# UnBoxed

A Journal of Adult Learning in Schools



Graduate School of EDUCATION

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*The Raptors for Rodents Project. Photo courtesy of Jeff Govoni*

cover image: Cameron Ishee's reproduction of Mee Kyung Shim's "The Tranquil Autumn Beauty."

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Spring 2014

# Welcome

*The Editors*

What does it mean to design instruction for deep, engaged learning? How do our students experience these efforts? Regarding this second question, our UnBoxed interview takes the form of a student panel, aired as part of a Deeper Learning MOOC in February 2014. Seven students, five from High Tech High schools and two from elsewhere, offer reflections on teaching, learning, and schooling. Participants in the MOOC viewed the panel as the highlight of the experience. We hope you will enjoy our excerpted, edited version, drawn from the transcript of the session. Cameron Ishee adds another student voice to the mix in an article describing how she developed a sense of agency (and global awareness) in a flexible school setting allowing for student choice in program design.

Student voice and choice figure prominently in our offerings by adults, too. Ben Krueger and colleagues invite students to assist in designing structures for learning, both by soliciting student feedback on lesson designs and by employing their sixth-graders as technology instructors for the training of new teachers. In separate articles, Georgia Hall

and Briony Chown describe ways to support and enhance student reflection and peer critique in the elementary classroom. Ashley DeGrano recounts what happens when she invites students to plan the exhibition for their project on immigration.

Cindy Meyer Sabik considers the roles of mindset, disciplinary thinking, and culture in teaching practice, asking what it means traditionally, and what it should mean, to think like a teacher. Philip Yenawine discusses the use of visual thinking strategies (VTS) to encourage open-ended discussion of works of art, culminating in learning that lasts. Both authors emphasize fostering students' ability to pose and explore questions as a key to self-directed, self-confident learning. Finally, Daisy Sharrock and Liz Perry align the learning in an ambitious, crowd-funded, student-run food truck project to the elements of deeper learning as defined by the Hewlett Foundation, including content mastery, critical thinking, collaboration, communication, academic mindset, and self-directedness.

The UnBoxed cards in this issue offer glimpses of projects and practices that we find inspiring. These cards are freely available on our UnBoxed website in a printer-ready format. Simply print, fold, share and discuss. Each card refers the reader to a web address for further information.

We wish to thank the K-12 and university educators who have reviewed our submissions for this issue and offered invaluable counsel. We invite all of our readers to join us in conversations about purpose, policy and practice in education by submitting your thoughts for publication or serving as a peer reviewer. To learn more, visit www.hightechhigh.org/unboxed.

Read, enjoy, and participate!

—The Editors

*Cameron and Sisi Dong, an eleven-year-old community organizer.*
*Photos courtesy of Cameron Ishee*

# Education, Expanded

*Cameron Ishee, Class of 2014*
*High Tech High International*

While studying abroad in China during the summer after my freshman year, I came across a zoo in Shanghai where the exhibited animals were obviously neglected. In the middle of the day, during the most intense heat of the summer, few animals had water and shade sources available to them. The pandas' exhibit was only a concrete box with a pile of bamboo leaves in the corner. A baby goat actually escaped from its poorly constructed exhibit, and wandered around the zoo before I caught it and put it back.

As a result of this experience, when I returned to the United States I started an independent study project to investigate the world of zoos. Over the course of the next two years, I looked into the social, economic, and historical factors that have given the United States and China different attitudes towards animals. When I started running out of things to read, I contacted professionals working in conservation, education, and zoo design to hear their opinions and discoveries in their own words. I attended two national conferences and worked in an office on a conservation education project. In my senior year, I

spent five weeks traveling through Southeast Asia with a professional delegation to promote positive human-animal relations and to network with other conservationists.

None of this was in the curriculum for any of my classes at High Tech High International, but at the same time much of my project would not have been possible without both the structure (and flexibility) of High Tech High and the support of International's teachers and administrators. Over the course of the last two and half years, my opinions, goals, and outlook on life have been transformed with each new experience. The different perspectives I have gained from the people I've met have helped me to develop a much more nuanced worldview. The most important shift was my evolution from looking at architectural issues of exhibit design to focus on conservation education in China.

Originally, after discussing the state of zoos in China with several professionals and learning about the evolution of human-animal contact in China and America, I thought that reforming the architecture of zoo exhibits would be the best way to make positive change for animals. The Woodland Park Zoo's revolutionary development of immersive-style exhibits over the past several decades was inspiring to me. Immersive exhibits depart from the traditional, "gallery" model of viewing animals by placing heavy focus on the idea of bringing the human into the animals' environment. This means having the people on-level with the animal, minimal barriers between them at that level, and an exhibit that resembles the animals' natural environment as much as possible. It is thought that this style, as opposed to, for example, a design where the animal is in a concrete pit for the humans to literally look down on, would promote respect in addition to providing better living conditions for the animals. While exhibit design is a very interesting and relevant subject, both my internship mentor and my school's culture helped to shift me in a different direction. Eventually, I came to see education itself in a whole new light.

The High Tech High system is a hotbed of intellectual thought on the topic of education, and being immersed in this environment on a daily basis provided me with a culture in which to develop my own views on education. Every one of my teachers has a personal educational philosophy that guides their teaching style, and they are very willing

to discuss it. We have tour groups from all over the world who come to discuss and learn. In this atmosphere where education is treated as a both practical matter with which to experiment and a philosophical matter to discuss and debate, it is very easy to begin to see the power of education in the world.

Another critically helpful piece of my school's structure was the junior internship. For the month of January, I was able to work full-time with my mentor: Dr. Chia Tan, a primatologist at the San Diego Zoo's Institute for Conservation Research. Dr. Tan studies a species of monkey whose last refuge is a reserve in southern China. She started the Little Green Guards (LGG) conservation education project, an initiative geared towards primary school children. Her description of her reasoning and her project's goals were a primary factor in my gradual turn towards seeing education as the best tool for creating positive change.

During this month, Dr. Tan and I created an afterschool club for the Little Green Guards. I made a video that was the first of an ongoing series intended to teach English alongside fun facts and stories about animals, entitled "A is for Ape." It was hard getting back to my somewhat rusty Mandarin but Dr. Tan, as a native speaker, was able to teach me a lot of specific words I needed to know.

When a delegation from the nature reserve in China came to visit, I was in the San Diego group that took them on a tour of the southwestern United States. This travel was accompanied by many long, in-depth conversations about the state and methods of conservation in China. I also got to present my video to the officials and to the teacher who visited me on-site. Not only did I learn quite a bit about both the subject matter and the "real adult world," but I also felt an intense satisfaction at actually making an impact, at actually working to change the problems that I had encountered at the zoo in Shanghai. It was the ultimate project-based learning experience, dynamically including all six tenents of project-based learning in the context of my passion (adult-world connections, authenticity, assessment, academic rigor, applied learning, and active exploration).

The connection I made with my mentor grew stronger over the following summer, when she traveled to China and implemented the activities we had planned and designed for the club. Towards the end of the summer of 2013, once she had returned, we started planning for me to accompany her on her next trip.

I was able to arrange with my teachers and school administrators to take five weeks off from school during the fall of my senior year. Everyone at school that I talked to about this was extremely supportive, and I had all the resources I needed to manage the major change to my schedule. Furthermore, my Engineering class even helped me with my project. We made jigsaw puzzles that taught basic physic concepts, which I later used to teach the Little Green Guards.

The trip began in southern China. I hiked through the reserve where the monkeys live, conducted a club meeting with the puzzles, held meetings with many officials, scientists, and educators about our project, and planned for the future of conservation in the region. We even held an outreach event at a local teachers' college to recruit volunteers, and I gave a speech in Mandarin to the assembled students and officials. Next, we went to Vietnam. We attended an international primatology conference, a meeting at the US embassy in Hanoi, and several networking sessions with other conservationists. I filmed primates at the Endangered Primate Rescue Center during the conference, and I saw wild monkeys for the first time. (Left is Delacour's langurs). Later, we traveled to Taiwan to meet with the leaders of the Taipei Zoo about possible future collaboration, and we got to tour their institution and see their practices. In addition to being a valuable educational experience, it was also so exciting. This sudden immersion in the world of conservation was one of the best things that has ever happened to me.

When I returned, I had to immediately return my focus to school and college applications. But I started thinking about everything in terms of this project, and I also started to see my school as a tool for real-world change in and of itself. The connection between my Engineering class and the Little Green Guards really opened my eyes to the potential the High Tech High model of education has for making such strong connections between the students' passions and the content of the curriculum. Even though I am now about to graduate, I definitely intend to keep close contact with my school. In addition to seeing high schools as educational institutions, I hope that more of the outside "real world" starts to see high schools as a place where valuable, "real world" work can be done.

For example, in senior year I started on a project created by my Calculus teacher, Will Haase. He intends to help students pursue their passions

through the Inquiry Project, where students essentially follow the pattern that I went through on my own, but with class time and teacher help. The students find something—a topic, a problem, a field—that interests them. They first research, then speak to professionals, and finally design a course of action to contribute to the field or solution. This project's main problem is the time frame in which it takes place. It's hard to tell students, "Okay, you have a two weeks to discover your passion, GO!" Some students know what they want to do right away, but most do not.

In reflecting on this project, and on my own independent study, I have come to see how valuable it has been for me to have all of this time to develop not only my independent study's content, but also my own thoughts and opinions. I started this in sophomore year, and now as a senior, I am in the middle of something incredible. I have gained confidence from my successes and from the support of my community here, and I am much more capable in a variety of areas than I would be otherwise. At first, approaching all of those highly educated, extremely successful professionals was hard. I didn't want to bother anyone, but I was welcomed time and again. Attempting to balance my schedule was also a daunting task, especially this last year, but it was well worth the effort. The fact that my school was so welcoming and accepting and supportive of my ideas and aspirations helped me to fully realize what I can do. I had time to edit and revise my work and my views, and I had time to evolve in my thinking. Looking back, I can see that the time I had allowed me to explore tangents and progress all the way from architecture to education.

The Inquiry Project in Calculus is wonderful, and if High Tech High can start earlier with supporting a longer version of such a project, I think the end result will be much more whole and more fully formed. High Tech High generally does a good job of preparing students for life after high school, and there is so much more potential there for connecting students to the outside world in a way that would deeply motivate them. For example, I used the internship opportunity to delve deeper into my project, while many of my classmates wound up doing something that they, in the end, did not want to pursue any further. While learning what you don't like can certainly be valuable, junior internship is much more fun, interesting, and valuable in the long term when you can go after what you are passionate about. I also

used the jigsaw puzzle project in Engineering to add to my lessons in China. I think that there are so many more opportunities for High Tech High education to be more personally inspiring to the students. There are also so many opportunities for students to work with each other, playing off each other's strengths, to help each other's projects across classes and grade levels to create content that does real good. For example, a student focused on music in their Inquiry Project could work to design a theme song for my educational videos, or I could use my Mandarin skills to translate another students' work to make it accessible to more people.

I envision future schools where students' education is driven by their passions, where a student's curiosity rather than a curriculum is driving the content, and where students collaborate not just on the projects that the teachers design, but on their own projects as well. I think the end result would be graduating classes where the students are more confident and know themselves much better. I hope that my successes can act as an example for what high school students can do when a school facilitates a student's individual interests and trajectories.

*To learn more about Cameron's experiences visit:*
*http://chinazoos.blogspot.com/*


*Students become teachers. Photos courtesy of Ben Krueger*

# Students as Experts in Professional Development

*Ben Krueger, Math/Science*
*High Tech Middle*

Involving students as experts in our adult learning community has been a great way to build a positive, collegial school culture. It invites students into the conversation about teaching and learning in a way that they find relevant and exciting. I describe below two ways to involve middle school students in adult learning that have worked well for us: soliciting student feedback, and enlisting student expertise.

**Soliciting Student Feedback**

Our staff set up a time during our afternoon professional development where the teachers and staff all interviewed current and former students to find out how they felt about different aspects of our school. We had a great range of students for the panels. In the process, I discovered that one of my shyer 6th grade students, Nathan, loved working on computers as well as fixing computer-related problems. He had been proud of some work he had done last summer, fixing his parents' computers. He and I talked about how this interest and skill could benefit our class and I ended up giving Nathan increased responsibilities with tech help and maintenance of the class computers.

At High Tech Middle, we often 'tune' our projects; soliciting help from others to create the best projects we can. We have included students as respondents in these structured conversations, and their perceptions have been incredibly insightful.

For example, I helped a friend and colleague, Bobby Shaddox, tune a project for his 6th grade class on creating a book about San Diego. We had a panel of ten students from his class. As we discussed the project as a group, ideas started to emerge. The students had a vast array of ideas on how they wanted to write about San Diego. They wanted choices about where they wrote about and what style they would use. They offered insight on how Bobby should structure his groups and organize responsibilities for the publishing process. They had ideas for selecting groups that would give students a choice, but also ensure that the groups were productive. Bobby left that meeting with a clear picture of his next steps in creating a  project, and the students benefitted from a leadership opportunity and voice in their education.

**Enlisting Student Expertise**

Students love to be experts. It can help to empower them, as well as help them to see learning as a continual life long process. The vast majority of students I have met love to help out and have a job. I have facilitated professional development sessions where a group of adults from other schools learn how to use Sketch Up from my students. They also work with the students on brainstorming ways in which they can use this 3D modeling program in their own school settings. The initial prompt is to design their dream home. They get to work with my students in small groups who have learned from our project work in class, and are bringing in their experience and expertise. The adults have a great time and learn so much more than I would be able to teach them, or they would learn on their own in the hour. They strike up conversations with the students while they work, and friendships are made. The students benefit because they are empowered with teaching someone who will go back to their setting and share this with others.

