their eyes were opened to the world around them.

—Olivia H

To learn more about this project and others, visit <http://lantern-project.weebly.com/>



The Wicked Soap Company

Matt Martin, 10th Grade Chemistry

High Tech High Media Arts

Students learned about saponification, chemical reactions, pH, strong bases, lab skills, marketing skills and applied what they learned to create high-end, quality soap that was sold competitively in both the online and brick and mortar marketplaces.

Teacher Reflection

Never have I seen students more engaged in a project. Students have generally been interested in the soap making process because it is messy, fun, and creates a beautiful, usable product. When we added an entrepreneurial aspect to this project, student excitement and engagement spiked to a level I have not seen before. Creative, social media, logistics, web design, and marketing departments quickly arose out of necessity. There was so much to do and students could pour their energy into an aspect of the project that appealed to them. A beautiful and functional website was created and successfully run by our students. Facebook, instagram, and yelp pages helped steer business to our online store and in-person selling events at the Earth Day festival, Von's shopping center, and various farmers markets. The logistics team accounted for all of our expenditures and sales. Sales topped \$5000 in our first semester which allowed us to give a grant to one of our teachers and a scholarship to a graduating senior. Paid internships were also created and filled by our class and we donated thousands of dollars worth of soap to local San Diegans in need.

Student Reflections

This project is not just about making soap, but being able to work with others and appreciate other's opinions. —Matthew M

Everything in this world, it's all chemistry. —Lucas S

This project taught me a lot about the real world, especially business. —Solomon S

I learned not only how to make soap but how to run a small business through a real world experience. —Marisol F

To learn more about this project and others, visit <http://mmarshall2017.weebly.com/chemistry.html>



Wat_er We Doing? A California Drought Story

Chris Olivas, Math/Science; Tracy Nathan, Humanities;

Brent Spirnak, Digital Arts, 8th Grade

High Tech Middle North County

In this project students worked together to make a documentary about the current California drought. Students learned about water chemistry, the water cycle, the drought's effect on the environment and economy, and water conservation. Students took extensive notes on current articles related to our drought. They used their new knowledge to write about, plan, film, and edit a documentary to show at our school wide exhibition and at the San Diego Botanical Gardens. Students also created stained glass graphing art pieces to auction off at both exhibitions. The goals of the exhibitions were to bring awareness to the drought and raise money for the San Diego Coastkeeper by auctioning off the student art work, DVDs of the documentary, various water saving items, and donated items.

Teacher Reflection

When we started the project, students already understood California was in a drought and we all need to conserve, but they were inspired by all that they did not know. The information revealed through field trips, expert interviews, current articles, and videos was shocking and motivational. When the time came to create our faux stained glass art for auction, students really owned the importance of creating a quality product that would bring in more money for San Diego Coastkeeper. Screening the film at the San Diego Botanical Garden took the students outside of just our school exhibition. They were proud to know that their movie would reach beyond the walls of our school.

Student Reflections

I realized that once we run out of water we have no backup plan.
—Kat

This project showed me how our lives depend on a delicately balanced system and that changing one thing can have a huge effect on us- the ripple effect.
—Kaitlyn

To learn more about this project and others, visit carterharrison-photography.com/water/

Portraits of Resilience

Nicole Lively, 10th Grade Humanities

High Tech High Media Arts



The inspiration for this project came from a student comment, “We learn a lot about the challenges and problems in the world, but what about how people overcome them?” And with that, Portraits of Resilience began. For the first iteration of this project, 50 students conducted 1:1 interviews with 50 veterans to explore these three essential questions: (1) In what ways does war affect human resiliency, (2) How can we resolve conflict aside from war and (3) Why do people fight? During the interview, students photographed their veterans. After the interview, students wrote vignettes to accompany the photographic portraits and capture their veteran’s spirit. The portraits were printed into full sized posters and were also published in a book along with the final written vignette. The final products were exhibited on the USS Midway Museum for a week and all veterans were invited to attend our evening exhibition.

Teacher Reflection

What was particularly powerful about this project was seeing how motivated my students were. I attribute much of this to the authenticity of the audience and the location for exhibition; people totally unaffiliated with our school were really counting on the students to produce excellent work. Throughout the project I consistently heard student remarks such as, “I really want my veteran to be proud,” and “I need to make sure that what I write truly represents who they are.” This combined with the high visibility of having their work on display in a museum pushed students to raise their own standards and exceed the high expectations that were set.

Student Reflections

Everyone has a story to share and their responses may surprise you.
—Sharon O

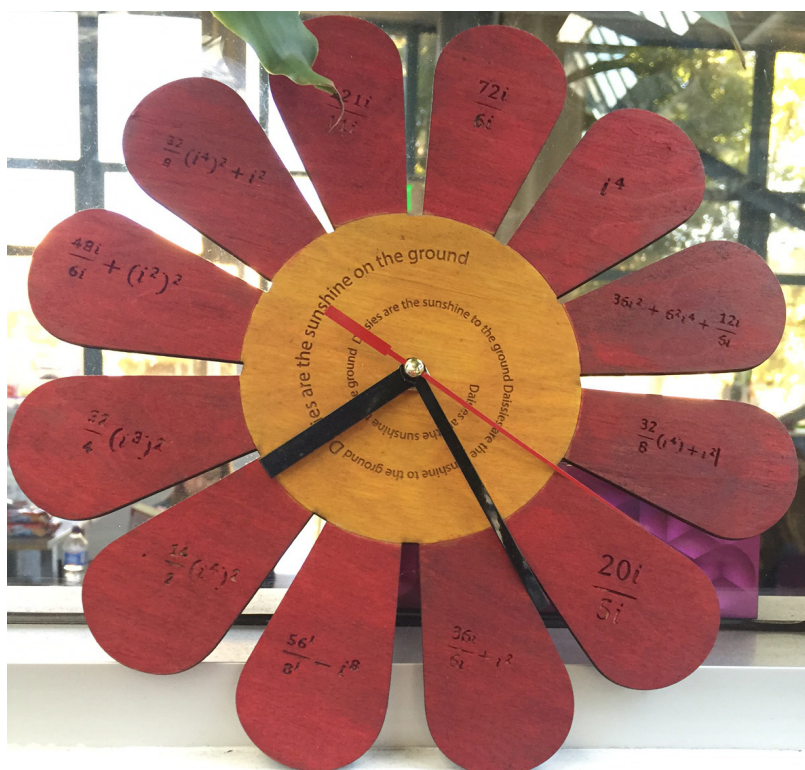
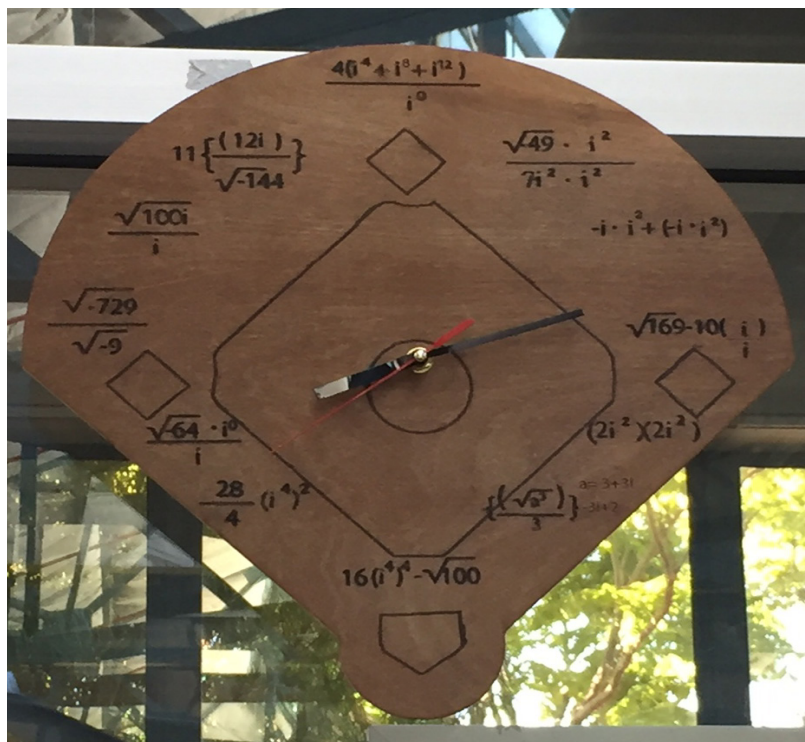
This project really opened my eyes on the different perspectives of war.
—Joshua E

To learn more about this project, visit portraitsofresilience.com

Best Project of All Time

Sarah Strong, Math

Gary and Jeri-Ann Jacobs High Tech High



Using time as a theme, in this project we explored the mathematical concepts of irrational numbers and complex/imaginary numbers. As we followed the process of mathematicians before us by expanding the number system, we decided the best use of our knowledge was to artfully show our learning through clocks. The clocks had to express their values either through all irrational numbers that were rationalized to make the numbers 1-12 or with imaginary numbers that were made real through the use of exponents.

Teacher Reflection

Math is a beautiful art form and in this project students were given the opportunity to see it as such. They took pride in coming up with the most complicated version of the numbers 1-12 that they could and then creating a theme for their clock that went with either their view of irrational or imaginary things. I loved this project because it was beautifully differentiated for the students (as they were in charge of making the numbers as simple or complex as they wanted) and because it valued the beauty of complex numbers just as they are, without the need to always find them “in the real world.” The students were very proud of their clocks at the end and I was proud of them as well!

Student Reflections

One thing that stood out to me was that this project made math fun! It made me push myself to make intricate equations and I exceeded my own expectations. —Michelle

I liked this project because it gave me the opportunity to use my creativity in math class! I had to make the equations as complicated as I could and then just make them equal to one. —Taylor

To learn more about this project and others, visit <http://sarah-gracestrong.weebly.com/best-project-of-all-time.html>

3D Printed Timeline

Heather Calabro, Social Studies

Mid-Pacific Institute

Ninth grade students in the MPX Program at Mid-Pacific Institute created a timeline of World War II using 3D printers. Each student chose a WWII event to research. In addition to creating a short documentary about their event, each student wrote an essay about the event through the perspective of a historical figure associated with event, which the student also chose. Hoping to draw in audience members and teach them about WWII, the students designed an artifact using 3D modeling software that would represent a WWII event they chose to research. The printed artifacts were arranged chronologically with qr codes that allowed visitors to pull up the student-created videos about the WWII event corresponding to each 3D-printed artifact, as well as an essay about the event written by the students in the perspective of a historical figure.

Teacher Reflection

It was great to use the 3D printers on campus in an interdisciplinary way. The project incorporated elements of design, history, language arts, and technology, which engaged the students throughout the process. The students were so excited to create a WWII artifact from scratch and see it come to life in the 3D printer.