Nathan, who helped out in my class, also helped me support all the new High Tech High teachers in creating digital portfolios in our

summer "Odyssey" for new teachers. The new teachers range from computer whizzes to people who have never created a website. The Odyssey offers a great opportunity for our new teachers to receive help from a student. Nathan pushed himself to work with this large group of unknown adults, going from one raised hand to the next. This was a leadership opportunity for Nathan and his peers, and it gave our new teachers a chance to see students in the driver's seat. Having a team of students offer tech help ensures that people leave that meeting with a website to show for their time. As a result, I have seen Nathan assume more leadership in class, as well as participate more in class discussions.

I recently organized staff development time in which our entire staff learned how to play a musical instrument of their choice. They got to choose between guitar, ukulele, bass, vocal coaching, or drums. They were taught by ten of our music students, and two of our staff members for 90 minutes. We all paired up and started jamming. My favorite moment from the workshop was when we realized we needed another ukulele teacher, so one of the students went to grab a friend, who just happened to be staying after school that day. He came back with Kim, and she taught our new 6th grade teacher Bernice ukulele for the first time. I saw Kim's eyes beam as Bernice caught on quickly and worked through her song. It was heartwarming to see Bernice make connections with students outside of her class as she acclimated to our school setting in her first month. The two have a special connection to this day.

Seeing the power of students as teachers and co-learners has changed the way I think about teaching and learning and school as a community, as well as what our students have to offer our school. The next time you are planning professional learning in your setting ask yourself, "How can we involve students?" You may find yourself pleasantly surprised with the outcome.

*Photo courtesy of Ashley DeGrano*

# A Humbling Lesson in Listening

*Ashley DeGrano, Humanities*
*High Tech Middle North County*

My class and I often have short, morning conversations (commonly known as "Tribe Talks" in my room) where we give shout outs, talk about our expectations of one another for the day, and all are part of the conversation. At times, I still forget that those morning talks don't just end there when it comes to letting students have an equal voice inside the classroom. Student voice and choice, being one collective unit, and creating a safe classroom is all part of an inclusive learning environment. I wanted to explore a bit more about choice in the classroom, specifically through projects, and understand what it means when the teacher lets go of the project exhibition process and product, and turns it over entirely to the students.

**Talking as a Tribe**

In the days before Fall Break, I needed to introduce my students to the idea of the exhibition that I created for them. I typically introduce exhibition a few weeks into the project. I wanted the students to have a general idea of my vision before going off to break. After all, upon

return from the week off, the students would have to be ready to construct the exhibition. We would only have three weeks left of our immigration project, and we would have to get to work right away in order to finish all of the products and make sure it was beautiful work. I had dropped hints about silhouette making and infographic creation, and had even mentioned that I reserved the turf outside to exhibit on, but I hadn't shared details past that. My first period class was fast approaching, and I was ready to share my grand idea.

> *"Alright guys, I've talked to you a bit about exhibition. I want to share some details about it before we go to fall break. Remember how I said we were going to have it held on the turf? Well, I got the okay! Exhibition will officially be on the turf! It's going to be rad."*

Blank stares and crickets.

> *"Uh, can we do a chalk talk on exhibition instead?"*

> *"Yeah! C'mon Ms. DeGrano, we don't have much more to say about the field trip."*

Wait. Why do they want to complete a chalk talk about exhibition? I already told them what we were doing. What is there to add? I've spent weeks planning! I've told everyone how awesome it's going to be. I've reserved the turf! My inner monologue would not quit. So I responded with the most diplomatic answer I could:

> *"Let's hang onto these thoughts for a bit. We are going to finish the novel, and complete a chalk talk during project time this afternoon."*

Great. I had silenced them for a bit. I needed to think. I needed to figure out my next steps. I finished reading our novel, *Breaking Through* by Francisco Jimenez, about a young boy who immigrates to the United States (without his family) at a young age. It is about his trials and tribulations as he adapts to the American lifestyle and lives out the "American Dream." As I finished, the students applauded. I looked up, grinned, and clapped with them. They were excited about the book, and happy with the ending. And then, all of a sudden, it hit

me. Right as I closed the novel and helped contribute to the applause, I realized that I was one part of the class and class culture. I was one clap contributing to the round of applause. It was not my exhibition. It was our exhibition.

During the break I wrote four statements on the different white boards in my classroom. The statements read:

- Exhibition on the turf.
- For exhibition, we will be creating…
- On exhibition night, I will be doing…
- Infographics/Silhouettes.

As the students walked in, they noticed the words on the board, and nudged each other, pointing, and understanding what was happening next. I began to share my reasoning with the students. I explained that I had put countless hours of time and effort into the creation of this exhibition. I then confessed that I had lacked the wherewithal to let them have a voice. I thanked them for pushing me to check my ego at the door. They giggled, but nodded. I encouraged them to be honest while completing the chalk talk, and to my surprise, the results were more than I could have ever hoped for.

The students reached a conclusion that exhibiting the work on the turf would be difficult because of the lack of lighting. Also, they felt as though an exhibition on the turf would be a bit showy, and they want to give every school and classroom a fair shot at exhibiting work. They didn't want to take the focus away from everyone else that night, since it is a village-wide exhibition. The students found silhouettes to be meaningless. They didn't find interest in creating them, and wanted to nix that idea. The students loved the infographics idea, but they wanted to integrate it based on their new plan for exhibition.

*"And then we can sell street food!"*

*"Yes! We need Border Patrol."*

*"What about passports for the guests?"*

*"Groups of 4! We will need power tools!"*

*"Guys! Half of this could be in America, and half in Mexico!"*

*"What about building stores? Selling products?"*

*"Right! I want to know about currency and what it takes to move to the US."*
*"What about the citizenship video we watched? We could teach them about it!"*

The conversation went on like this for about an hour. I facilitated, took notes, and we finally reached consensus.

The exhibition was to be presented in rooms 125 & 126 of HTMNC. The wall down the center of the room would represent the border between Mexico and America. My office would be the legal port of entry. On that night, Border Patrol would keep watch of the area. Shops would be located in both The United States and Mexico. Merchants would produce goods, and professionals would run services. Groups of four would put together either a good or a service, and complete research to create an infographic about it. Goods would range from jewelry to street tacos. Services would range from lawyers to medical doctors. At the exhibition, guests would receive citizenship to one country only. Some would receive passports, and some guests would need to locate lawyers to help them get to another country legally. The night would still prove to be informative, and the excitement would be generated from the students.

"Choices for Children: Why and How to Let Students Decide" written by Alfie Kohn (1993) goes to great lengths to explain how traditional learning is based upon doing things *to* students rather than *with* them. This essentially eliminates any trust and choice element, and replaces it with preplanned units of study to make sure the information is gathered, repeated, and moved away from in a timely manner. Kohn refers to an article by early childhood development professor, Constance Kamii: "Toward Autonomy: The Importance of Critical Thinking and Choice Making." As a firm believer in choice and autonomy, she states, "We cannot expect children to accept ready-made values and truths all the way through school, and then suddenly make choices in adulthood. Likewise, we cannot expect them to be manipulated with reward and punishment in school, and to have the courage of a Martin Luther King in adulthood" (1991, p.387). Near the end of his article, Kohn explains that teachable moments develop through conversations with

students about their own educational path. Allowing students to have a voice in the direction of their learning is crucial to their experiences inside the classroom. "It is not "utopian"
or "naive" to think that learners can make responsible decisions about their own learning; those words best describe the belief that any group of people will do something effectively and enthusiastically when they are unable to make choices about what they are doing" (p.3).

**Tribe Tribulations**

I work for an organization that encourages student voice and choice, and had thought that in the past I was doing a decent job of balancing my own creation with the flexibility to allow student input. This experience, however, was not without challenges, limitations, and sacrifices in the practice and the process:

1. There were moments where the excitement overshadowed the rigor. Often times, many of the students became so engaged with the designing, building, and creating aspect, that core objectives were lost in the process.

2. One particular student took student autonomy too far. He expressed to me many times how disengaged he was with the project subject. The student advocated for completing his part of the exhibition solely on dinosaur immigration. In this moment, while I wanted to honor his voice and choice, he missed the essential understanding of the human face of Immigration between Mexico and the United States. I sacrificed my student's learning for his engagement.

**The Wise Ones**

The opportunity to have students decide what *their* exhibition looked like and felt like was eye opening. After exhibition was over, I asked the students to respond to a journal prompt that read, "How was the process of the Immigration Exhibition? What did you like, and what are some concerns or challenges that you had along the way?" Here is a selection of student responses:

"Sometimes during projects we get to do what we want, but this was the first time that we got to plan out everything."

"I liked that our ideas mattered."

"It was difficult sometimes for all the students to be on the same page, but the exhibition was cool to see. Everyone pulled it together."

"It was like Ms. DeGrano wanted us to actually care about immigration because she completely let us run the show. I'll probably remember this project for a long time."

"I loved our exhibition. I loved that I was able to have my ideas considered."

"Because a lot of us have never had that much freedom before, it took longer and was a little chaotic. But we had fun. I think we really came together as a class. It was a bonding experience."

"I feel listened to. Usually that doesn't happen."

**Grow with the Tribe**

Student voice and choice is alive and well inside classrooms within the High Tech High community. It is extremely important to consider student voice when creating projects. Each student obtains information differently, and this can be translated into different versions of the same project. In my experience, my students already had ideas about the way that they wanted to complete and show their work. Some students wanted to build, others wanted to write, a few wanted to lead and speak. When students had a say in how exhibition looked, they felt empowered and began to own the project and their education. Isn't that what we hope for? The idea is that if students are invested in their learning, the quality of work, ideas, and creation rises. I want my students to feel valued within the classroom, and I want my students to figure out how they obtain information best.

It's extremely important to not only listen to your students, but also have conversations with your students. It is impossible to understand their needs if you don't understand who they are as individuals. After reflecting on this entire process, I realize it didn't happen overnight. I got to this point in my teaching career by starting out small. I first had short conversations about educational space. In the beginning of the school year, I asked students the following questions:

- Where do they feel most safe on campus?
- Where are there negative stigmas on campus?
- Where would they love to exhibit work on campus?

This provided insight to me about their feelings and pointed out fantastic rooms or spaces that they saw as a healthy, safe space to exhibit. I also found it important to remember that their vision can be adjusted and helped along by me. As a facilitator, it was necessary to guide the students along the way, while still valuing their ideas.

Lastly, and this was the most difficult part for me, was that I pushed myself out of my comfort zone. I find that if we as teachers push our ideas for projects and education, our students can understand the meaning of risk-taking while still being supported within their passions, strengths, and aspirations.

The biggest risk for me was to let go and to listen. I am learning that in order to be a strong educator, there are times where my own ego must take a backseat. My students have pushed me into the valuable role of facilitation. I am proud that my students spoke out and shared what is valuable to them about the project. This experience was a lesson in listening. I am grateful to learn from them at times, in the same way that they can learn from me. As I said earlier, I am one clap contributing to the round of applause. So now when I'm approached about what my exhibitions will look like and how they are progressing, I simply respond with a smile and say, *"ask the kids."*

**References**

Kamii, C. (1991). Toward Autonomy: The importance of critical thinking and choice making. *School Psychology Review*, 20, 387.

Kohn, A. (1993). Choices for Children: Why and how to let students decide. *Phi Delta Kappan. 75 (1)*.

# Teaching, Learning, and Relationships

*Gibran Huerta, Envision Academy*
*Dora Aguilar, City Arts and Tech High School*
*Trey Lewis, Paris Gramann, Erina Chavez, and Daniel Cohen, HTH North County*
*Ana De Almeida Amaral, High Tech Middle Chula Vista*

*In this panel discussion, aired as part of a MOOC on Deeper Learning, students share their experiences and insights about teaching, learning, and schools. Rob Riordan of the HTH Graduate School of Education moderated the discussion and edited the transcript for publication.*

MODERATOR

As a student, what is the work that you're proudest of?

ANA

Currently we're learning about forensics and reading The Adventures of Sherlock Holmes. I'm excited about this project because it's very integrated, and it's something that I'm passionate about. In humanities we're going to make short mystery stories based on Sherlock Holmes, and in math/science we're going to have an exhibition of a crime scene. We're going to be masters in one area of forensics, and we're making stop animation videos to educate our audience.

TREY

In math, we just got into a new unit of finance. So the project is about more or less planning out a future, looking at things like mortgages, insurance, everything that adults deal with in finance nowadays. I'm really proud to be doing it so early on.

PARIS

We just finished up a project in biology, focusing on our own topics that we wanted to study, related to genes and nature versus nurture. My question was, does stubbornness run in your family, and is it genetic? We all found our own solutions with the guidance of our teachers. It was a struggle because we didn't really know where we were going, but I find that the best way to learn is by going through the hard times.

DANIEL

We did a project on disease prevention and where disease originates. We did oral history in humanities, and it integrated aspects of every other class into the project. I love when projects are integrated. Personally I like to make movies and edit, so this project was a really great way to edit, interview, get public speaking skills, and find information about our family members that we might not have known before. A portion of the project is actually being exhibited in an art gallery at the UCSD grad school, so I think that's something to be proud of for everyone who worked on it.

DORA

This semester we went to Cleveland Elementary School and read to kindergarteners.After that, we asked them a few questions based on their favorite animal or their favorite environment, like rainy or icy or windy or desert-like, and we're making a story for them based on different biomes, which is very based on the students themselves.

GIBRAN

Last year we learned in biology about the effects of alcohol on the body, and then in our performing arts class we made a performance about what we had learned in biology. I love performing and I love sciences, so I got an opportunity to combine these two things that I really love. At the exhibition I got to show my family members and people in the community what I learned in my biology class.

MODERATOR

Summer Howorth in the audience asks what are some keys for teachers to consider when deepening student engagement in learning?

ERINA

When projects and classwork are integrated, that's definitely a key. Each student can find something in the work that they like, and it makes them want to learn better. For me, when we integrated art with biology, I was able to get into biology a lot more because I love art. Integrated projects make it less stressful on the students. They have one project they're thinking about, not seven different ones.