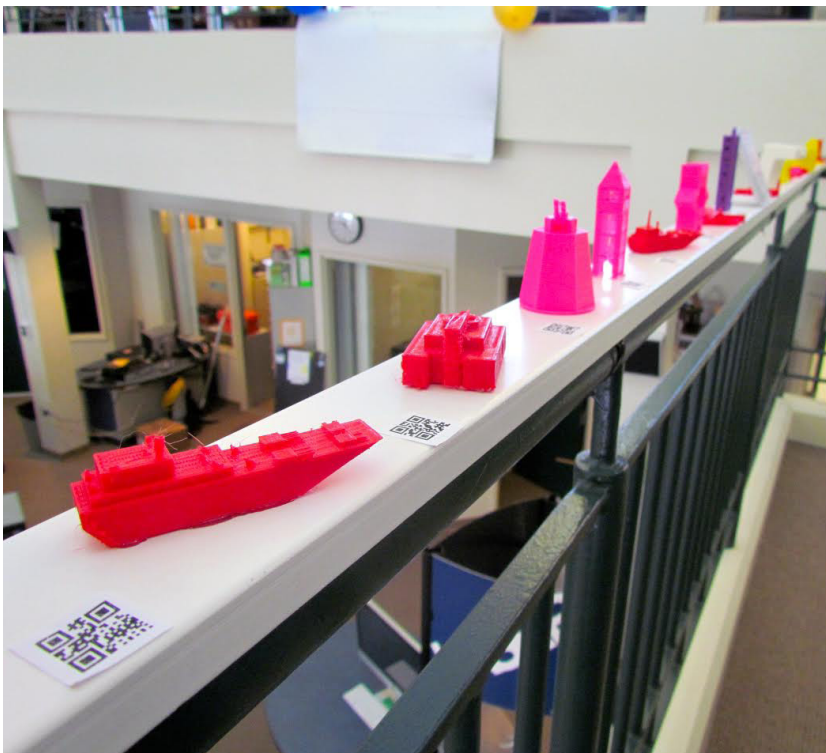
Student Reflections

The process of learning, step by step, the programs and then seeing your creation come out of the 3D printer was cool! I also really liked how we got to dive deep into a WWII event that particularly interested us. —Dan

It was a great learning experience to imagine that you were in the historical figure's shoes and also to create something in your mind that was then printed so you could hold it in your hand. —Isabel

I liked how this project made me think about how I could best represent my event through a 3D design. —Michael

To learn more about this project and others, visit <https://sites.google.com/al/midpac.edu/midpacific3d/>



You Say You Want a Revolution?

Becky Frost and Ashley Carrico, Fifth Grade

High Tech Elementary Explorer



In this action-packed eight-week project, students used primary and secondary resources to research the beginnings of our nation. As historical fiction authors, they wrote first person narratives from the perspective of one of the colonists at Roanoke. After comparing the politics, religions, and immigration trends of the settlers in the New England, Middle, and Southern Colonies, students began to examine what contributed to the desire for independence. As artists and mathematicians, they created shadowboxes inspired by Joseph Cornell that express their interpretations of the big ideas of revolution.

Teacher Reflection

We loved this project for so many reasons and our end of the year student reflections showed that this was a favorite for the majority of scholars in our class as well. The collaboration and compromise required helped our students become better communicators and closer friends. This project also involved so many disciplines as students were asked to work as authors, artists, mathematicians, historians and makers.

Student Reflections

In this box project we learned how to build, use math in real-life situations and lots about the artist Joseph Cornell, but most importantly, we have learned about ourselves. We faced many challenges in this project but we found out that we could overcome all of them. We also learned that in the 1700s nothing was really fair, and freedom was a privilege. As we go into middle school we will always remember our skills we have learned. We loved this project.

—Delanie & Audrey

One thing we definitely learned was that to create a masterpiece, you need patience and collaboration. We experienced a time when we couldn't rely on our teachers for every little thing or critique. We had to ask others in the class for critique and help when something went wrong.

—Nora & Alanna

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

Superheroes Unite!

*Diane Hawke, Linda Salamanca and Jen Schultz, First Grade
High Tech Elementary Explorer*



The Superhero project explored what superhero qualities each student possessed and how these unique “superpowers” contribute to our classroom and school community. The students investigated fictional superheroes and found a common theme in their powers. The students examined everyday superheroes in their community, learning about their different jobs and responsibilities. Each first grader considered the questions: What super qualities can you bring to better our community? How do superheroes work together? Students designed and made a costume to represent their superpower. The children also created social stories featuring their superpower in a comic book format. The stories were then made into short films with the students role playing in their superhero costume. These films and the students’ experiences were then shared at a school gathering.

Teacher Reflection

There were several things we loved about this project. An absolute highlight was the excitement in the children’s faces when they realized that everyone possesses a superpower and no matter how old you are, you can make a difference. We often found them using their superpowers like Grit Girl, Thinking Man and Happiness Gal on the playground or during class time when no one was watching. At a table you would hear “Don’t give up, use grit!” when participating in a difficult math activity or “I’ll get a band-aid!” as Helpful Boy ran off to help a friend who had fallen down on the blacktop. It empowered the children to take ownership in making a positive change in their classroom and school.

Student Reflections

The Superhero project taught me that I should help people and I should take big risks for the people I care for. —Nia

I learned that superheroes are real and help us everyday like police officers and firefighters. Everyone is a superhero! —Giovanni

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



Staircases to Nowhere

Jeff Robin and Andrew Gloag, Art and Physics

Gary and Jerri-Ann Jacobs High Tech High

Seniors used physics, art, and carpentry to plan and build model and life-sized staircases of their own designs. First students designed 1:10 scale model staircases alone or with a partner. They had to find some mathematical equation or pattern that modeled something about their staircase and show it in a poster. In the next phase of the project, students designed 1:5 model staircases, which they had to carefully plan and execute. The larger size required them to be more detail-oriented in their designs. In the final stage of the project, students worked in groups to build 1:1 life scale staircases around the school. The four full stairway installations will be permanent and must hold up to significant human teenage wear and tear. The 1:1 staircases required teamwork as well as design, engineering, physics, and carpentry skills.

Teacher Reflection

The scale models, the one-to-ten, were basically whimsy and play. In the one-to-five, students were thinking about structure and how to build these things. The full sized ones were practical and buildable. They all lent different things to the creative process of the students. In the first staircase they learned that play is important to design. In the second, they learned that planning is important to creating something. In the third one, they learned that collaboration is critical to doing something bigger than yourself.

Student Reflections

I learned that it takes an immense amount of planning to produce things in the real world. You can't just B.S. something that you want to look nice.
—Sophie

It requires stepping out of your comfort zone and realizing that you have to put forth a team effort, that everyone does work. Sometimes it's work you don't really want to do, but you do it anyway.
—Czarina

To learn more about this project and others, visit <http://dp.hightechhigh.org/~jrobin/Projects.html>



Who Walks Here: The Journey of Our People and Our Land

*Shayna Cribbs, Brooke Newman, Misa Adams,
Christine Kuhl and Julie Hutchins, Third Grade
High Tech Elementary Explorer*

The Who Walks Here project came from the teachers' passion for nature and wanting our students to explore the outside world. The project began with an overnight camping trip. Students visited places in San Diego County, and worked with local experts, to experience what life was like for the Kumeyaay (first people who lived in San Diego) and to see first-hand our local birds and native plants. Each student researched a local bird and a native plant, and their final pictures and research were put together into a published field guide that was donated to the experts they worked with. Students worked to make scientific drawings of their birds by participating in the critique process, making multiple drafts of their birds, and working with high school buddies. Students researched more about the Kumeyaay and wrote historical fiction stories or legends. After learning about the footprint the Kumeyaay left on the land, the students thought about the footprint they want to leave on the land.

Teacher Reflection

My hope with this project was for my students to gain an appreciation for nature and want to protect it. I did not anticipate that through this project a group of "birders" would be born. A handful of my third graders became passionate about birds. They would want to take walks on the weekends to look for birds, and they would bring bird books to school to read and to share with one another. Many also worked on drawing drafts of other birds in their free time.

Student Reflections

We should all love nature and enjoy it and be thankful for its beauty and what it provides for us. —Camille

The Kumeyaay barely changed the land. They treated it with respect and they weren't doing any harm and they never ever wasted food, drinks, or any other kind of resources. —Alex

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



The Bee Project

*Rhea Manguil and Marissa Adams, Second Grade
High Tech Elementary Explorer*

Why do we need honey bees and how do they affect our world? In order to answer these questions, second graders investigated the role of bees in our ecosystem, and the various ways bees are being threatened. Once their research was complete, students became advocates for the bees. Working collaboratively in groups, students wrote and performed bee plays to educate the school community about the threats to bees. They also wrote letters to the city and large corporations, planted over 200 bee-friendly plants, and built beehives to donate to a community organization in Mexicali.

Teacher Reflection

This has been one of my favorite projects because it gave students the opportunity to advocate for what they feel is important and to make a change in our community. I knew this project was meaningful when students insisted we write letters to our local government asking if they could plant more pesticide-free flowers for bees. Our students were so proud as they stood by the plants that they put into the ground with their own hands. I think that what impacted me most as a teacher was to see my students take ownership of their learning. When they began to understand the problems that honeybees were facing, they also realized that there were ways for them to advocate for change. Students began to ask questions about why people, namely adults and big corporations, are not doing more to help the honeybees. After building beehives to send to Mexicali to help a community of women and children there, students felt a sense of accomplishment and contribution to solving a problem that they realized is affecting us all.

Student Reflections

I learned that if we didn't have bees we wouldn't have most of our favorite food.
—Silas

Working in a group helped me because I got more ideas. None of us is as smart as all of us.
—Aiden

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



The Haunted Arcade Interactive Halloween Carnival Games

*Colin Monaghan, Technology
The Evergreen School, Shoreline, WA*

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.