PARIS

There are a couple of things I would think about. First, if teachers give a kind of broad guideline for the project and have the students do something that they're interested in, it'll keep them going the whole time because it's something they're passionate about. Second, treat the students like adults. Obviously if the students feel like they're worth it and feel like they're adults, they will act more like adults.

TREY

Student choice is really important when it comes to getting engaged. For example, in our humanities class when we read literature, we often have a choice of three to five books to read, and we'll get into reading circles and discuss that book. So that is great because we're not all reading the same book with half the class bored out of their mind. Of course this applies to just about any class in terms of different choices that students are making.

ANA

Letting students know how this is going to benefit them in the future is important. Students may say, "How are we ever going to use algebra in the future?" but if you really let them know that and use real-life problems, it'll help them understand and really get into it.

DANIEL

For the oral history project I mentioned, the teacher did an oral history interview before he introduced the project. It really gave us inspiration, and we realized it wasn't just a project that he threw together in a couple days. He really invested his time, and I appreciate that because

it shows that the teacher wants to learn with you. Along the way he got brilliant tips from students, and he improved on his oral history as well.

MODERATOR

Another benefit of doing the project himself is that he can begin to understand and anticipate the problems that students might have.

DANIEL

Exactly. The first day of the project when we were editing on iMovie, he said, "Oh, by the way, there are a couple things that you can do so that you can edit the video and still keep the audio." It was a really well thought out project, and he had already given it a test run.

MODERATOR

Gail in the audience asks, "How do you find collaboration with peers? Is everyone eager to collaborate? Are some students reluctant? How do you move forward with a group if others are reluctant?"

TREY

It really depends on the classroom environment. I've had classes where there are lots of students who do not want to participate, and it makes group work very challenging. I've also had classrooms where the environment is that everyone participates, and you are more or less looked down upon if you don't. So instead of looking at it as, "Oh I don't participate. The other group members will do the work," it's more about how can I chip in? That's something that a teacher can kind of control, or even students. The environment makes a world of difference.

ANA

Of course you have to have the right balance in a group, but group work may be beneficial for some students who at the beginning are not very motivated. The leaders in the group will eventually realize that this person just needs some more motivation and maybe needs some more tough love. Even when students are reluctant, it is a work in progress, and we can find ways to build off of that and make it a positive thing.

DORA

Collaborating productively is a leadership skill, and working with peers is a huge aspect in our education. You get the perspective of other people, how they think about the subject or the project. It can be very challenging for those who like to work independently, but once they get into it, it becomes very beneficial.

MODERATOR

Here's a question from Bart Miller, whose sixth graders are starting on their first self-directed exhibition projects. What would you suggest for someone just getting into projects and trying to foster self-directed learning?

PARIS

I'd say that you'd want to put purpose into the projects so that the kids know what they're doing and what they want to do.

ERINA

It's really great that the sixth graders are already doing self-directed exhibitions. What I found in projects is that there need to be two things. One is critique. Critique is a big part of making sure that students keep improving and they don't just get stuck. It's not just the teacher telling them they have to do more. Students are telling their peers that you could fix this and you could do this, and that makes them want to do it. The other thing is having a facilitator. If there's someone who knows that they're going to help everyone keep on track, or five people who know that they're going to help everyone keep on track, it goes a lot smoother.

DORA

In my first exhibition in my freshman year, my very first try at it, what really benefited me was presenting in front of my class. We practiced in front of the whole classroom and we got feedback from each and every student. They gave us a rubric and it was very helpful to get pointers on how we could improve.

GIBRAN

The biggest thing is making sure that the project really connects to the students. You can't really do a project that has no connection to yourself and that you're not proud of showing. Sometimes teachers

tend to give deadlines and benchmarks and create topics that kids don't really connect to. As a student, you really have to learn how things connect to yourself and make sure that what you're talking about really makes sense to yourself before it can make sense to the audience. For example, we did this oral history project where we had to interview an immigrant. My mother and my father are both immigrants, so when I was conducting this interview, I really had to put myself in their shoes and it really connected to my own family experience.

TREY

One thing that helped me my first year was lots of communication between the students and teachers, students and students, even teachers and teachers—checking in with one another, making sure everything is explained as clearly as it can be. Communication is very key the first time and every other year after that. But that first time is crucial.

MODERATOR

A member of the audience asks, "Are you students on the panel typical of students at your school? And if not, what would other students who might not be as interested in school say if they were on the panel?"

ERINA

I have days when I'm not engaged in the lesson, but what I manage to do is I go home and I don't just give up. I don't just say, "Oh, well I don't understand it. I never will understand it." I think that's the important part. It's not like you're the perfect student and you'll always get it the first time. But what I've tried to do in the past, especially with larger projects, is connect it to something that does interest me. And I find that does help.

DORA

I am not the perfect student. Last year was very hard for me academically. I was going through a lot of personal issues, but what helped me was the push of teachers and staff who show me that they care about my education and they see my potential as a student. It's important for teachers and administrators to know that they have a huge impact when they care about their students, because the students can actually feel that.

DANIEL

The students on this panel are invested in our learning, but that doesn't mean that the rest of the students don't care. It's just that we're all different. I am especially motivated because my parents never went to college, and I always have wanted to achieve the best I can life. I mean we only get one life, and you learn so many life lessons through school. What we do here shapes the rest of our lives.

TREY

I love what Dora said about the staff and teachers. They have to be involved. That's what makes great schools different from regular schools. As Daniel was saying, we are taking the time out of our day and we're here. I think at great schools most students would be willing to do that, volunteer, get active and really participate in everything they can. I really think it has to do with the motivation of the teachers.

MODERATOR

Here's a great question from the audience. "We can learn a lot from failures, too. Tell a horror story. What does it look like when things go bad?"

ANA

For Dia de Los Muertos, we made paintings about loved ones that have passed away or have contributed greatly in our lives, and in groups we had to set up altars in our hallways about those people. Everyone had to bring in one thing, and my best friend brought in things, but no one else in her group brought in anything. So we went around trying to find things in the school that we could help put on that altar. She was very invested in that project, and she was of course really sad that her group didn't bring anything in, but I think that with all her hard work she really deserved a thumbs up for that one.

MODERATOR

While you're thinking about horror stories, think about another question from the audience as well: What makes a great school?

GIBRAN

Two weeks ago we had an exhibition where we had to do a performance, and one of my friends just completely lost her lines. She literally stood up there for a whole minute trying to remember what she was trying to

say. And she just couldn't so she just simply walked off the stage. And sometimes with stuff like that you learn from your mistakes and you have to just pick yourself back up. As for what makes a good school, I will say one of the things that makes my school unique and special is that it's a small school with only 400 kids, and my principal greets every single student every single morning, and all the teachers know all the kids' names no matter what grade they're in. It's that strong connection between the students and the teachers that really makes a great school.

TREY

In the ninth grade we had to make a solar oven, and it started out great. I had finished my final product, and the morning of the actual tests, it started to fall apart, which of course is everyone's worst nightmare. This leads to my point about great schools. My school is very real-world related, so when we have projects that go wrong at the last minute, we have to think on our feet and fix it. I definitely think that incident is going to help me with future real-world projects.

DANIEL

A couple of weeks ago we had history week, and I had a partner I'd never worked with before. We were doing a presentation, and he told me all the information he had put in was correct. When it came time to present, my partner was absent. I read one of the slides, and my teacher nicely said, "I just want to let everyone know that's not necessarily accurate information." It put me in a really difficult position because I didn't put that information in. Now I know that for future presentations I need to check in with my partner and say, "Can I see where you got this?" But I think what makes our school great is the teacher and student relationships. I thought that High Tech High was not the best learning experience for me, so last year I tried to transfer to a new school. I ended up coming back less than a week later because I missed so much the relationships I have with my teachers. They really do care about us, and that's something that makes our school really special.

PARIS

What makes a great school to me is that the kids are interested in what they're learning. For me, I'm interested in my projects because they connect to society and have a real-world purpose.

DORA

Last year I had to collaborate with a group, and I had to do most of the work, honestly. It was a bad experience, and the day we had to present, I lost the project. So I ended up crying my eyes out, because I put so much effort into it. I really learned to choose wisely who I want to work with. As for what makes a good school, I consider my school a great school honestly. They don't let you fail here. They're really on top of you about your work, and it's not that they're holding your hand. It's that they're pushing you and showing you that you could do so much if you're really not trying hard.

MODERATOR

What is the best piece of feedback or assessment that you have ever received from a teacher?

ANA

For the Dia de Los Muertos exhibition, I made a painting about my grandma and what she liked to do and how she impacted my life. My art teacher gave me some feedback, and my painting came out so much better than it was before.

TREY

Some of the most helpful and meaningful feedback I've gotten is from students. I have done things before where I've had to teach a peer about something and at the end they said, "Now I get it." I think that has been the most helpful for me because I then realized if I can teach it I know it so much better and I kind of have that insight to what teachers feel like when a student says I understand it.

MODERATOR

Kathleen Cushman in the audience asks if any of you can describe a time when you found yourself drawn into an area of learning that previously had not interested you at all?

DANIEL

I've had this happen to me multiple times, and a big part of it is teacher engagement. In math right now we're studying finance, and in the beginning I didn't think I needed to do it at all. Then the teacher told us that he saw some people thought this was irrelevant, but he said, "You know, this is in our everyday life. I want to show you the best

way to handle your money and teach you math through that and really help you for your future, because we're all going to have to go through this." So that really opened my eyes and I thought wow, he really cares about us, and I'm learning about something that will affect me in the future. I thought it was great that he sat us down and told us that.

DORA

I was very not interested in math for most of my elementary and middle school years. Coming to CAT, Mr. Barrett got me really interested in wanting to learn more than Algebra I, which I was taking at that time, and he really just told me how you can use it for real life. This is what career path and options you can have. It got me motivated and wanting to learn more, and I showed potential that I never knew I had for math.

ANA

In humanities we were learning about Mayan and Aztec civilizations, and at first I wasn't interested. Then our teacher started showing us interactive videos and documentaries about the way they lived and the way they communicated, and then she put learning in our hands. She told us, okay, you guys can now go ahead and make a short slideshow so that you can educate your peers. As soon as I felt that my learning was in my hands, I was interested in researching and really finding out how they lived and how they communicated.

MODERATOR

Everybody gets a final word. What's the one last thing you would like to say to our audience?

DORA

My advice to the teachers is to set goals for your students instead of standards. I think goals are more motivating for the students to hear.

PARIS

I think the biggest thing is fostering a real relationship with your students on an academic level and a personal level as well.

ANA

To rephrase what Erina and Paris said, it is a very big part that the teachers are on the same level with the students and are connected and communicating with them.

DANIEL

The teacher-student connection is definitely something to keep in mind. If students are finding that the subject is dull, find a way to really engage and talk to your students. It's very important because sometimes they might be too shy or they just don't feel comfortable, so it's really important to try and reach out to them.

ERINA

Throughout this conversation, we're talking about teacher and student involvement, almost as if there's student involvement and there is teacher involvement. But the two go together. It's so important that the teacher has that constant collaboration. People are asking how they can make sure a student is learning in a group project. It's just the constant teacher collaboration with the student. That has really hit home for me this year, especially with internship and school work on top of that. So to all the teachers out there, make sure you're talking to your students constantly. It really helps.

***Notes about contributors***

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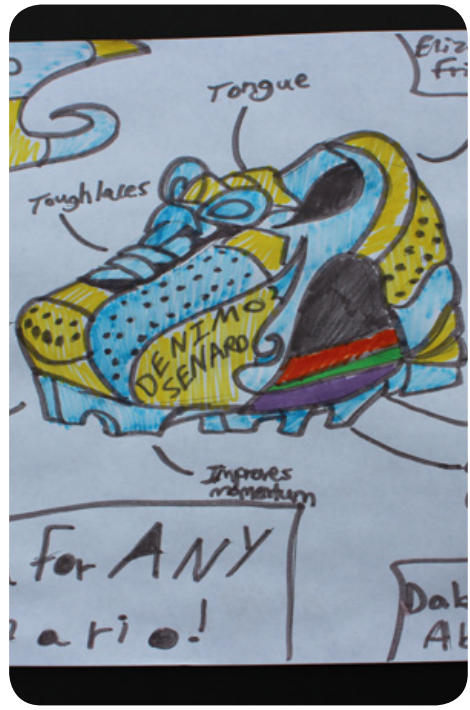
# Project Gallery

*Teachers and Students*
*High Tech High Schools*
*and other Innovative Schools*

In this gallery, we offer a set of *UnBoxed* "cards" that provide quick, concrete glimpses of projects we find inspiring and practices that support teaching and learning. These cards are now freely available on our *UnBoxed* website with additional teacher and student reflections, in a printer-ready format: *http://www.hightechhigh.org/unboxed/cards/*. Simply print, fold, share and discuss. As always, each card on the website refers the reader to a web address where further information is available.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DENIMO SENARD
Improves momentum
for ANY

## 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

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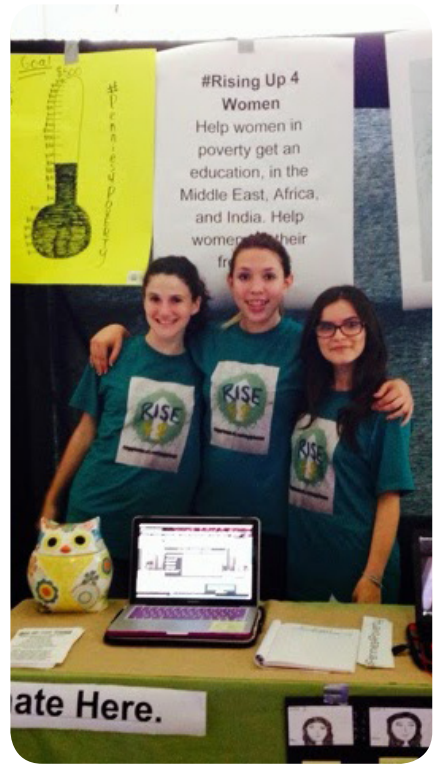
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Women
Help women in
poverty get an
education, in the
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and India. Help
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## #Hashtag Film Project

*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.

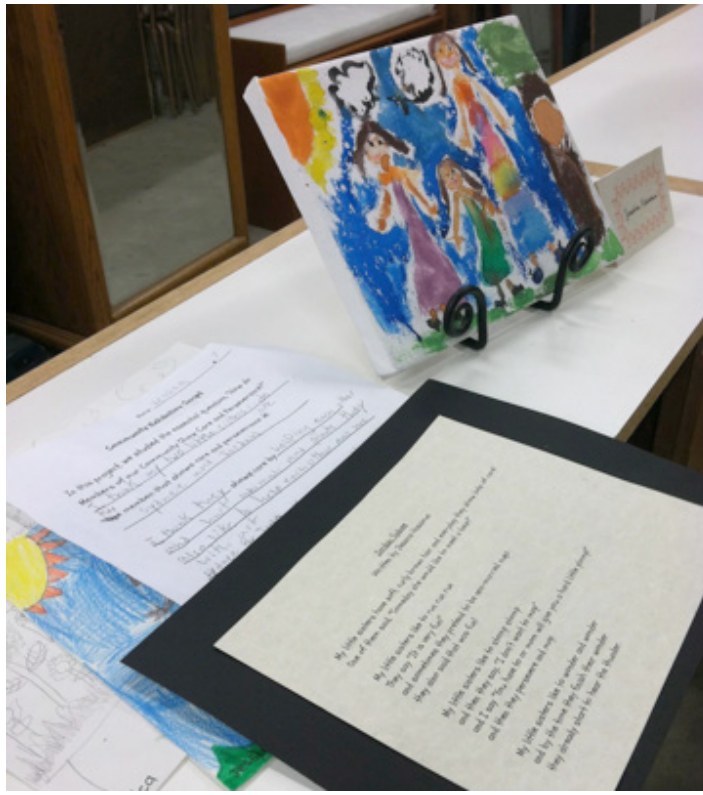
**Teacher Reflections**
Earlier this year we had been struggling with student engagement and motivation. We wanted students to have more voice and choice in this spring exhibition project. Allowed to choose their own topics and video formats, students showed more enthusiasm and ownership of their work. 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.

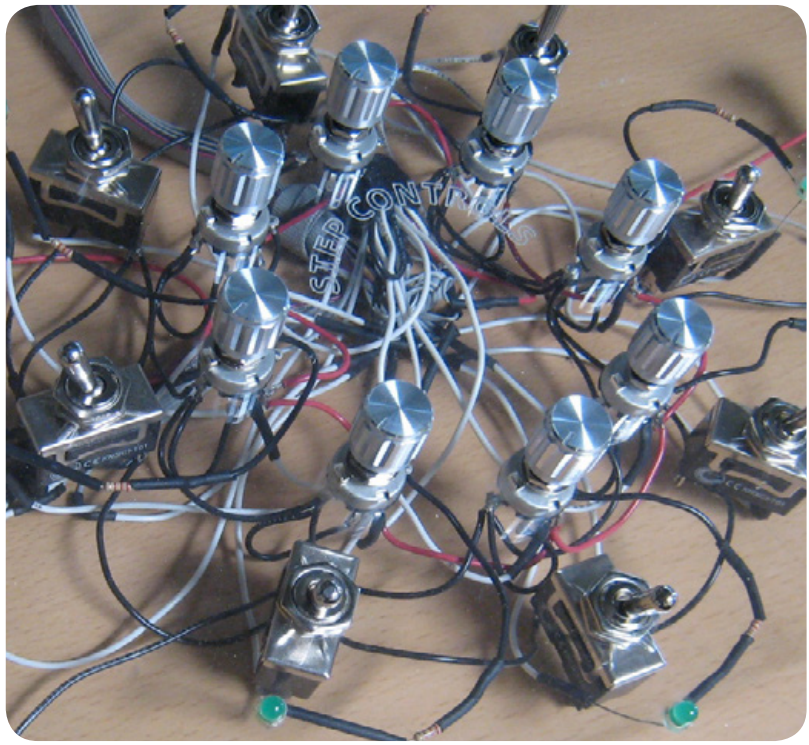
Finally, the students selected one member of their community who inspired them and taught them about our Habits of Heart and Mind. Students wrote creative biographies and created Norman Rockwell style artwork, developed through multiple drafts. These pieces of work were exhibited at a local non-profit 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*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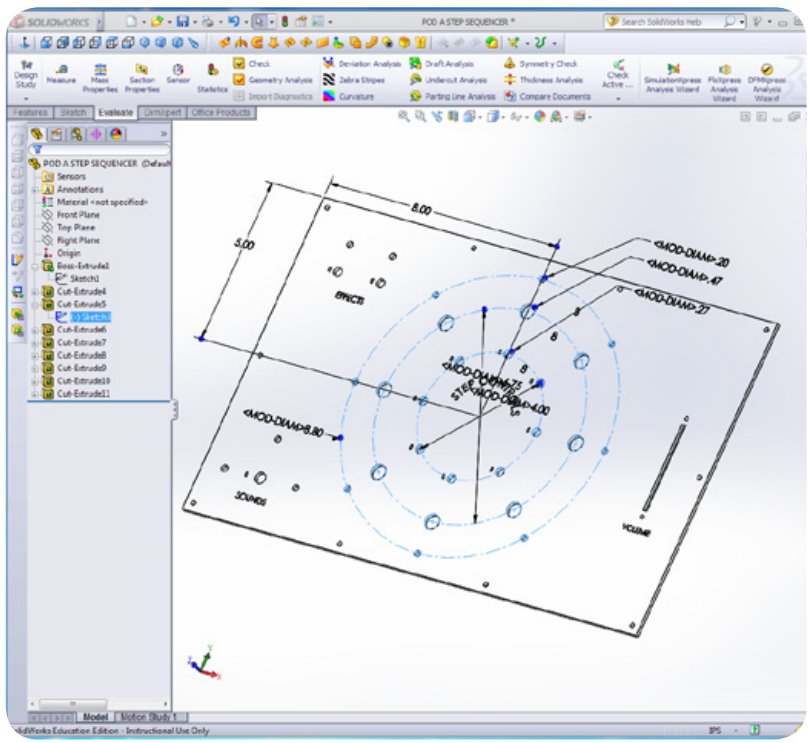
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## Jambox Project

*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

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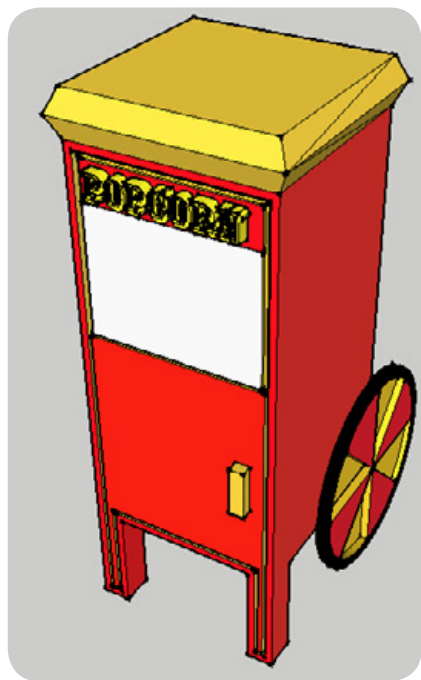
CARNIVAL


RIDE #20
Clayton H.
Eric M.
Max V.


POPCORN

## 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.

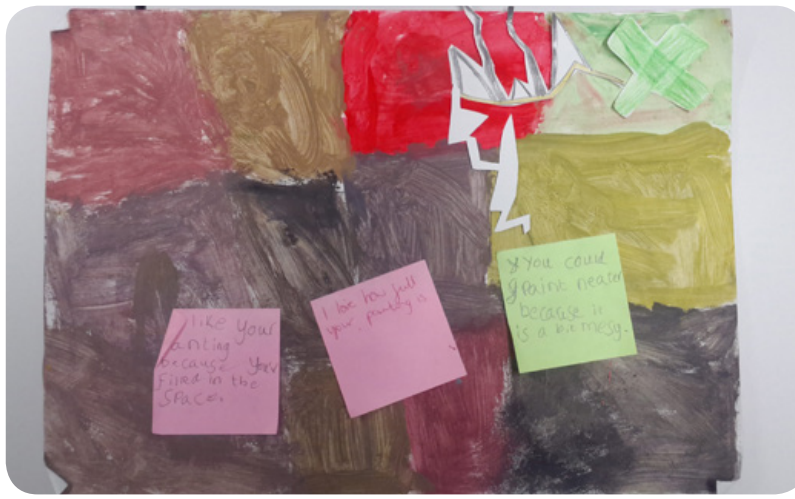
**Student Reflections**

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*


I like your mixed colours because they are


I like your painting because you filled in the space.
I like how full your painting is
You could paint neater because it is a bit messy.


Noah Adeoye
Kandinsky Class
Feelings for an Alien
called Bergo
2014

## 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*


Act I, Scene I


Act 2, Scene 1
juliet
Scene: Ballgown
Act 2, Scene

## 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?

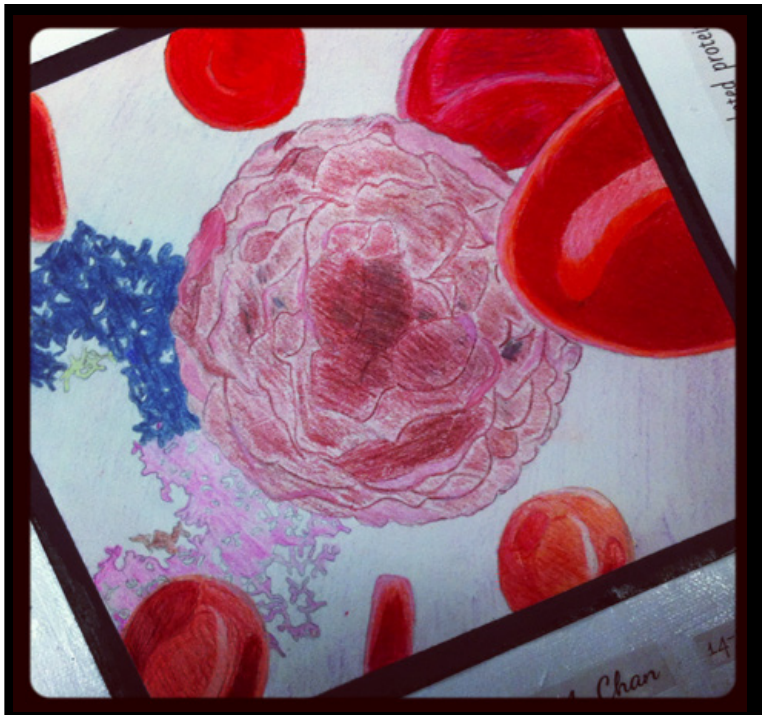
**Teacher Reflection**
The idea for this project came from a thesis I wrote for theatre school that set Romeo & Juliet inside the French-Vietnamese Conflict. I realized then that the story could be applicable to any world conflict, and I decided to bring that to my students in this project. Working with 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/*


MEASURE-RIGHT
5 GALLON / 18,9 L
2¼ gal
2 gal
1¼ gal
1 gal
¼ gal
5
GALLON
18,9 L
MEASURE-RIGHT
5 GALLON / 18,0 L
14 Liters
13 Liters
12 Liters
11 Liters
10 Liters
9 Liters
8 Liters
7 Liters
6 Liters
5 Liters
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3 Liters
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## 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.

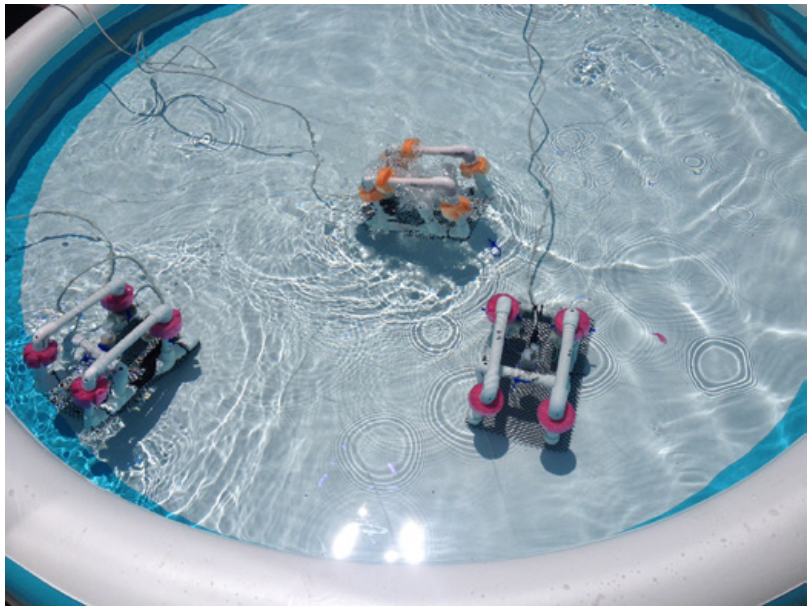
**Teacher Reflection**
The Siemens competition challenged our students to think like scientists and tackle real problems that affect real people. By providing a rigid but broad framework, we were able to incorporate student voice and choice in the design and execution of each group's action plan. Solutions 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.