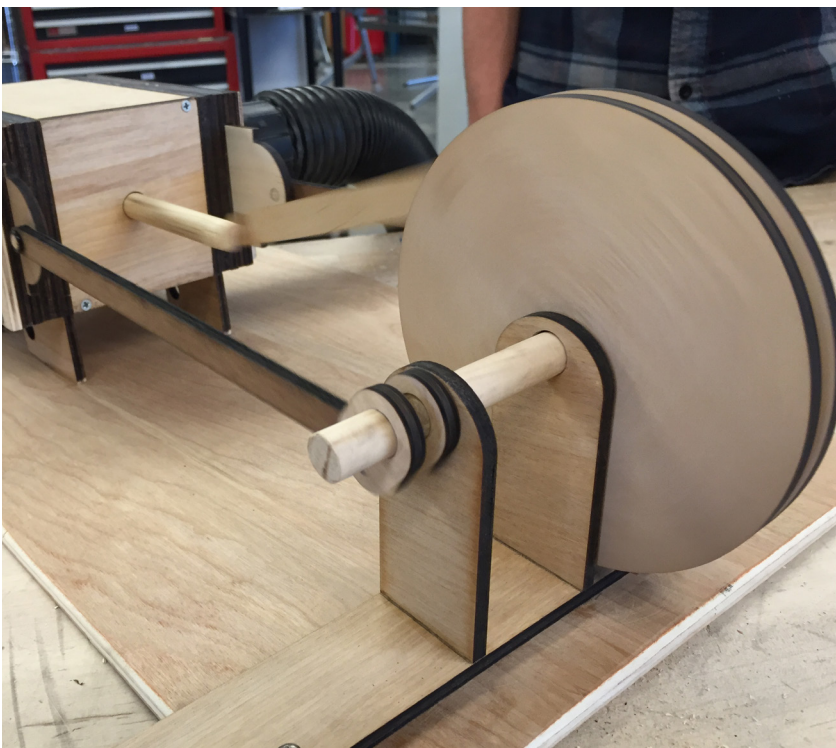
Student Reflections

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



Cyclic Machines

Mike Amarillas, 12th Grade Engineering
High Tech High North County

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/>



Syrian Refugee Simulation

*Alec Patton, 10th Grade Humanities
High Tech High Chula Vista*

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

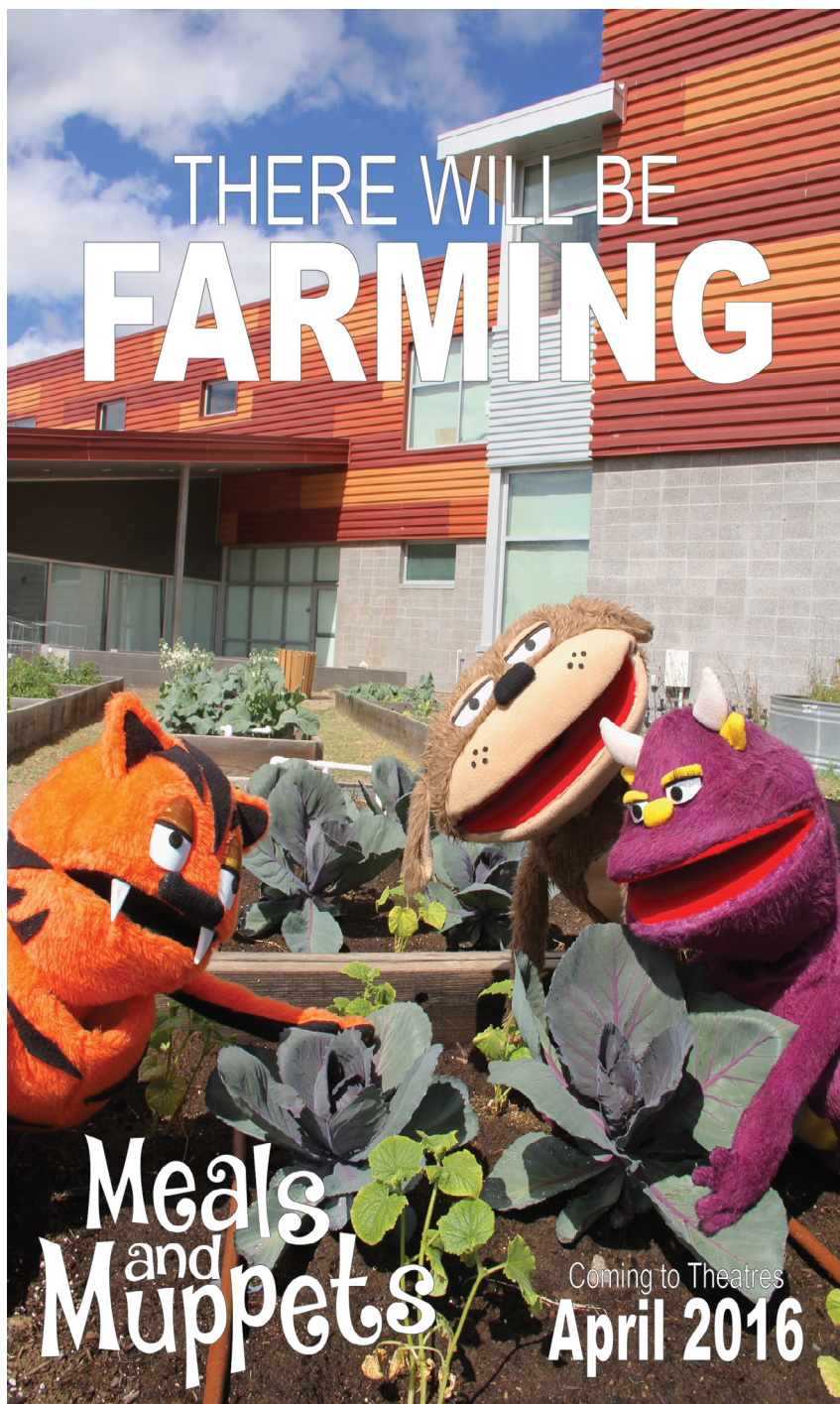
I knew this project would be logistically complex when we started, but the extent of the challenge only became clear once we were in the midst of it. Students figured out the complexities of European immigration law, worked out the going rate for smugglers under a variety of circumstances and the likelihood 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



High Tech Middle Chula Vista - 7 West Productions

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>



The Complete Works of William Shakespeare (Abridged)

Jennifer Howard, 10th Grade Humanities
High Tech High North County

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>



Coded Structures, Decoded Identities

Samara Francisco, Rachel Nichols,

Margaret Noble, Dave Stahnke

12th Grade English, Mathematics, Art and Technology

High Tech High Media Arts

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>

HIGHER EDUCATION PLAN

Reach School



UCSD is my reach school. It is my main school that I am reaching for because of the prestigious Biology programs that it has and its reputation. It has the majors that I am looking into and are well known in them, making it the main school I would like to attend. UCSD however is very competitive with an average GPA of 3.88 and SAT score of 1882. Applying for one of the schools most competitive majors, biology, scores higher than average are going to be needed to get accepted to this amazing university.

Realistic School

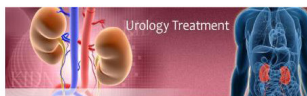


SAN DIEGO STATE UNIVERSITY

SDSU is my fit school for me based off the locate of the school, it's scores, and its majors and minors. It is in San Diego, a location that I am highly encouraged to go to school in, and is a school that I have been looking at it for a while. It has General Biology undergraduate as well as graduate school. They also have a bachelor's degree in Biochemistry and Molecular Biology, also another major i'm considering. It isn't as competitive as UCSD with an average GPA of 3.74 and a SAT score of 1696. I'm confident with my scores and application that I will be able to get accepted into their programs.

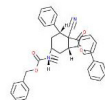
COLLEGE MAJOR AND MINOR

General Biology



The majors that I want to obtain in college, hover around the same subject, Biology. As of this point, I am going to major in General Biology because of its vastness in direction. Studying this major, I will have the opportunity to pursue a large variety of careers. My main goal for a career right now is to be a physician like an urologist.

General Chemistry



The minor that I would pursue is general chemistry. This is because of my interest in molecular biology. If I were to decide to not pursue my Biology major, I will then be able to continue on my interests in chemistry. In chemistry, I would however like to have some part of Biology if I pursue a Chemistry based career. Chemistry can also be an minor that may support my major depending on the path I follow.

SKILLS AND GROWTH IN COLLEGE

Keeping A Steady Hand

One of the most important skills needed for a surgeon is study hands. It's greatly stressed with urological surgeons because of all the small precocious cuts that are needed to be made throughout all surgical procedures. This skill can be inherited from clinical studies.

Keep Calm and Proceed

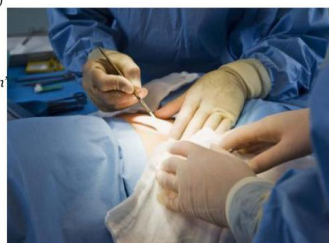
When in a surgical procedure, it is stressed that physicians don't become extensively nervous. This can result in life-threatening mistakes on a patient. This is something that can be achieved through clinical studies however mainly more throughout experience gained throughout your career.

Pay Attention in Class, This Info is Needed

A Urologist's job is emphasized with precise detail. When working with a sick patient, you need consider all the urinary systems functions and areas. Then you need to conclude what part of the system is dysfunctional and is needed to be done to correct the function. This knowledge is gained from the classroom studies as well as clinical.

Notes Acknowledged From Interview

Dr. Ghaffary stressed the importance of being determined because the path to Urology is very long. He says to stay focused on your dream.



Vahid Ghaffarnejad, a former graduate of SDSU and UCSD informed me about the different class ratios from the two school. Also the point that after you receive your first job, your school that you attend doesn't really matter anymore, just your work resume.

MY BROADER IMPACT ON SOCIETY

When thinking about what I'd like to do for the rest of my life. I first look for different amenities and privileges that the career will offer. First, I have to be able to sustain my family and offer them with anything that they need or desire. This includes materialistic objects and will as time with me. Second, I want to go to work everyday knowing that what I'm doing is worth something. In other words, I crave an occupation that positively affects people's life. A career such as a Urologist. Urology is a well paying field of practice in which I will be able to take care of my family with. It's a career in which on average I will spending at least 40 hours out of the week assisting patients in need of my aid, fulfilling both the necessities desired by me to make a greater impact on society.

College Knowledge

Matthew Leader, 11th Grade Biology

High Tech High North County

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/>



Mind The Gap

Melissa Cochran, Gail Gonzalez Coloyan, Janelle McCammack
11th Grade Humanities and Math
High Tech High North County