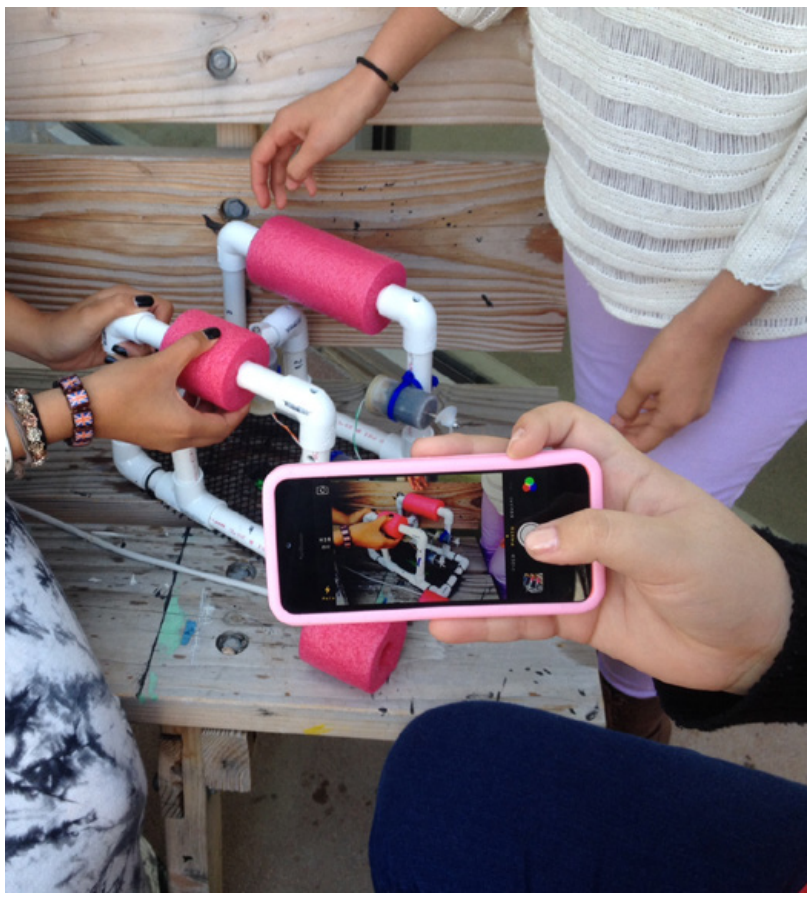
**Student Reflections**
The research and hours of time that we spent working have changed me. Every day brought me closer to my group and my planet, giving me a strong understanding of why I should care and what I can do to help. —Aine P

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/kOYNoU*


*The Reel Delicious Food Truck. Photo courtesy of Daisy Sharrock*

# A Reel-y Authentic Project

*Daisy Sharrock and Liz Perry*
*Gary and Jerri-Ann Jacobs High Tech High*

At first, we thought this was a little bit crazy," parents informed us at our all school exhibition in December 2013. Raising thousands of dollars in a short period of time to start a student run, non-profit food truck seemed perhaps a bit ambitious back in September. Yet, by mid-December, three weeks into our six week Kickstarter campaign to raise $35,000, the possibility of success seemed much greater. "You'll definitely make it," parents now said with increased confidence. Admittedly, we were still a bit nervous. Despite all the hard work we had accomplished already, our team, made up of 52 high school sophomores and three teachers, still had a ways to go. Using Kickstarter.com, an all-or-nothing platform for raising money for creative projects, clearly presented a risk to our team. Yet it was the risk that offered the greatest reward: the opportunity to engage in authentic learning experiences with the real possibility of success or failure. As such, whether we met our funding goal or not, we were confident that the project was serving its purpose.

In Spring of 2013, we sat down as a teaching team to start mapping out our project for the next academic year. This would be our first

semester working together, but it was clear from the get go that we had many shared passions that could lead to an authentic project for our students. As ideas evolved, we narrowed our focus on food trucks, an industry that is taking off around the United States, and one that had many clear connections to our core academic content, including math, chemistry, humanities, and Spanish. In an exercise often encouraged at High Tech High, we then began to dream. In the absence of limitations, how far could we run with this? It was in our willingness to dream that the idea of starting a student-run food truck surfaced, and from there, the pieces quickly started falling into place. We could clearly see how using a platform like Kickstarter would engage students in Deeper Learning, defined by the Hewlett Foundation as learning in which students "are mastering core academic content, like reading, writing, math, and science, while learning how to think critically, collaborate, communicate effectively, direct their own learning, and believe in themselves (known as an "academic mindset")" (2014). The end product, a fully functional, student-run food truck, would be our vehicle for engaging students in these powerful learning experiences.

**Deeper Learning Through Reel Delicious**

> **Mastery of Core Academic Content:** Students build their academic foundation in subjects like reading, writing, math, and science. They understand key principles and procedures, recall facts, use the correct language, and draw on their knowledge to complete new tasks. Hewlett Foundation (2014)

Starting and running a successful business would first require the students to gain a solid understanding of the industry. In other words, we needed to do our research. Prior to launching the Reel Delicious Kickstarter campaign, students examined the food truck industry from various perspectives. In the first few weeks of school, students went out into the community to conduct ethnographic field research. In teams of two to three, students observed the day-to-day operations of a food truck and interviewed food truck owners, employees, and customers to get a better sense of what it takes to start and maintain a successful food truck business. They learned to design research and interview questions, to analyze qualitative data, and to draw conclusions from their observations and interactions. Their qualitative data were then used to write ethnographies in English and Spanish, which are now documented on the website www.sdfootrucks.org. Their ethnographies

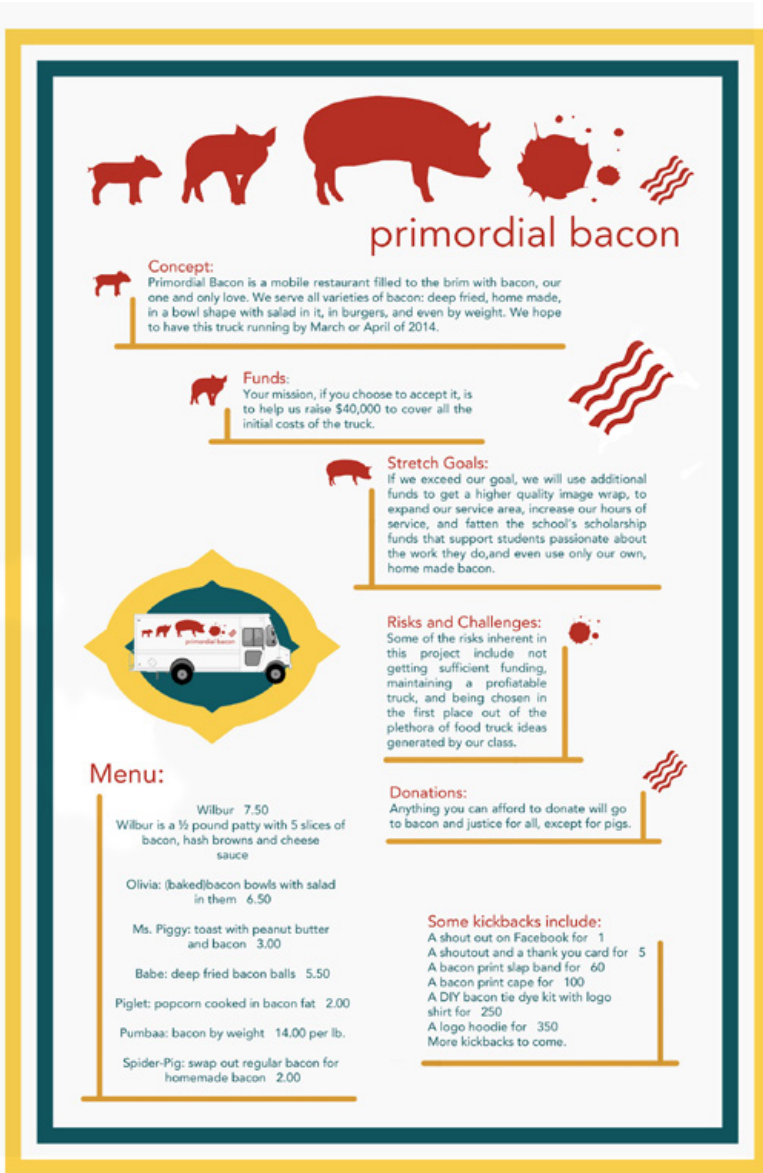
highlight important aspects of the industry, from having a "punny" name, such as *God Save the Cuisine*, to using social media to build a community of supporters.

In chemistry, students analyzed the biochemical basis of the five components of taste and how they interact with smell to create our experience of flavors. Students identified the different molecular structures of esters, carbohydrates, proteins and salts, and also explored what makes a molecule bitter. Students made use of *Science & Cooking: From Haute Cuisine to Soft Matter Science*, a massive open online course (MOOC) on the science behind cooking developed by Harvard scientists in collaboration with some the world's most innovative chefs. Through this course, students explored how contrasting textures and flavors can keep a dish interesting and prevent taste bud fatigue and the chemistry behind spherification. They also learned about the chemical concept of moles through analyzing the ingredients in chocolate chip cookies. Finally students used their newfound understanding of cooking to generate signature dishes for their food truck proposals.

> **Critical Thinking and Problem Solving**: Students think critically, analytically, and creatively. They know how to find, evaluate, and synthesize information to construct arguments. They can design their own solutions to complex problems. Hewlett Foundation (2014)

Creativity is one of the cornerstones of effective problem solving. After completing their ethnographic field research, we challenged students to use their insight into the San Diego food truck scene to generate their own concepts for a successful food truck business. "The whole idea of entrepreneurship," stated student Natalya Volk, "is being creative." To be successful in this component of the project, students would have to engage their creativity and entrepreneurial spirits to come up with an original food truck concept that met the needs of the community. In pairs they designed food truck themes, logos, and menus and presented their ideas to a large public audience. Using peer critique and the inquiry process, students developed unique dishes to accompany their food truck concepts. Students generated ideas such as: *Eh for Effort!,* a food truck specializing in Canadian foods, such as poutine; *Primordial Bacon,* a food truck featuring everything bacon, including peanut butter and bacon sandwiches and popcorn cooked in bacon fat; and The Yard, a food truck that turns kids menu favorites

into adult-friendly delicacies, such as parmesan crusted chicken tenders. Four local food trucks joined the students as they exhibited their concepts, drawing a large crowd of interested students, staff, and community members, many of which took the opportunity to weigh in on students' ideas.



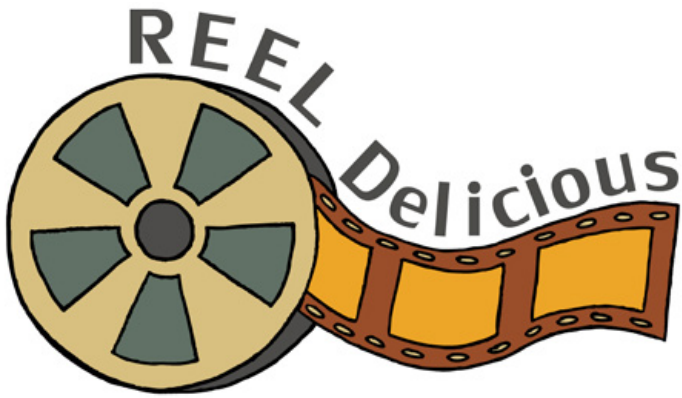

*Above:"Primordial Bacon" – Food Truck Concept by Theo and Bella*


We used this step in the process as a formal brainstorming session to generate a pool of ideas that the class could collectively draw from to create the final concept for our Kickstarter campaign. Many of the students' creative concepts had strong international themes that resonated with the class focus of diversity and cultural awareness. (*Left is the concept by Abi and Branden).* Furthermore, many students felt strongly about, and included in their designs, sourcing foods locally and from farms that use sustainable practices. One of the groups proposed working with the Latino and Asian film festivals and showing movies on their truck, and the seeds of our project were planted. The class was now moving forward with Reel Delicious, a food truck that promotes cultural understanding through food and film.

> **Collaboration:** Collaborative students work well in teams. They communicate and understand multiple points of view and they know how to cooperate to achieve a shared goal. Hewlett Foundation (2014)

After researching successful Kickstarter campaigns, we generated a list of seven committees to tackle the various components of launching a successful campaign and creating a new business. Students selected their top four committee preferences, which were then used to place students into groups. The logo and design committee took on the daunting challenge of coming up with the truck name, Reel Delicious, designing a logo, and creating the look and feel of the campaign and future business. They worked closely with the pledge perks committee, which was responsible for creating the kickbacks for different donation levels during the campaign. The cooking group generated and refined the fusion recipes that would form the core staples of our

menu, and the legal and finance committees researched the permits and regulations needed to start a business and wrote a business plan. A public relations team wrote press releases, developed the social media strategy, and attended community events to promote the project. The final student committee was responsible for creating the video that was to be featured on the Kickstarter website, a key component to any successful campaign.




In each committee, students had to work closely with one another to accomplish their tasks. Be it within a committee to divvy up responsibilities and set deadlines or between one committee and another, students needed to interact and depend on one another to get the job done. Luis Garcia, an often quiet classmate and member of the cooking committee expressed, "the thing I struggled with most was working with others. I don't always work well with others; I'd rather be by myself working. I sort of achieved this by putting myself in a group and depending on them more." In order to accomplish the various tasks at hand, students had to draw on and learn from the strengths of others and trust one another to accomplish their individual responsibilities. The real possibility, that without the help of everyone, we might not meet our goal pushed students to work together and give their best effort. In the end, the collaboration of students and pooling of diverse strengths resulted in the creation of a professional, polished Kickstarter campaign that represented the best work of the entire group.