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

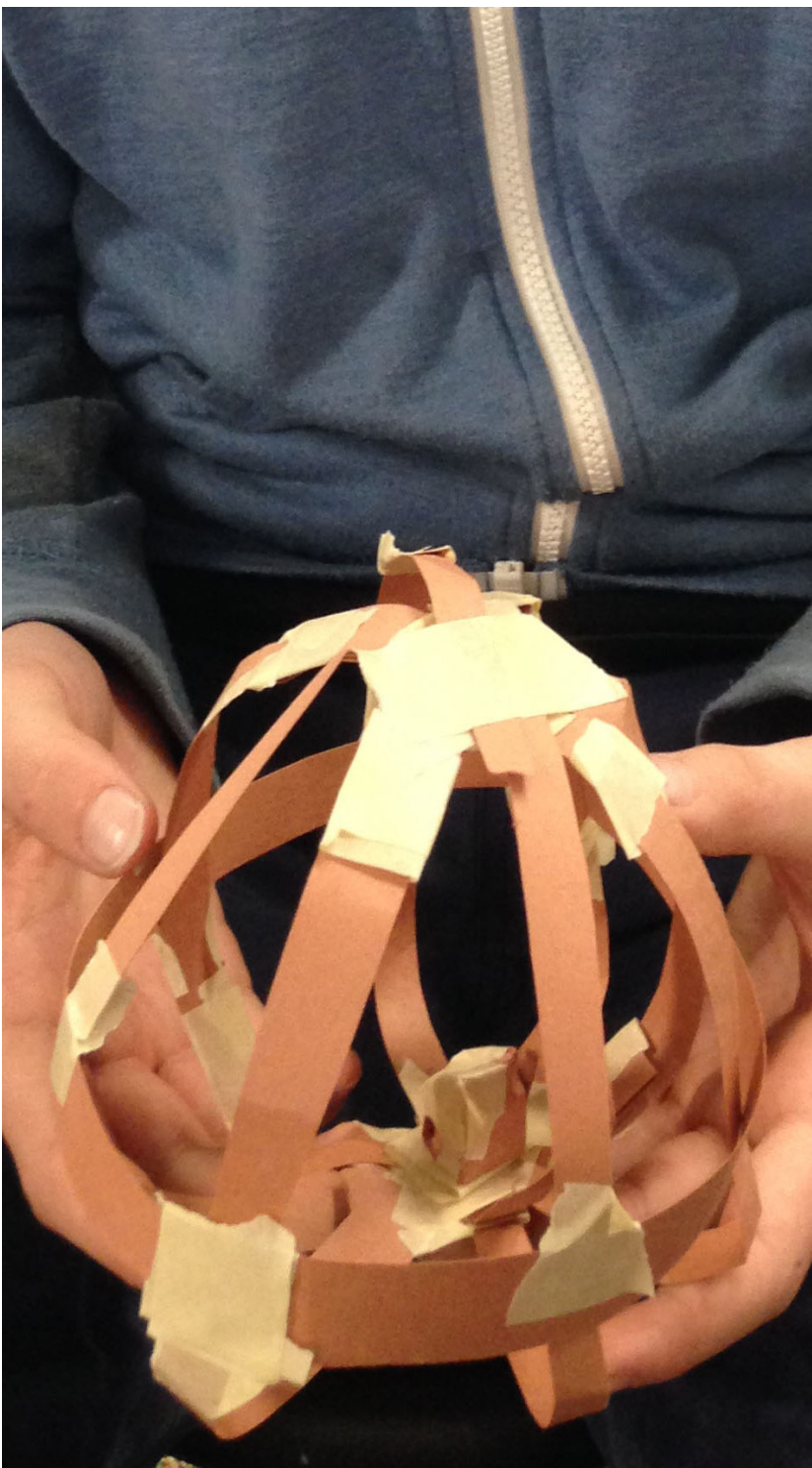
This project engaged our students in difficult conversations about inequities in society. Our goal was to expose students to new ideas and challenge them to consider perspectives different than their own. This created moments of discomfort at times, but we wanted students to be comfortable with their 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://mind-thegap2015.weebly.com>



Seed Dispersal Challenge

*Kiki Contreras, Middle School Science
The Evergreen School, Shoreline, WA*

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>



Human Impacts on Local Wildlife

Nick Ehlers, Biology/Environmental Science

High Tech High Chula Vista

Students collected and dissected vehicle killed wildlife and participated in marine wildlife necropsies to better understand issues surrounding wildlife-human interactions. After receiving a call, small groups (5-12 students) gathered safety equipment and relevant data sheets and drove to meet our collaborators, such as NOAA Biologist Kerri Danil. On site of vehicle-killed wildlife, we documented (e.g. data collection sheets, photos) and collected organisms using the S.D. County Dead Animal Removal protocol. For exhibition, student research groups accompanied their necropsy with original six word stories and photography to engage their audience in conversation surrounding roadkill and marine mammal strandings. Our essential questions included: 1) In San Diego, what are the reasons for vehicle killed wildlife and marine mammal strandings? 2) How do we live consciously and bring awareness to topics that are often ignored or misunderstood? 3) How do the anatomy and physiology of marine/terrestrial mammals compare and contrast to our human body?

Teacher Reflection

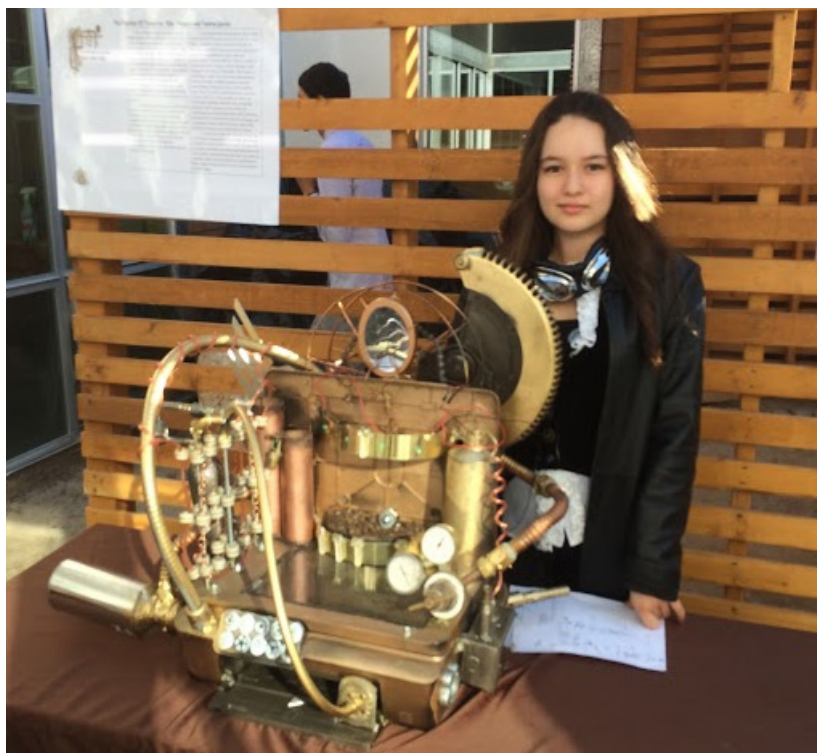
Being on call with our collaborators brought a sense of student excitement and anticipation to each day of this project. This excitement combined with the reality of our onsite investigations and necropsies, provided ample opportunities for in-class discussions, weekly student reflections, and empathy for victims of roadkill and deadly strandings.

Student Reflections

Before this project, I would just think if I saw an animal on the street like a skunk or opossum just try to get it away, but after this project it has made me think that they are no different than any other animal because they have a life too. —Christian

I'm going to remember the experience of cutting open and observing the dead body of a coyote because it made me come to terms with the millions of lives that are being lost due to the way our civilization operates. —Nadia

To learn more visit <http://nehlers.weebly.com>



Steampunk Revolution

*Sara Islas, Humanities; Joshua Moreno, Art;
Ted Cuevas, Design Engineering and Physics
High Tech High Chula Vista*

Students learned about the industrial revolution and picked often forgotten negative issues that erupted due to this era, such as labor rights issues, and environmental damage. After picking those issues and researching them, they developed a steampunk character whose mission was to help fix these problems. They had to make something that used a steampunk aesthetic, whether it was an invention that helped the environment, or a soapbox monologue that called for people to give attention to child labor, or a film that showed what happened when there are no labor regulations. The exhibition focused on steampunk ways to change the world and make it better.

Teacher Reflection

I really loved that every student got to make something and that they could decide what they wanted to make out of their research. The diversity in products allowed for equitable access into the classroom. I loved how students took ownership over developing a pitch to display their learning about the industrial revolution and the dark underbelly of it; it was also great to explore change ideas with the students and see how much they began to care about issues like child labor and wealth inequity.

Student Reflections

I learned about the Triangle Shirtwaist Company fire in making my short film. By reading and developing our understanding of the event we were able to imagine the scenes in our heads including the factory, the day the fire was caused, and the real struggles factory workers went through at work with low pay. —Idalia

Our invention uses solar panels to produce electrical currents that get stored in batteries. The batteries get charged and are used as energy to power the sensors. If we use more solar energy, we will be taking people out of the harsh environment of the coal mines and giving them jobs in the solar industry. —Carla

To learn more visit saraislas.weebly.com



Design Challenge: Recycling Center

*Sarah Goff, Culinary; Debra Hacker, Physics
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 simple 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

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 achieved our goal of producing receptacles that both are green and benefit various school programs.

—Alex

To learn more about this project visit www.napaccr.org



Bonapartism

Peter Jana and Eric Hoobs, 10th Grade Humanities

Gary and Jerri-Ann Jacobs High Tech High

When Karl Marx wrote that history occurs, “the first time as tragedy, the second time as farce” he was referring to how revolutions start by imitating past revolutions and end by undermining their own ideals. Napoleon Bonaparte and his nephew Louis Napoleon were the examples foremost on his mind. Later, the term Bonapartism came to refer to the historical tendency of a dictator to emerge at the end of a democratic revolution and use the ideals of the revolution as a way of masking his own power. During the Bonapartism project students conducted comparative historical analysis to determine whether the Egyptian Revolution of 2011 followed the same patterns as the French Revolution of 1789. Students were asked to consider the following questions: Do revolutionary processes follow similar patterns or does each revolution follow its own dynamic? Did a Bonaparte figure emerge in Egypt? Students presented their research in the form of creative monologues that were written from the perspective of historical actors. The monologues were videotaped and used in a student made documentary that can be found on YouTube. For exhibition they were performed live in a local public venue.