> **Effective Communication:** Students communicate effectively in writing and in oral presentations. They structure information in meaningful ways, listen to and give feedback, and construct messages for particular audiences. Hewlett Foundation (2014)

Successful Kickstarter campaigns rely on the support of the community, and each step of the way students reached out to existing and new networks of supporters. In collaborating with one another and with members of the local community, students had to consider their audience and communicate effectively. Students sought support from two local film festivals, the Latino Film Festival and the Pacific Arts Movement (which organizes the San Diego Asian Film Festival) and attended events hosted by each organization to promote their vision. In addition, students visited local farms to source organic and sustainable ingredients and reached out to local chefs for feedback on their recipe development. The finance and legal teams researched and discussed business strategies with our school's Chief Financial Officer and lawyers from the community. Students met with politicians and attended a San Diego Planning Commission meeting, where new policies for food truck operators in San Diego were being discussed. Our public relations team sent out hundreds of emails to news organizations around the country, spreading the word about Reel Delicious. Rachel Dunkin, a formerly shy, soft-spoken student, remarked, "I have never been so comfortable with myself than I am this year because of the food truck project. I am a more confident student, a reliable leader and an enthusiastic learner because of this project." Reaching out to community partners, local professionals, and even contacting family and friends, students practiced their ability to communicate professionally and to overcome uncomfortable or challenging scenarios.

> **Self-directed Learning:** Students develop an ability to direct their own learning. They set goals, monitor their own progress, and reflect on their own strengths and areas for improvement. They learn to see setbacks as opportunities for feedback and growth. Students who learn through self-direction are more adaptive than their peers. Hewlett Foundation (2014)

Over the course of the project, students directed their own learning, setting weekly and daily goals and reporting on their progress to the entire team. Each committee, consisting of four to eight students, was assigned a designated leader. Leaders helped the group to determine a timeline for accomplishing goals and served as a point person to address questions or challenging situations. As students generated their lists, it was clear that they would have to accomplish tasks that they had never done before, and perhaps knew little to nothing about. For example, the finance and legal team were tasked with writing a business

plan, which was eventually submitted to the Young Entrepreneurship Program (YEP) contest for young entrepreneurs. Students reviewed an online curriculum presented by the YEP and received feedback from a small business attorney and business advisor to startups. They wrote multiple drafts, arriving closer to the final product with each version. While tedious at times, the group accepted feedback, made revisions, and wound up winning the YEP contest. Greta Watson, leader of the finance committee, sees this accomplishment as a primary example of directing her own learning. "We did a contest that we didn't think we were going to win," she stated, "but we tried our best and pushed through it, and we won." Would she do it again? Sounds like she doesn't plan to write another business plan in the near future. However, could she? Undoubtedly.

> **An "Academic Mindset"**: Students with an academic mindset have a strong belief in themselves. They trust their own abilities and believe their hard work will pay off, so they persist to overcome obstacles. They also learn from and support each other. They see the relevance of their schoolwork to the real world and their own future success. Hewlett Foundation (2014)

On January 23rd, 2014, the last day of our Kickstarter campaign, we reached our funding goal, raising over $35,000 in less than six weeks. What seemed like an incredible reach just three short months ago, had become a reality. "I, as well as every other student on this team," stated student Rachel Dunkin, "am a major component to making this project a success, and it makes me feel good knowing I can accomplish something so immense." Through the project, students came to see that their collective hard work could lead them to accomplish something they weren't sure they could do. Students not only impressed themselves with their own success, but their parents and the rest of the High Tech High community.

By breaking down the complex challenge of raising such a large sum and starting a business into tasks performed by different committees, the class mirrored the real life process that entrepreneurs and successful companies must undertake to succeed. Regarding this process, student Mia Higgins stated, "It's not going to always be really fun, but if you have an amazing idea then the end result will actually be awesome. You just have to stick to it and put all your effort into it." The campaign

was immediately identifiable as relevant, real work, traditionally only found outside school settings. As committees rolled out their best effort, each new step in the process inspired the rest of the class. A great logo inspired unique perks. One newspaper article sparked others; a moving video galvanized those that had doubts, and discussing the project with our new, growing community of supporters became second nature to everyone involved. The students took ownership of their learning and the project and created their own reel success story.

**References**

What is Deeper Learning?. (2014, March 28). *Hewlett Foundation News*. Retrieved April 18, 2014, from http://www.hewlett.org/programs/education/deeper-learning/what-deeper-learning

*To learn more visit http://reeldelicious.org/*

*Photos courtesy of Georgia Hall*

# Growth Through Reflection

*Georgia Hall*
*High Tech Elementary Chula Vista*

It has been a crazy day full of morning meetings, project work, thoughtful discussion, laughs, minor crises and tears, a billion questions asked...three of which were actually answered. Before we know it, we've reached the last hour of our day. Sound familiar?

"Ms. Georgia, is it reflection time yet?" an eager student asks. "You betcha, Alex. Go ahead and grab your journal so we can get started!"

Then it begins. The time of our day in which we all have a mutual understanding about what will happen. This is our sacred and beloved time. Each one of us understands, no matter how triumphant or overwhelming our day felt, the time is now to take this space and reflect. We can marvel in our day with pure joy or leave it all behind on this single page. This is personal, meaningful, and a moment of empowerment.

But you cannot just say, "Yeah, let's reflect. Go!" Before it approaches sacred ground, reflection is a learned and practiced process. In my

experience, most students do not initially enjoy or understand how to approach reflective thinking.

**The Process**

In the beginning of the school year, I typically work with my students on the objectives behind reflecting and how one builds stamina. We explore through discussion times when writing has excited us and name how it feels to personally connect writing with personal thoughts that are tied with emotion. This is called being "in the zone," and it is what we can achieve whenever we reflect. Then I go more in depth and talk with them about what makes a meaningful reflection. I ask them to consider if their reflection should sound just like their classmates, if it should be a reiteration of their daily schedule, and if not, why? We also consider how the reflection will inform their work and behaviors in the coming days. Does it make specific connections to the work that you will do to help you grow? Once we master the objective and sustainability of the practice, we then begin developing our quality of writing. I typically have students practice writing with more specificity and depth for the remainder of the year. However, that is not what happened this year, and I feel really excited about the change.

My class is a beautiful bouquet of thinkers and writers. I have the full spectrum—students whose thoughts are mature and thoughtful yet who struggle to get them down on paper; I have students who love to write page upon page but do not really know why they write what they do; I have some who get stuck right away; I have those who hate it when I announce that reflection time has concluded. You name it, this class has it. If no two students really felt and executed their reflective thoughts in the same way, I wrestled with why my expectation was for them to approach reflection from a similar perspective—journal out, in your seat, voice off, and writing complete thoughts.

**Open Dialogue & Questioning**

In reading about constructivist classrooms, Brooks (2001) highlights the value of social discourse by saying, "Having an opportunity to present one's own ideas, as well as being permitted to hear and reflect on the ideas of others is a powerful experience. The benefit of discourse with others, particularly with peers, facilitates the meaning-

making process" (p. 108). In addition, Horton & Freire (1990) simply state, "one of the best ways to educate is to ask questions" (p. 147). Although this may not necessarily strike an educator as novel, I would argue that the practice of questioning is not used widely enough within classrooms. With questioning and discourse in the forefront of my mind, I decided to call a meeting with my class. I shared my objective for reflection—to make that time as meaningful for each student as possible, I told them reflection elements that I really wanted to hold on to and why—it being quiet, purposeful, and sacred. Then I said what I was willing to let go of—the location where they reflect, how they choose to get started, and the forms that their reflection may take (e.g., written, drawn, mapped). This naturally led to their questioning: "Well, if we don't have to sit at our seats, how will we know how to pick a good spot?" "What if someone doesn't pick a good spot, and then I get distracted by them?" All of this was great dialogue where opinions, concerns, ideas, and questions were voiced in a constructive manner. This experience showed me that students were concerned with preserving the same sacred reflection time that I too covet. Through our meaningful discussion, my need for maintaining control was eased. It naturally led to generating approaches to reflection that were more inclusive, as they came from student thought and teacher support.

**Listening & Supporting Student Needs**

From our class discussion on how to best individually reflect, students were able to brainstorm various writing locations and choose where the best fit was for them (e.g., laying on rug, propped on a stool, propped with a pillow, sitting at a quiet table). Students also chose how they wanted to start writing. I was able to offer scaffolds to meet their requests (e.g., with a picture, teacher or student generated reflection prompts, an idea map). Some questions that prompted these outcomes included: "How can we brainstorm our idea without having to write down sentences that take a while?" "If my brain gets stuck, how can I get started?" "If I want to write about ___, could we add this prompt to our list?"

**Growth & Outcomes**

After implementation of the co-created reflection techniques, I noticed a few trending outcomes both expected and not. One outcome was

that writers who before had hesitated to delve in the reflection process were now writing something with less time passed. I asked one of my students who struggled both with writing sentences and with thinking about reflection details, "What has changed for you?" and he said, "Now I just draw or do an idea map to start and then it just helps me to write sentences. I am proud of what I write now." Another outcome was that I see more of the students' personalities and spirit when they write their reflections. They are telling me more of a story, and the way they choose to do it reflects more of who I see in them as people—not just what I see them do throughout the day.

An outcome that I did not expect was students' willingness to help contribute reflection prompts to my generated list from the beginning of the year. This added to the idea of a co-created, constructivist class, which felt extremely rewarding as a teacher whose objective was to achieve more student voice, choice, and engagement. A few of these prompts include: What's on your mind? What are some goals you are working on? How is everything going at your table? What was the challenge of your day?

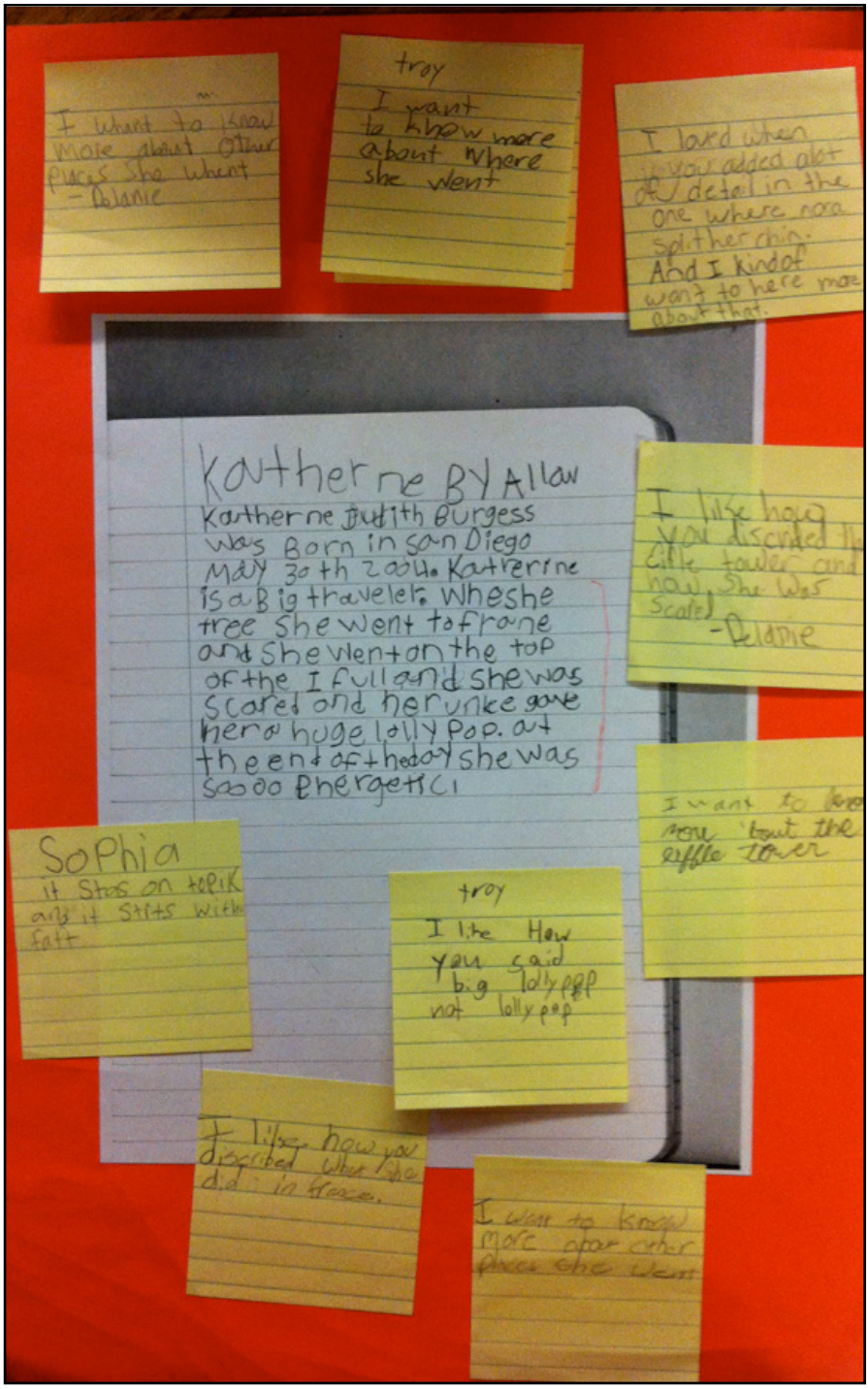
Writers who struggled before our reflection discussion now report more time focused to reflection with the writing scaffolds like idea maps or time to illustrate thoughts prior to journaling. There is more evidence of student voice and expression in student writing, as well as student motivation to co-create journaling prompts that best meet their reflective needs.

From opening up the discourse and simply fostering a co-constructive atmosphere where students could express their thoughts and ideas, I truly saw each student make their own meaning of reflection. I am now able to see each individual at the end of the day express, in his or her unique ways, what it means to be deeply reflective. Keeping the dialogue open and flexible helped me honor my students in their reflection endeavors. Soliciting both teacher and student ideas, equally, motivated the creation of personalized and meaningful work.

**References**

Brooks, J. (2001). *The Case for Constructivist Classrooms*. Upper Saddle River, New Jersey: Prentice Hall.

Horton, M., & Freire, P. (1990). Educational practice. In BrendaBell, J.G. & J. Peters (Eds.), *We Make the Road by Walking: Conversations on education and social change*. (147). Philadelphia, PA: Temple University Press.




*Gallery walk critique*

# Making Critique Work

*Briony Chown*
*Explorer Elementary Charter School*

Like many educators, I introduced critique to my class after reading Ron Berger's manifesto, *An Ethic of Excellence*. Following Berger's example, I explained to students that critique should be "kind, specific and helpful" (Berger, 2003, p.93). Initially, the feedback they gave each other was kind and specific but not particularly helpful — certainly nothing like the feedback Berger described his students giving to each other. For the most part, my students corrected each other's punctuation and grammar.

From speaking to other teachers in elementary, middle and high schools, I have found this to be a common problem. After trying a number of strategies, from children writing a question that critiquers must answer to modeling what good critique looks like, I found a simple solution: provide children with a checklist detailing what should be in the writing. I give this to the children before they start writing and then again when they are critiquing each others' work. This checklist differs from a rubric because it does not evaluate the piece of writing and there is no sliding scale for success: the writing either has an element or it does not. Equipped with this checklist, every

child in the class can look at a peer's work and say what the writer has included, and what is unclear or left out.

**The Goals of Critique**

Creating the conditions for peer critique to thrive is one of the core principles of my classroom. Without a culture of collaboration and critique, it falls upon teachers to impart knowledge, advise, judge, and guide. This is inefficient, and it creates learners who do not have ownership of their learning. In his conversation with Paulo Freire in *We Make the Road by Walking: Conversations on Education and Social Change,* Myles Horton explains that when we come to an idea ourselves, rather than because an authority has told us, it is far more likely to be retained (Horton, 1990). This sounds ridiculously simple but it is not the way that most people experience school. In a 2013 interview, the actor Daniel Radcliffe (best known for playing Harry Potter) spoke for the majority when he said he didn't do well in school because, in his words, "I am not somebody who will learn best when you tell me to sit down and be quiet and sit still. I learn by talking back and engaging in conversation and walking around." (Hattenstone, 2013). By allowing for many voices to be heard, a culture of critique enables us to begin to build the conditions for this active learning and collaboration. Juli Ruff, a ninth grade humanities teacher at High Tech High explains this well. In her work on using student voices to improve student work, Ruff explains that critique "invites students to take a critical eye to their own and others' work, and puts the student in a place of power, by asserting that his or her opinions and judgment about what makes for quality work matter" (Ruff, 2010 p. 6).

Another reason that critique is a powerful force for improvements in student work is that it allows students to see what their peers are producing. This creates a healthy sense of competition that is not to be underestimated. In fact, the single most useful thing that I can do to improve the quality of writing in my class as it is happening (as opposed to during critique) is to walk around the classroom and read aloud exemplary words or phrases that different students have used.

Sharp-eyed readers will note that in the example above, the teacher is still the arbiter of quality and imparter of knowledge, and when I introduced critique sessions, I found it difficult to step back (and

difficult for students when I did so). The trouble was that after nearly two decades of formal education and several years of experience as a teacher, I had internalized schema for the elements of high-quality work that the students had not yet developed. Thus, left to their own devices, they honed in on what they knew (or thought they knew): grammar. As a result, I observed many children leaving critique sessions disappointed - they hadn't received useful feedback, they didn't feel like their peers had noticed what they had done. This wasn't because the students I teach didn't want to critique well, it was because they didn't have the skills to do so. That is where a checklist comes in: it provides a basis for conversation, a starting point and a focus. In his 1993 article, 'Choices for Children' a teacher told Alfie Kohn "I'm in control of putting students in control." Checklists do just that.

**Why Checklists?**

Within the last two decades, checklists have revolutionized medicine. In The Checklist Manifesto, surgeon Atul Gawande explains how in 2001 Peter Pronovost, a critical care specialist at John Hopkins Hospital, implemented a checklist outlining the steps needed to correctly insert lines into patients in the ICU. He plotted the five steps needed to avoid infection and then authorized nurses to stop doctors if they were skipping a step. In the year after the checklist had been implemented, the ten-day line infection rate went down from 11% to zero. After two years Pronovost and his colleagues estimated that the checklists had saved eight lives and two million dollars. In addition, he found that the checklists "helped with memory recall and clearly set out the minimum number of steps in a process." Moreover, the checklist actually "established a higher standard of baseline performance" (Gawande, 2009, p. 39). The impact of these findings have led to other hospitals around the United States and Europe adopting checklists for patient care.

It seems absurd to equate the classroom with an intensive care unit. However, in both situations, a simple checklist has made a dramatic difference to the quality of the work. Similarly to Pronovost's findings in the ICU, I found that checklists provided students with a map for each step of their work and a tool to help them assess the work of others. Furthermore, these checklists improved the work of every student — just as Pronovost had found in the hospital.

In addition to helping students to assess the work of others, checklists have led to greater equality of feedback in the classroom. One of the challenges in a critique session is that some students are much better at it than others. While every student has a valuable contribution to make, many are not yet able to formulate their ideas in a way that can be easily understood by their peers. Checklists provide a structure upon which students can base their responses. Every student, whatever level they are working on, can look at the work of every other student and provide them with clear and useful feedback.

**Checklists in the Classroom: The Results**

At first, I created checklists that simply contained a series of topics that needed to be included in the work. I introduced my first checklist when students were writing artist statements for paper cuttings (see picture below) that we had produced to tell the story of somebody who immigrated to California. Each group had chosen one person who had come to California and then divided up their journey into separate sections that were worked on individually. The paper cuttings were beautiful but they needed some explanation. After much discussion, the class decided that each group should write one joint artist statement to describe what the paper cuttings showed and how they fit together as well as individual artist statements. The components that students identified were the elements I compiled into the checklist. The finished artist statements were excellent. (See them all at http://eeroom15.weebly.com/a-room-of-their-own-online-exhibition.html) However, this was a lot of work for the students and one group in particular needed a lot of support with the checklist.

I have since moved on to creating separate checklists for each stage of the work. This allows the students to critique using a manageable amount of foci. For example, when my class wrote biographies, the first checklist indicated, paragraph by paragraph, what should be included, the second checklist focused on accuracy and meaningfulness to the subject of the biography, and the third checked for accuracy in writing conventions.

At the end of the project in which the students wrote biographies, I set up an anonymous survey to gain student feedback on various parts of the project. We had completed four critique cycles—the critiques based on the checklists listed above and an initial gallery walk. One question in the survey asked students to rate how the different critique sessions helped them to improve their biographies. Students chose from a Likert scale with the following options: it was extremely useful, it was useful, it wasn't useful, and I didn't do this. There are 24 students in my class and 18 of them completed the survey. Out of those 18, 16 children rated the three checklist critiques as either "useful" or "extremely useful." This is a contrast to the 11 children who rated our first gallery walk critique as "useful" or "extremely useful" (in fact, only 4 out of the 18 found that gallery walk to be "extremely useful").

**Creating the Conditions for Success**

A good checklist is one that is created with the students (Berger, 2003, p. 70). In order to do this, my class and I pore over models, both professionally written ones and those written by me to find out what makes a good biography, diary entry, newspaper report (or whatever we are writing). We talk about what we like, jot down phrases or words that we want to use and pull out the elements that make that piece of work successful (or not). As Ron Berger points out, using student work as models is particularly effective. Typically, I know the students are ready for a checklist when they are able to answer the question "What makes a good…" on the chart that they read when they come into school in the morning. I then organize these answers into a checklist, expanding on each point or breaking it down as necessary.

In his 2006 article, "The Trouble with Rubrics," Alfie Kohn states that "rubrics are, above all, a tool to promote standardization" through a "narrow criteria for what merits that rating." He then questions whether "standardizing assessment for learners may compromise the

learning" (pages 6 - 12). Kohn's criticism of rubrics is predicated on the idea that rubrics are evaluative and prescriptive. On the other hand Ron Berger sees rubrics, not as a way to narrow student work but as a way for us to "try to name features of the work that we feel are making it successful." (Berger, 2009). In An Ethic of Excellence, he explains that projects "begin with a taste of excellence." The teacher and the students work together to "critique and discuss what makes the work powerful" (Berger, 2003, p. 31). These "list(s) of strong dimensions" (Berger, 2009), containing elements of success to guide students to creating powerful pieces of work are what the students create when they reply to my question on the morning message chart. I then organize and expand upon their thoughts to create a checklist.

To keep checklists from becoming, in Kohn's words, "tools to promote standardization," it is important to explain to students that checklists are not rule books. While the first checklist for our biographies stated what information would be useful in each paragraph, writers could choose whether to follow it. In addition, no student was required to alter their work based on the critique—if the critiquers had noticed that information was missing but the writer didn't wish to include it, then that was their decision. However, most children leapt on the critique sheets when they were returned. From scanning down the list of checks and crosses they quickly identified which areas the critiquers hadn't found in their work and they rushed to the computers to make changes.

Finally, I have found that checklists work best when students work in pairs to read each other's work and then check that all the elements have been included. When children critique individually, they are more likely to be too accommodating or too exacting but critiquing in pairs slows down the process and means that the critiquers must be able to discuss and justify their judgments.

**A Mental Map**

Providing useful critique is hard. It is hard for adults and it is even harder for children. As a result, loosely structured critique can leave students frustrated, confused and even more reliant on their teacher than they were before. I found that checklists gave students the mental map they need to see the piece of writing that they were critiquing

as both a whole and a set of components. It is clear from the student survey responses that the children I teach found that checklists helped them to improve their work and gain relevant feedback. Without a clear structure, the critique process can reinforce inequality between students. With the transparent structure that a checklist provides, critique can become a powerful force where every voice is equal and important.

**References**


- Berger, R. (2003). *An Ethic of Excellence: Building a culture of craftsmanship with students*. Heinemann

- Berger, R. (2009, September 16). On feedback rubrics and models [web blog comment]. Retrieved from http://blogs.hightechhigh.org/bendaley/2009/08/29/on-feedback-rubrics-and-models/

- Expeditionary Learning, (2013), Austin's butterfly: Building Excellence in Student Work - Models, Critique and Descriptive Feedback [Video file]. Retrieved from http://vimeo.com/38247060

- Gawande, A. (2007). The Checklist. *The New Yorker,* 83(39), 86-95.

- Gawande, A. (2009) *The Checklist Manifesto: How to get things right*. Henry Holt and Company, New York.

- Hattenstone, S. (2013, November 23), Daniel Radcliffe: 'There's no master plan to distance myself from Harry Potter', *The Guardian*. Retrieved from http://www.theguardian.com/film/2013/nov/23/daniel-radcliffe-interview-no-plan-distance-harry-potter

- Horton, M., & Freire, P. (1990). *We Make the Road by Walking: Conversations on education and social change*. Temple University Press.

- Kohn, A. (1993). Choices for children: Why and how to let students decide. *Phi Delta Kappan*, 75(1).

- Kohn, A. (2006). The trouble with rubrics. *English Journal,* 95(4), 12-15.

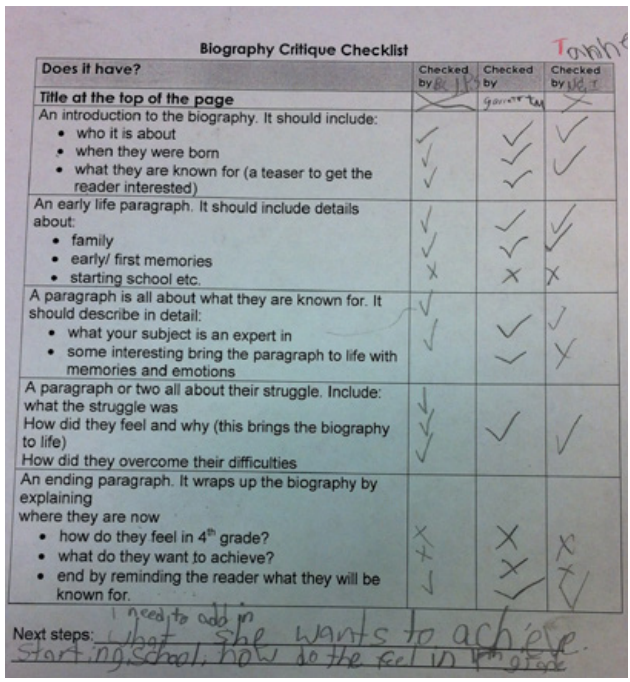
•Michaels, K. (2012). Clear guidelines, open response: Introducing peer critique, *Unboxed*, 9.

•

Ruff, J. (2010). *Peer Collaboration and Critique: Using student voices to improve student work*.