Teacher Reflection

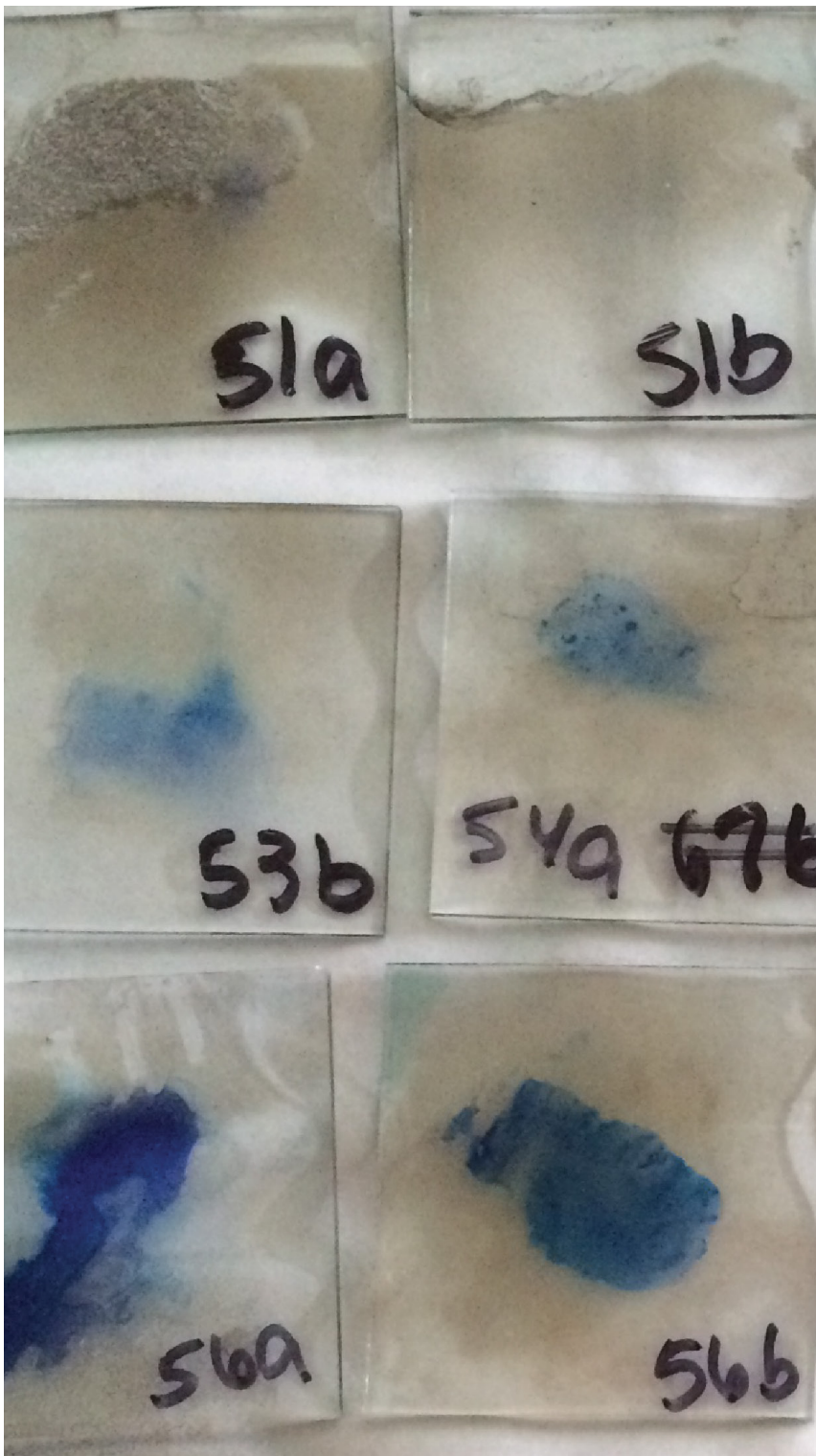
I appreciate how students deeply explored a historical concept and used a variety of creative ways to communicate their conclusions. The French Revolution and the dictatorship of Napoleon can easily be seen as dusty things without much contemporary relevance, but this project shows how a key concept from the period can be an organizing principle that helps us understand the world today.

Student Reflection

The most meaningful part of the project was how it helped me connect with the emotions of individuals who participated in historical revolutions. I could relate their experiences to my own as well as to current civil rights issues. I walked away from this project with an enhanced sense of empathy that has carried over into my life outside of school.

—Ilona

To learn more visit <http://peterjana1.weebly.com/bonapartism.html>



Bacteria and You

Mary Kraybill, 9th Grade Biology; Larry Singer, Culinary/Hospitality
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

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

To learn more about this project visit www.napaccr.org



Liberty Station: Then and Now

Ruby Rodrigues, Jami Saville, Janna Steffan
and Georgia Figueroa, 2nd Grade
High Tech Elementary

The community our school lies in has so much rich history. We knew that our 2nd grade students would be fascinated to know that our very own building used to house a pool for Navy Seal Team 6 to train in. There are so many interesting stories to gather from the people who knew this community as the Naval Training Center. We thought this project would be a great entry point for students to delve into learning about the past and how one community can change over time. Through this project, students also became experts on Liberty Station, as we know it today and how it serves our community in the present. They then created a mobile website about Liberty Station.

Teacher Reflection

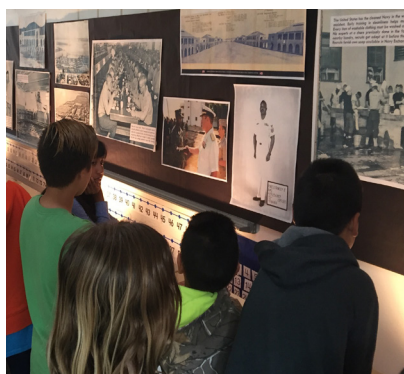
This was the founding year of our elementary school. Our students came from diverse neighborhoods within San Diego county. As we began learning and sharing about our unique neighborhoods in the first months of school, students began sharing their interests and curiosities about our school's surroundings, Liberty Station. We took many walking trips from school to local businesses and met with Naval Training Center experts to learn about the history of our school's building and community. It was rewarding to see students connect and apply learned information towards the creation of a kid-friendly, mobile website to then educate our greater community.

Student reflection

I really liked walking around Liberty Station because we got to witness and learn about the past and the present. I also really liked how we made a website about it. It wasn't just for us to access, but for other people to use and learn!

—Lillian

To learn more visit <http://hteplroom208.wixsite.com/libertystation/about>





Does Nature Need Us?

By: Arden Isadora Carlsteen

People pollute it, people cut down it,
People build on it, People kill it,
People live in it, they ruin it for animals
that really need it.

When I am stiff it makes me feel soft.
It makes me feel as light as a feather.
When my breaths are heavy they seem
to feel light again. When I feel down in
the dumps I look at it and cheer up.

We need nature.
But does nature need us?



The Dream Project

Allison Kucia, 3rd Grade

High Tech Elementary

Why are we here if not to dream? In this project, students engaged in conversations with different members of our San Diego community to investigate the wide scope of dreams that an individual may have in his or her lifetime. In honor of April being National Poetry Month, students sought inspiration from various poets, and deeply examined their own lives and dreams for the future to create a piece of writing accompanied by a mixed media illustration. These poems were compiled into an anthology and published by a company selected by the students based on cost and time efficiency. Their co-created anthology acts as a “dreamcatcher,” or legacy project, of the students’ aspirations at that point in time.

Teacher Reflection

What I love about this project is that it provides students the opportunity to be creative through both artistic and written expression. It was powerful to see how beautifully students worked independently, as a classroom unit, and with project collaborators to critique and improve their work, and to ensure that their art and poetry captured their hopes and dreams correctly. I attribute much of this to the high involvement of students in all realms of the project. Having students learn and engage in the process of writing, illustrating, and publishing a book from start to finish (students ended their project by watching their book get printed and compiled at the publisher) gave them a heightened sense of pride and ownership over their work.

Student Reflection

The best part of the project was making our final drafts. It was pretty cool to go to the publishing company and see how they turn our work into a real book. Our book was made by a powerful machine with smart technology. It was neat to see how it worked and how the people at the company used it. —Luca

To learn more visit www.hightechhigh.org/hte/projects



Healthy Me

*Dallis Fox, Trisha Magoon, and Meaghan Leahy, 1st Grade
High Tech Elementary*

In this project, students explored all about healthy living. First graders became exercise experts, learning different ways to move their bodies and why exercise is important to staying healthy. Students also learned about nutrition and applied these ideas to their own lives. They discovered the five food groups and why each is important in a balanced plate. At the end of the project, students completed two final products. Through multiple drafts and critique, students created a 'healthy plate' that included the food groups with labels and realistic drawings. Students also used group work to choreograph an exercise routine. They filmed each section to compile into a class instructional workout DVD. First graders brought the plate and DVD home to help their families stay healthy.

Teacher Reflection

We designed this project with active first graders in mind! Our hope was to harness their natural energy and need for movement while serving the purpose of promoting healthier living. We felt that they would be very engaged in the different forms of exercise and would enjoy choreographing and videotaping their own workout routines. What we didn't expect was how enthusiastic they would be about nutrition as well! They really enjoyed learning about the food groups and how each one helps our bodies. They also loved creating actual plates with their careful artwork showing examples for a balanced meal. They worked diligently to use critique and improve each draft to make their food look realistic. Students took what they learned about food and carried that into their real life. Parents have told us that when they go grocery shopping now, their child will often suggest healthier options!

Student Reflection

It was special making the first grade workout video because I got to make it with other people. We used a green screen. At first I was like, 'Wait a minute! It's just going to be green behind us!' But then it changed to have different scenes like New York or a picture frame!
—Sydney

To learn more visit www.hightechhigh.org/hitel/projects



THE FORCE OF FRICTION | The Story of Mirabel 5:30
 Accross the River 6:00
 The Traveling 6:30
 The Road to Life 7:00
BONUS FEATURES: KINETIC ART GALLERY WALK!



The Force of Friction: What Moves Objects? What Moves People?

Michelle Sadrena Clark, Humanities;

Cate Challen, Maths/Physics

High Tech High North County

In humanities students researched undocumented minors and the reasons they immigrate to the United States. After examining multiple perspectives through texts, documentaries, guest speakers, and border field trips, students wrote an original, bilingual, one act play, based on the life of an unaccompanied minor, and then decided which plays would be produced and performed at the all school exhibition. During each play performance, at the moment of climax, the audience had an opportunity to determine the protagonist's course of action, and the play was acted out accordingly. Our hope was to enlighten the public and inspire civil discourse. In physics and math, students studied forces, energy, motion and geometric transformations. Students applied their understanding of these transformations to illustrate the migration of an unaccompanied minor through a unique kinetic art (moving art) piece.

Teacher Reflection

Students developed their problem-solving, critical thinking, and collaboration skills to design and engineer unique designs with an emotive story behind them. We were impressed by the critical thinking, courageous conversations, and creativity the students exhibited throughout this project.

Student Reflection

The Force of Friction immigration project made me more aware of the social and economic factors affecting immigration in the United States and taught me a very important aspect of critical thinking; know the facts before forming an opinion. In Maths/ Physics I utilized my understanding of mechanics and my creativity to apply our lessons on transformations into kinetic art pieces.

—Rachel

To learn more visit <http://thedifferencemakercoachclark.weebly.com/the-force-of-friction.html> or <http://catechallen.weebly.com/>

Big Ideas from Small Creatures

Patricia Lim and Julie Hutchins, 1st Grade

High Tech Elementary Explorer

First grade scientists in Room 2 have been interested in garden creatures for a long time...since kindergarten! They have spent a lot of time outdoors looking for, observing, and wondering about these animals. These are questions they had about the animals: Who lives in the garden, and how do they live? Is our garden a good home for these animals? When they became experts on these little creatures, they taught the school community about them. Other children learned about the animals and learned to take care of them while visiting the garden. They also figured out which animals are helpful or harmful to the garden. This can help other classes find solutions to gardening problems caused by animals. Signs and books remain in the garden so students can continue to learn about the animals.

Teacher Reflection

Students were truly connected with this project. They knew that the idea came from them and their passion for animals and the garden (which they designed and built in a previous project). They now understand that they are real scientists, artists, writers, and teachers. At our exhibition, guests learned from the 1st graders and noticed their expertise on the subject of animal adaptations and gardening, and sensed how proud students were of their work.

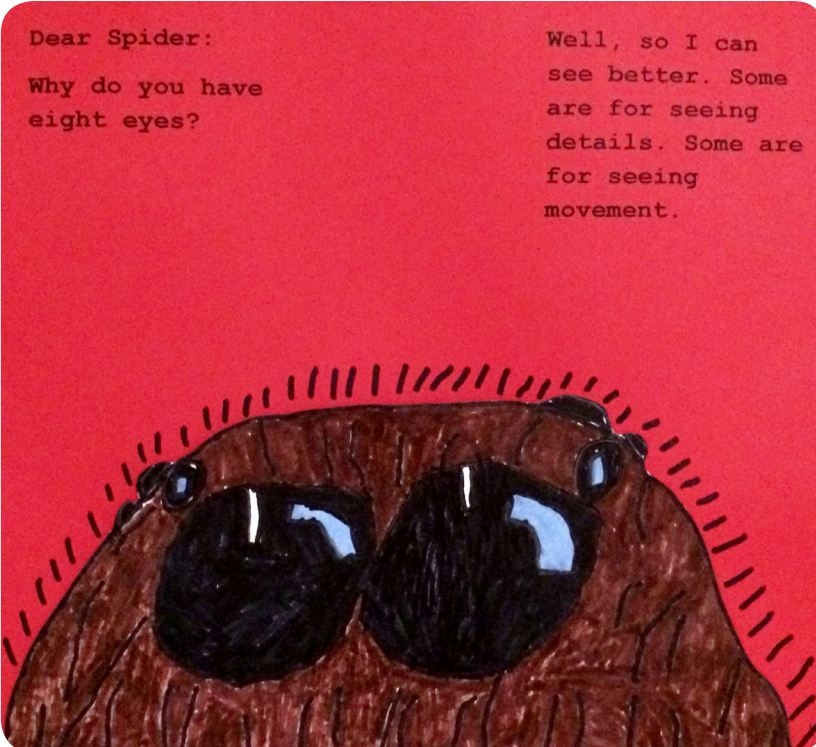
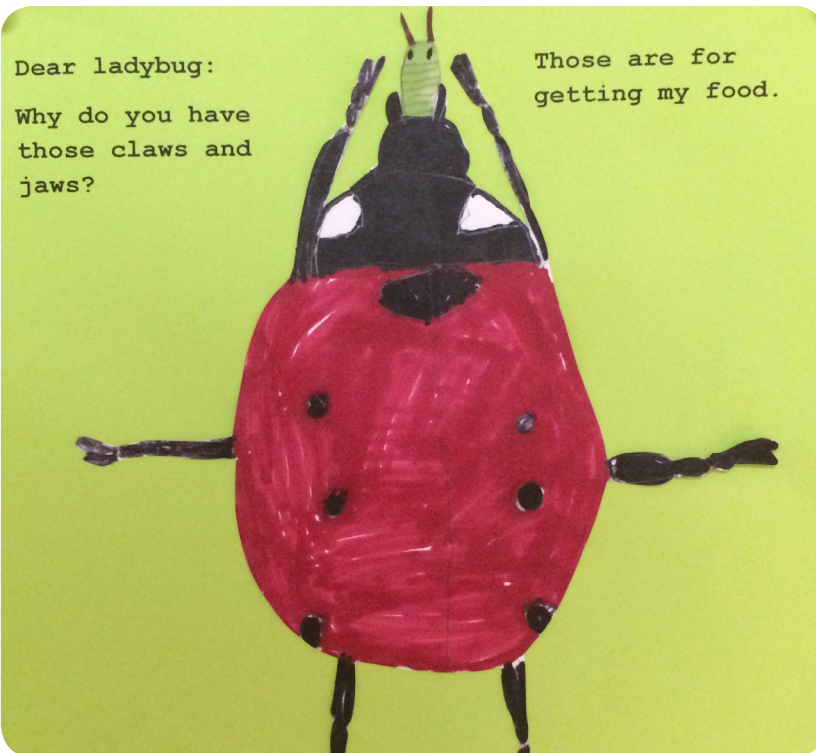
Student Reflection

Our project was about what small animals can do. I learned about what snails can do. The hardest part for me was writing a lot. My favorite part was making the experiment. This helps others because I can tell others all I learned. —Stella

I felt like a real artist and that's what I really want to be.

—Blanca

To learn more visit <https://www.hightechhigh.org/schools/HTEX/>





The Making of the Modern Teen

*Rachel Nichols and Margaret Noble
12th Grade English and Art Technology
High Tech High Media Arts*

The graduating seniors of HTHMA presented a compelling and provocative interactive art exhibition on the current state of social, cultural, technological and ideological constructs emerging in today's modern teenagers. Fifty students presented short talks and interactive art experiences on topics ranging from bullying, depression, education, media addiction, feminism, sports injuries, the judicial system and many more contemporary issues. All of these projects were uniquely authentic as the sources of inspiration came directly from the teenagers living these realities every day. Through their rigorous research, personal experiences, artistic renderings and computer programming design, these 50 teenagers provoked their peers and adults to reconsider their notions of the challenges, habits, practices, and rich cultural experiences that impact the leaders of tomorrow today.

Teacher Reflections

We felt it essential to design and facilitate educational opportunities where students can try, take risks, make changes to their work, and adapt as they go forward. This process is critical to their growth as students and as people. The outcome of this work was extraordinary. Working in this type of interdisciplinary, collaborative environment with the students leading their research interests and directing their projects' development really demonstrated to us the importance and educational merits of honoring student voice and choice.

Student Reflections

I learned how to synthesize ideas, think logically and analyze research. I wasn't quite sure what to expect when I started learning programming or had to figure out a way for mature audiences to understand what I was trying to convey through both my research paper and interactive program. But, I found my way through these challenges and to see myself overcome and flourish was pretty amazing.

—Angie

To learn more visit <http://nobleeducator.com/the-making-of-the-modern-teen/>



Faces of South County

*Dalya Almansour, Chemistry; Laszlo Folks, Humanities;
Marisol Franco, Spanish
High Tech High Chula Vista*

In this semester-long project, 10th grade students dissected, analyzed, predicted and suggested specific ways to improve the lives and livelihood of six South County communities, based on their ethnography and current needs. Each group studied the complex intersection of culture, politics, economics and technology to create real world change for those around us. Students assumed a variety of roles (from anthropologist to politician) and generated projects that utilized professional consultants along with their own ethnographic research. The wide-range of final products included building a local park for families in Logan Heights, and implementing enrichment and wellness programs at a retirement home in Bonita. Our essential questions were: How do individuals' wants vs. needs affect the direction of a community? What actions are necessary for a community to continue to thrive in the long term?

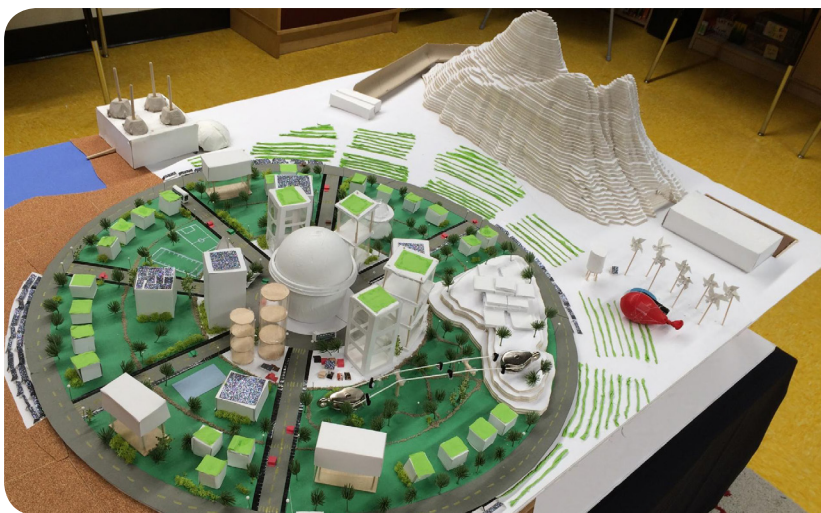
Teacher Reflection

I was struck by how much our students grew in areas that were not specific to any of our disciplines, but nonetheless integral pieces of their learning repertoire. Students rose to the occasion and delved into our communities, learning to empathize with perspectives other than their own. As they grappled with the intricacies of collaborative problem-solving, they developed both their abilities to voice their opinions and compromise, working through their disagreements and owning their decisions.

Student Reflection

When we first visited Imperial Beach we were overwhelmed by the beautiful surroundings of the community. While there, we interviewed several locals in order to better understand the community. We noticed right away that there was half of IB that welcomed new changes and another half of the community that wanted things to stay the same. As a cohort we needed to figure out something that addressed the needs of both parts of the community. —Mariano

To learn more visit www.hightechhigh.org/hthcv/projects



Multi-Use Homeless Cart

Inventor: Sebastian Montgrain

Problems

Ever noticed a homeless person having to keep their things in a stolen shopping cart?

Solutions

The multi use homeless cart enables people to keep your things safe and heat up your food.

Simple machines

The wheel and the lid are a wheel and axle and a lever that rolls and moves up and down.

How it works

First you can keep your things in is with the lid and lock. Then you can carry is and push it with the handles. And you can heat up your food in the solar oven.

Ideas That Changed the World

Mari Jones and Cassidy Laikin, 4th Grade

High Tech Elementary Explorer

Inspired by the way that World's Fairs bring visitors into a vision for the future, Fourth Grade students recreated a World's Fair, complete with their own working inventions and a large-scale model of a city of the future. This exhibition at the San Diego History Center in Balboa Park also helped to celebrate the centennial of Balboa Park. For this project, students researched current problems of today and designed innovations to make our future better. Among the innovations was a city plan that included alternative energy, smart growth, and innovative infrastructure. As part of the project, students presented project proposals to experts such as city planners, transportation planners, and environmental advocates. In addition, students created working prototypes of inventions to help with mobility, environmental issues, hunger, poverty, and water issues, and informational posters and flyers for their inventions.

Teacher Reflection

This ambitious project shows how we should never underestimate children's potential. The quality of student work, and their level of professionalism in presenting to experts, families, and the general public was amazing. The depth of learning was evident in the way students transformed knowledge about our world today to create something new.

Student Reflections

It felt good to present my work to family and strangers to get feedback and to put it out there.
—Asher

The most challenging thing was making everything work as expected. I can do that by taking more time and testing more often.
—Ally

About the Invention Cycle: I learned that it is very challenging, and you fail a lot. The most exciting part for me was seeing it finally work.
—Heather

To learn more visit <http://room14explorer.weebly.com/>



3-Acts

*Enrique Lugo, Art; Kyle Kirby, Math,
High Tech High Chula Vista*

Our questions: Can we create math problems in the form of 60 second films that draw people into solving them? How can a math problem give access to every student in the class while still challenging the most persistent of students? We broke the project into three phases: the first, where students experienced doing many 3-Act problems in collaborative groups in math class while learning animation techniques and telling stories in art class. We also analyzed the 3-act problems we did, working at creating criteria for 3-act problems that effectively pull people into the problem while giving them access. In phase two, art and math merged and students drew storyboards in art class to represent a math problem they developed in math. In phase three, students perfected their 3-act problems through critique and feedback cycles.

Teacher Reflection

3-Acts is, in essence, a project in math education that pulls as much rigorous math discussion into the project as possible. There is craftsmanship in the refinement of the film; there is authenticity in the search for scenarios that draw people into a math problem; there is intellectual complexity in the dozens of problems that students solve throughout the project and in the tension between the need for great story and the need for access and challenge in a math question.

Student Reflection

I learned that failure leads to success. Doing the animation and storytelling was a challenge for me, but throughout the project I learned that perseverance and effort will leave me with the satisfaction of a great final product. A math classroom should be a safe space where students can show their ideas and work together to come up with a solution, can share their creativity and never be scared to be wrong. They should accomplish each task and challenge feeling proud of themselves and never giving up.

—Marysol

To learn more visit www.hightechhigh.org/hthcv/projects



photos provided by Zoe Randall

Engineering a Mindset: Exploring an Elementary Engineering Classroom

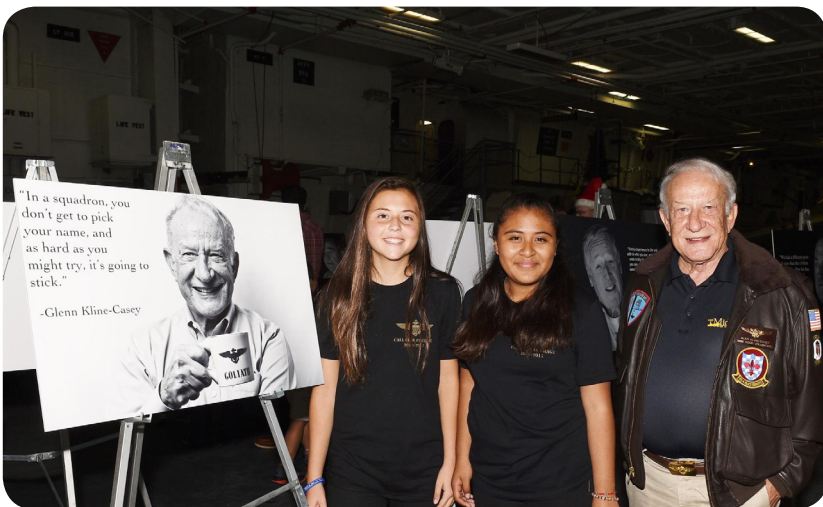
*Zoe Randall
High Tech Elementary Chula Vista*

On my first day of teaching engineering, our room was empty. It was by design that I moved out the chairs and tables and put some carpet squares out to sit on and left the walls blank.

I envisioned this project would be my first community building project for all K-5 students and we would design our room together.

I remember my students' faces, tiny, a little confused, wondrously looking around the empty room. Then I asked them to share their hopes and dreams for our classroom and I realized quickly that robots, flying couches, dog houses and playgrounds although varied and wonderful, were not all going to be possible. However, we celebrated them by hanging their drawings up on our blank walls to share, and thus began the dream classroom project.

I'm not an engineer, nor do I have a degree in engineering or engineering education. My background is in visual arts so I literally started teaching engineering from scratch. After nine years as a middle school multimedia teacher, I yearned to explore a different path. I



Call Sign: Courage

*Kelly Jacob, Chris Olivas, and Max Cady, 8th Grade
High Tech Middle North County*

Students collaborated with the USS Midway museum to capture the stories of Naval Aviators and celebrate the 100 year anniversary of the “Wings of Gold” insignia. In humanities, students read *Unbroken* and interviewed current and retired aviators to capture their stories involving call signs and moments of courage. In science, students learned about Newton’s Laws and the forces of flight in order to build flying vehicles for the the San Diego Air and Space Museum’s “Fly Your Ride” competition. Students also created a digital scratch project to showcase photos and mementos of the aviators’ experiences. This project culminated in an exhibition onboard the USS Midway Museum.

Teacher Reflection

Though the project centered around aviators, the heart of the project was looking at human experiences and the importance of telling and archiving stories. The students and aviators each created lasting impressions on each other, and having an authentic audience drove students to produce high quality portraits and stories that both students and aviators were proud to stand next to. We were proud of our students’ growth mindset in planning, designing, building, testing, and revising their vehicles for the competition at exhibition. This was a great project to apply NGSS 3 dimensional learning.

Student Reflections

My partner and I made our flying vehicle thinking it was going to work with no problem, but we were wrong. We used our original vehicle to look at the flaws and how to improve it. Then we made a second, third, and fourth draft, each time looking through every flaw. We eventually made a working vehicle and were proud that we kept working on it until we got it right. —Canon

I now have a different perspective on the people that serve our country. I saw war through their eyes, and it really made me appreciate everything that they do for our country. —Dani

To learn more visit: 8thgradehumanitiesjacob.weebly.com/call-sign-courage.



Destruction and Restoration: A History of Sausal Creek

*José Garcia and Lindsay Weller, Grade 4/5
ASCEND K-8, Oakland, CA*

Fourth and Fifth grade students at ASCEND learned about the fragility of a local urban watershed and considered how human activities can be both destructive and restorative. This expedition drew content from science and history and learning was expressed mainly through art and writing. As a culminating task, student docents led families and other community members on a tour of the visible products of their learning. These included botanical drawings and research writing highlighting native plants found in the Sausal Creek watershed. Students reflected on their role as community members and have seen how real world problems are solved through collaboration, perseverance, and compassion.

Teacher Reflection

We realized that all the smaller process steps along the way to publishing the field guide were also essential products for students to use as launching points for their docent tours during our exposition of student learning. Aside from the final art and research for the field guide, students presented writing, reflections, and art from field trips and classroom activities. Additionally, we were pleased that students had the opportunity to educate the local community on the delicate nature of human impact on our natural environments. Students and the school community benefited by becoming advocates for responsible choices and stewardship of the environment. Ultimately, they learned that their voices truly matter and can make a difference.

Student Reflections

Everybody that saw my work was very surprised that someone as young as me had so much stuff to show and that made me realize that all of my hard work really paid off. —Dyana

I learned that people can make change for good. For example, Friends of Sausal Creek are trying to grow native plants and plant them back in Sausal Creek. —Jaime

To learn more visit <http://efcps.org/our-schools/ascend/>



Give Me Shelter

Sacha Casciato, Math/Science; David Visser, Humanities

Charley Jacob, Makerspace

High Tech Middle North County

In this project we discussed the issue of homelessness and poverty to encourage students to develop empathy and to see the world from different perspectives. Students took a closer look at the underlying issues of homelessness. We examined the issues of resource availability, equity, and access. We grappled with questions about over represented populations. Students took a hard look at their own biases and misconceptions and developed a better understanding through community service. Students created change with public service announcements, demonstrations holding cardboard signs with facts and statistics, and the creation and implementation of community food pantries.

Teacher Reflection

We saw a tremendous shift in our students' thinking and perceptions about what it means to be homeless. Throughout the process it was evident that students were growing as empathetic individuals who wanted to create change in their local community. Each student worked to help the homeless population in our community gain access to much needed resources.

Student Reflections

This project was based on empathy and helped us see how the other half of the world lives, and that we can do so much to change the world if only we try.

—Emersyn

The campout made me realize that the homeless live in harsh conditions, like cold, rain, and hard places to sleep. Having to build our own shelters helped me understand because ours fell down in the middle of the night.

—Ashby

I had seen some homeless people in the park in Escondido but it was drastically different to see the camps downtown.

—Bree

To learn more visit: Mrvisser.weebly.com, Mrscasciato.weebly.com, or Charleyjacob.weebly.com



Here Now, Gone Tomorrow

A Children's Book on Climate Change and Its
Impact on Endangered Species

Created by High Tech Middle North County
&
High Tech Middle Chula Vista

Here Now, Gone Tomorrow

*Curtis Taylor and Ivan Recendez, 6th Grade Math/Science
High Tech Middle North County and
High Tech Middle Chula Vista*

As a collaborative project between the Chula Vista and North County campuses, students created and published a children's book detailing their chosen endangered species challenged with the impacts of climate change. Students created a watercolor illustration of their endangered species which was included in the children's book. Our created children's book is now being used to help educate other students and the public, on how human impact has become problematic for our wildlife. This project was aligned with the Next Generation Science Standards.

Teacher Reflection

This was such an impactful project dealing with a very important issue, not only in our country, but worldwide. Students were able to be scientists, researchers, artists all in one through this project. To have the students create their own learning around this issue by exploring this phenomena really allowed for them to want to become activists. Also, the cross-school collaboration allowed for our schools to come together. We feel literacy is very important and we wanted to find a fun way to incorporate it in a math and science classroom. We saw students step out of their comfort zone, and we teachers did too. We had no experience using watercolors, and it was great learning experience, which we shared with our students.

Student Reflections

I feel good about helping the earth, because now I know ways to save the environment in the future. —Rishi

I didn't know I could paint. My animal looks really cool! —Leo

The best part was seeing my book on a website. People can buy it and my name is there. —Illeana

To see or purchase the book, visit <http://www.blurb.com/b/7640975-here-now-gone-tomorrow>





Living North County

*Carol Cabrera, Kurt Schwartz, and Julio Zuniga, 9th Grade
High Tech High North County*

Students explored six different North County communities through the lenses of their different classes: Humanities, Spanish, Physics, & Math. We visited Carlsbad, Encinitas, Escondido, Oceanside, Vista, and San Marcos. Students not only visited the cities, but scheduled and conducted interviews, filmed activities that high school students engage with in these areas, created short films, designed info-graphics, and studied the culture of these various communities in depth. Ultimately, in groups of nine, students designed an eighteen box spinner that was displayed at our exhibition.

Teacher Reflection

Taking a close look at what exists in our communities, in our own backyards was definitely the highlight of this project for us. So often, we think of history as what exists in books, but the truth is that we are constantly making history, and that history is living in our communities right here and now. One of the highlights of the field trips for us was watching our students hike through Annie's Canyon in Encinitas. What was interesting for the students to realize was that the subjects that they are studying in school can apply to their everyday lives in the communities in which they live. We also really enjoyed having a challenging product for the students to collaboratively build with their hands.

Student Reflections

I liked getting to talk in Spanish during the exhibition. It was really fun. I didn't know that San Marcos was known as a chicken park.
—Mariana

The Surf Museum in Oceanside was really interesting, and it was cool to see Bethany Hamilton's surfboard. The building of the box was pretty fun too. There were times that it was stressful when things couldn't fit and you had to request for more, but at the end, seeing the finished project was pretty cool. I mean, we made that.
—Jake

To learn more visit <http://misscarolcabrera.weebly.com/living-north-county.html>



Matter That Matters

*Nicole Lively, Humanities and Sophia Oller, Chemistry
High Tech High Media Arts*

In this collaborative Humanities and Chemistry project, students worked in partnerships to comprehensively research a “problematic” element, compound, or material and its effect on society, both historically and currently. For example, one pair investigated chocolate and its connections to child labor; another explored carbon and conflict diamonds. In Chemistry class, students created an image that represented the conflict and used electrochemistry to etch it into a copper plate. Photographs of the copper plates and the research paper from each group were compiled into a book, which was displayed at Exhibition and is available on Amazon. Our goal was for students to understand how resources in our natural world acquire value and the positive and negative effects of the pursuit of ownership of those resources.

Teacher Reflection

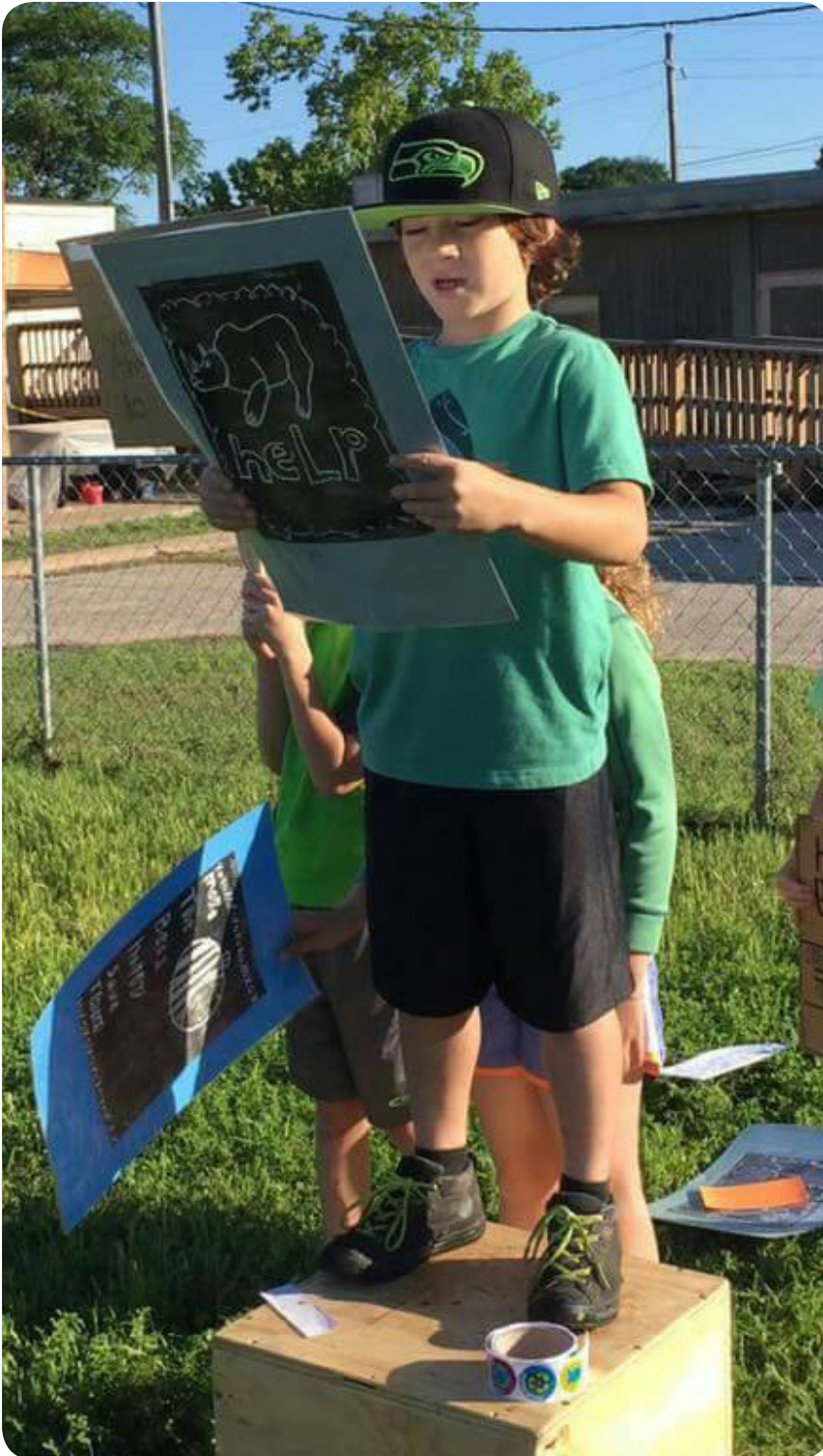
What we really enjoyed about this project was that the interdisciplinary collaboration felt really natural and authentic; students were able to synthesize their knowledge from both classes at a higher level, and it was rewarding to see. There was also lots of room for student choice and we ended up with a beautiful and rigorous final product. Seeing students at Exhibition fluently switch between talking about the electrochemistry of copper etching and historical conflicts over resources was inspiring.

Student Reflections

The importance of a material is influenced by its chemistry a lot, because its chemistry gives it the properties that make it important.
—Roan

I learned that you always should look into a conflict. Always see the full story and never just blindly accept the media’s version of it.
—Eden

To learn more visit <http://nicolehthma.weebly.com/> or sophieoller.wordpress.com. Amazon book link: https://www.amazon.com/dp/1541076818/ref=cm_sw_r_sms_c_api_adHVybKR5ZD25



One Drop at a Time

*Christine Sullivan, 3rd/4th Grade Social Studies and Language Arts
Austin Discovery School*

There were three major components to this project: A class novel study of the novel *A Long Walk to Water* by Linda Sue Park, students researching and writing a persuasive speech, and the building of soapboxes. The novel served as a case study of how millions of people in Africa lack to access clean drinking water. After reading the novel together as a class, students were asked, “What are the top environmental crises faced by the world today?” Students took several weeks to research topics such as: deforestation, reviving the world’s oceans, air pollution, agriculture and transportation systems. The final product of their work was to write a 1-3 minute persuasive speech. For our exhibition of student learning, the 3rd and 4th graders were asked to read their speeches aloud at our school-wide celebration of Earth Day on April 22, 2016. During the weeks leading up to Earth Day, our class took a field trip the Austin Tinkering School. Then using woodshop tools, students worked in teams of four to construct soapboxes so that during exhibition they would both literally and figuratively, “Get on their soapbox” and speak about an environmental cause.

Teacher Reflection

Students are living in an era where climate change is their inheritance. It was inspiring to see them be both passionate and well informed as they delivered their speeches. Having an audience of students ages K-8th grade and their parents, helped the students believe that their words mattered.

Student Reflections

All Americans have a voice! So let’s use it! —Alyssa

Always remember, ‘Don’t make greenhouse gas, so that we can all last!’ —Jaxon

So here goes my pep talk, you might be small compared to this world, but you can help! —Liberty

To learn more visit <http://www.austindiscoveryschool.org/>



Wise Kids Traditions

Daniel Wheat, 4th Grade

High Tech Elementary

We students thought it pretty important to think about one of the most critical things facing our generation – our health, our energy, and our youthfulness. We often hear mixed messages about what to do and what not to do. But, you rarely hear or read about the practices of indigenous people. Sometimes we forget to check out history when we try to solve problems. What can we learn from people who were connected to their food, their land, and to each other? What were/are they doing differently? How were they able to avoid some of the common diseases we see in our communities today? There were a lot of questions that we wanted to answer!

Teacher Reflection

I wanted a project that gave students the opportunity to challenge and investigate. But I was amazed at how much students learned during this project. They could identify fat and water-soluble vitamins and share the role that certain vitamins play in the body. This was completely foreign information to them. I really wasn't sure how they would respond to trying new things like organ meats, kombucha, bone broth, sour dough bread, raw cheese, kefir, sauerkraut, and homemade butter. By the end of the project, students genuinely appreciated these foods (notice I didn't say they enjoyed eating each of them... yet) and understood why they were valuable to so many indigenous peoples. A year later, I still have students that talk about the project. They share about their learning, and show they continue to investigate matters that are critical to our health.

Student Reflections

Ancient people knew how to prepare foods, and found the best ways to get nutrients from food. —Owen

You should try to stay healthy with the right foods, instead of spending money on medicine with side effects. —Aaron

To learn more visit <http://www.hightechhigh.org/hte/>



Plant and Insect Life Cycles

Julie McMillan and Kate Snyder, Second Grade Science

ASCEND K-8, Oakland, CA

Throughout our twelve-week expedition, Second Graders became botanists and entomologists as they cared for and cultivated plant and insect life. We integrated arts and science curriculum to study painted lady butterflies, silkworms, fava beans and marigolds. Both in class and at home, students watched the life cycles unfold in real time and compared each species' stages of growth. This science expedition interwove the ASCEND values, ELD, writing, the arts, community service, and technology. At our school-wide EXPO day, students sold hand-crafted informational coloring books on the life cycles of fava bean plants and painted lady butterflies. Second grade scientists shared their informational reports and led members of the community through a tour of our 3D plant and insect sculptures. Our expedition culminated in class performances of seedling and butterfly poems.

Teacher Reflection

It was amazing to watch our students transform into scientists. When insects came to our classroom in their larval and egg stages, these budding entomologists demonstrated compassion as they cared for and observed the insects in their stages of growth. In science-integrated ELD students practiced and internalized new scientific vocabulary that they later used in their investigations. We kept a bilingual blog and a 24-7 insect webcam so that students could observe the life cycles of our insects from home. In art, students connected their studies to create 3D models that were larger than life, which proved to be very fun and messy!

Student Reflections

What was fun about EXPO was that we got to give away our seeds after we gave tours to the people who came to visit. —Erick

The coolest thing at EXPO is that I performed a poem in front of probably sixty people! We played instruments and did a poem on stage to represent seedlings. We did the poem in English and Spanish, to show how a seedling becomes a bigger flower. —Jayla

To learn more visit <https://ascend2science.blogspot.com/>

Design Challenge: Beekeeping in Doha, Qatar

*Lisa Bastedo, Maria Manacheril, and Rachel Rust,
10th Grade Biology
American School of Doha*

After doing an in depth study about the decline of honeybee populations in the United States, our students were presented with a challenge to design beehives that would be able to withstand the harsh conditions here in the desert of Qatar. Students read about local beekeepers and the problems they faced and then designed hives to solve problems such as extreme temperatures and dust storms. Students tested their prototypes and followed that with a redesign. Despite having limited resources for this sort of project, they were able to produce impressive hives that were indeed effective in solving their problem. The student designs ranged from internal cooling systems to insulated outer layers to the hive.

Teacher Reflection

This was our students' first introduction to the design thinking process and engineering practices in NGSS. We were impressed with students' engagement in the project and their genuine concern for declining honeybee populations. Going forward, we would like to be sure that students are personally connected with the local beekeepers that are here in Qatar so that we can have implementation of their designs by the beekeeper.

Student Reflection

It is important to listen to other people's ideas and not just your own as we need to put as many ideas as we can on the table in order to have a good design.
—Jude

I previously had no idea that there were so many types of beehive designs.
—Andia

The high temperature and dust have a huge impact on the survival of bees here in Qatar, but with a well thought out design, we can solve those problems.
—Eleyna

To learn more visit <http://www.asd.edu.qa/>