*To learn more about Briony's work at Explorer Elementary, visit http://eeroom15.weebly.com*

Appendix 1: paragraph by paragraph checklist

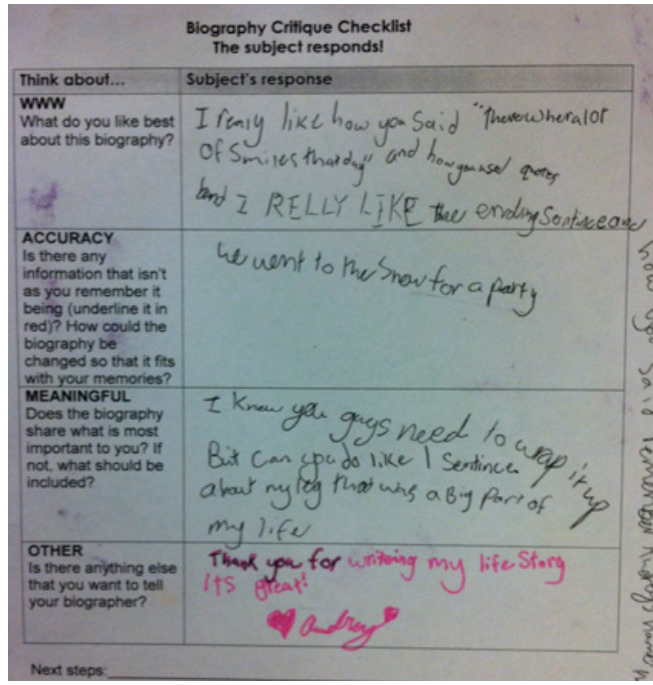


**Biography Critique Checklist**

| Does it have? | Checked by | Checked by | Checked by |
|---|---|---|---|
| Title at the top of the page | | | |
| An introduction to the biography. It should include:<br>• who it is about<br>• when they were born<br>• what they are known for (a teaser to get the reader interested) | | | |
| An early life paragraph. It should include details about:<br>• family<br>• early/ first memories<br>• starting school etc. | | | |
| A paragraph is all about what they are known for. It should describe in detail:<br>• what your subject is an expert in<br>• some interesting bring the paragraph to life with memories and emotions | | | |
| A paragraph or two all about their struggle. Include:<br>what the struggle was<br>How did they feel and why (this brings the biography to life)<br>How did they overcome their difficulties | | | |
| An ending paragraph. It wraps up the biography by explaining<br>where they are now<br>• how do they feel in 4th grade?<br>• what do they want to achieve?<br>• end by reminding the reader what they will be known for. | | | |

Next steps: I need to add in what she wants to achieve starting school, how do the feel in 4th grade

Appendix 2: truthfulness and meaningfulness checklist

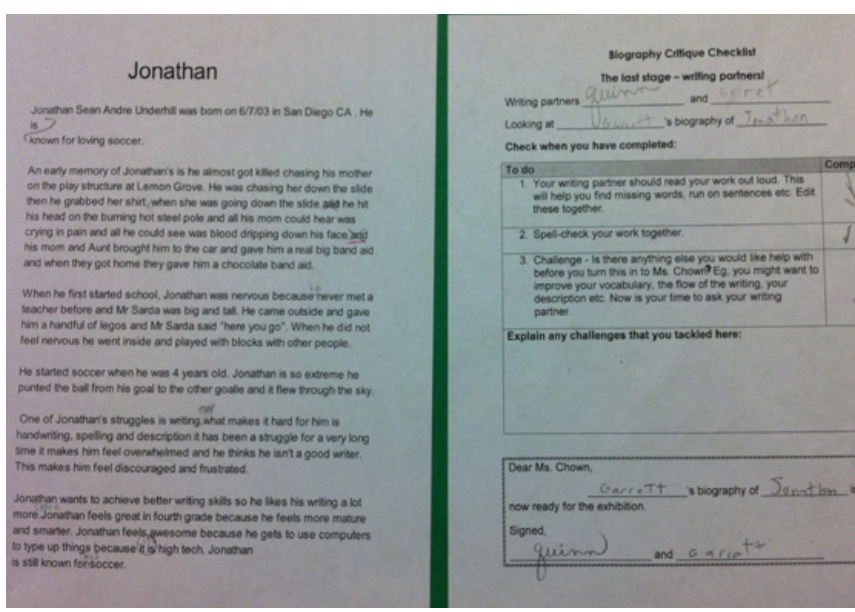


**Biography Critique Checklist**
**The subject responds!**

| Think about... | Subject's response |
|---|---|
| **WWW**<br>What do you like best about this biography? | I really like how you said "there was heralot of Smiles that day" and how you used quotes and I RELLY LIKE the ending Sentence and how you said remember hugs |
| **ACCURACY**<br>Is there any information that isn't as you remember it being (underline it in red)? How could the biography be changed so that it fits with your memories? | he went to the Snow for a party |
| **MEANINGFUL**<br>Does the biography share what is most important to you? If not, what should be included? | I know you guys need to wrap it up But can you do like 1 Sentince about my leg that was a Big Part of my life |
| **OTHER**<br>Is there anything else that you want to tell your biographer? | Thank you for writing my life Story Its great! Audrey |

Next steps:

Appendix 3: writing conventions checklist



Jonathan

Jonathan Sean Andre Underhill was born on 6/7/03 in San Diego CA . He is 7
known for loving soccer.

An early memory of Jonathan's is he almost got killed chasing his mother on the play structure at Lemon Grove. He was chasing her down the slide then he grabbed her shirt, when she was going down the slide and he hit his head on the burning hot steel pole and all his mom could hear was crying in pain and all he could see was blood dripping down his face and his mom and Aunt brought him to the car and gave him a real big band aid and when they got home they gave him a chocolate band aid.

When he first started school, Jonathan was nervous because never met a teacher before and Mr Sarda was big and tall. He came outside and gave him a handful of legos and Mr Sarda said "here you go". When he did not feel nervous he went inside and played with blocks with other people.

He started soccer when he was 4 years old. Jonathan is so extreme he punted the ball from his goal to the other goalie and it flew through the sky.

One of Jonathan's struggles is writing,what makes it hard for him is handwriting, spelling and description it has been a struggle for a very long time it makes him feel overwhelmed and he thinks he isn't a good writer. This makes him feel discouraged and frustrated.

Jonathan wants to achieve better writing skills so he likes his writing a lot more.Jonathan feels great in fourth grade because he feels more mature and smarter. Jonathan feels awesome because he gets to use computers to type up things because it is high tech. Jonathan
is still known for soccer.

**Biography Critique Checklist**
**The last stage – writing partners!**

Writing partners Quinn and Garrett
Looking at Garrett 's biography of Jonathan

**Check when you have completed:**

| To do | Complete |
|---|---|
| 1. Your writing partner should read your work out loud. This will help you find missing words, run on sentences etc. Edit these together. | ✓ |
| 2. Spell-check your work together. | ✓ |
| 3. Challenge - Is there anything else you would like help with before you turn this in to Ms. Chown? Eg, you might want to improve your vocabulary, the flow of the writing, your description etc. Now is your time to ask your writing partner. | ✓ |

**Explain any challenges that you tackled here:**

Dear Ms. Chown,
Garrett 's biography of Jonathan is now ready for the exhibition.
Signed,
Quinn and Garrett

# Permission to Wonder: Using Art to Deepen Learning

*Philip Yenawine*
*Visual Understanding in Education*

In 1987, roughly halfway through my 10-year tenure as education director at the Museum of Modern Art (MOMA) in New York, several trustees challenged my staff and me to find out if anyone learned from our many educational options. We were asked to be accountable for our teaching: were we effective? Did people learn what we taught?

Sound familiar? It's a question that has been central to school-based learning for the past two decades as well. Answering the question led to discouraging findings at MOMA, also true of the ubiquitous testing of students in too many public schools. Our response to the news was to recast our teaching, and more than a dozen years of field research in diverse schools has led to a curriculum with positive implications for others concerned with effective education.

At MOMA, we were asked to be a site for learning, albeit in less formal ways than in schools. Surveys revealed that many visitors wanted help understanding why modern artists do the often-confusing things they do. In response, we offered standard tools of visitor education: lectures,

gallery talks, interactive school group visits, teacher workshops, short courses, and an array of printed and audiovisual materials.

To all appearances, we did it well. Audiences were consistently responsive and enthusiastic. We could see their engagement. Evaluations were positive. Programs consistently filled. Visitor evaluations, however, didn't quite satisfy the MOMA trustees asked to help pick up the tab for our efforts. They prodded us to assess more deeply: "Do visitors leave knowing more than when they came in?"

Given that testing visitors wasn't really an option, we turned to Abigail Housen, a cognitive psychologist who studies how people think when they look at art, and asked her to help us see if people retained what we taught them. She went to work gathering data about our teaching programs in particular. To our surprise and great dismay, she found visitors didn't retain what we taught. When visitors attending gallery talks, for example, were asked moments later to retrace their steps and relate what they remembered from the talk they'd just attended, they didn't even recall all the images examined, much less provide an accurate recounting of what they'd been told. Our teaching seemed to engage audiences but not enable them.

**The Open Nature of Art**

One thing that was easy for us at MOMA was capturing people's attention. While that might be expected of adults—MOMA's grownup visitors came already interested (unless, of course, dragged by a date or mate)—it can't be said of the kids who were put on buses in schools and ended up in our galleries. Nonetheless, we had no problem getting or keeping their attention, not always the case in K-12 classrooms.

Why?

Here are several possible reasons. First, all sighted people have the ability and innate habit of looking at what's around them and thinking about what they see. Beginning as toddlers we examine everything–people, things, faces, bugs, the moon–and come to understand such things in our own ways. To reflect on this universal practice reminds us of the close interaction between the mind and the eyes; what we see inherently shapes what we think we know. Museum galleries are

full of images created specifically to attract our eyes and challenge our minds. It's hard not to be caught up in them. School-based learning focuses mostly on text, not capitalizing on innate human capacity.

Second, much of what we see in art is common to daily experience. Most art images depict people, places, things, expressions, interactions, moods, costumes, weather, spaces, light, colors: virtually all that we experience or imagine finds its way into art of various times and cultures. Importantly, however, works of art are also ambiguous in meaning, multilayered, intentionally open to interpretation, and often have symbolic and abstract elements; making sense of them offers great exercise for our minds. An important aspect of art is that feelings are embedded in it along with information, triggering a full range of responses from those who look at it thoughtfully. Few things engage so much of the brain's capacity simultaneously.

With these things in mind, Housen and our team at MOMA set out to see if we could capitalize on the easily captured attention of our visitors. We were looking to hone what we came to call viewing skills—observing, interpreting what one sees, probing and reflecting on first and second thoughts, considering alternative meanings, and so on—these skills used so effectively in "real life." Skills that are the basic processes of visual literacy, and also the building blocks of critical thinking. Over many years of research, Housen had been able to identify for different viewing stages what might be termed "their questions." For example, beginner viewers often try to create a narrative out of a picture. Their mode of processing can be phrased as "What's going on here?" When beginner viewers are asked this question, they easily respond because it has a deep correspondence to the way they are predisposed to think.

What didn't help our beginning viewers—a large majority of visitors—were approaches like lectures and labels. While they could make sense of images in their own ways, once the specter of specialized knowledge was revealed, they thought, "Oops. I guess I need to know something to have the right experience. Please help." But because the help we provided didn't match the needs or questions people actually had, it didn't stick.

**Visual Thinking Strategies**

In 1991, we began to test a protocol for viewing art with the help of elementary school teachers who were willing to work with us over an extended period of time. The method (and curriculum) we developed is called Visual Thinking Strategies or VTS, and it did what we wanted: learning stuck. It's been adopted by many schools, where it is used not simply to integrate art, but also to teach young people how to dig into all sorts of unfamiliar material—from historical artifacts to scientific phenomena to poetry.

In VTS, the teacher facilitates a student-centered discovery process focused on images carefully selected to address age and developmental readiness. The teacher is central to the process but not the authoritative source; instead, the students drive the discussions, aided by the teacher. As facilitator, a VTS teacher helps students to:

- Look carefully at works of art
- Talk about what they observe
- Back up their ideas with evidence
- Listen to and consider the views of others
- Discuss and hold as possible a variety of interpretations

Here is just a quick snapshot of a VTS image discussion as 4th graders consider a Depression era photo entitled "Cheevers Meadows and His Daughters" by Doris Ulmann. In this black and white photo, a grim faced man in overalls sits hands in lap, as a girl stands staring at him, while a younger girl buries her face into his sleeve. The discussion continued beyond the point where I cut it off here.

***Teacher:*** *All right, everyone, take a minute to look at this picture.*

***Teacher*** *(again, after a pause): What's going on in this picture?*

***Student 1****: I think a poor family and there's a little daughter, and a dad and maybe the mom left and they're just living in this little tiny place. And that's why—I don't know if that's a little girl or boy—is crying. [As the student speaks, the teacher points to all that is mentioned: the family, the dad, the child, the place.]*

***Teacher**: Okay, so you're looking at these figures and thinking they're a family. And that they're poor. Maybe the mother left them. What did you see that made you say they were poor?*

***Student 1:** Because they don't have, like, a very good house really. I think they're in that house. They don't have very good clothes either. Like their clothes are all wrecked up and ripped and the children's clothes are really dirty.*

***Teacher**: Okay, so you have several pieces of evidence that suggest they're poor to you. You're looking behind them, thinking they might live in a very plain house. And you're looking at their clothing and noticed that it's torn and soiled. All right, what more can we find?*

***Student 2**: Um, I think that they're a poor family and maybe their mom died and maybe like something happened, so they're . . . And I also agree with Julian, I think that they live in a little place and maybe like a horrible storm happened.*

***Teacher**: Okay, you have a few ideas. You are also wondering about the mother. What did you see that made you say that something happened to her?*

***Student 2**: 'Cause they're really upset and there's no mother in the picture.*

***Teacher:** Okay, so we're missing a mother figure and you see the others as upset about it. And what did you see that made you say they looked upset?*

***Student 2:** Because they're not, like, smiling and the little kid is, like, crying.*

***Teacher:** Okay, so you're looking at their facial expressions and sort of seeing that no one's smiling and this figure actually might even be crying. All right, what more can we find?*

***Student 3:** Well, I was thinking they are not poor, 'cause it doesn't matter what they look like. 'Cause they could have just finished, like, gardening and they are all just dirty from all the dirt. And the house, I*

*just think it is a regular house, like all of our houses because, it is just showing part of the house.*

***Teacher:*** *Okay, so you're offering another interpretation, saying that people could be wearing clothes like this—sort of ripped and dirty—if they've been out gardening. Maybe we don't know everything about their situation.*

***Student 3:*** *Just because their clothes aren't good, doesn't mean they are poor.*

***Teacher:*** *So wearing worn clothes doesn't necessarily mean you're poor. Maybe they've been out working. And you were saying that we don't have a lot of information about where they are. It's just a little piece of the background and you are saying it could be any house. Okay, so it's another way to look at that. What more can we find?*

**A Chance to Explore**

It's important to stress that in VTS the teacher facilitates the discussion but does not direct it, as you can tell. She contributes no information. She refrains from "correcting." Instead, she echoes what the students observe, paraphrases their interpretations, citing the evidence they found to back up their ideas. She allows divergent observations and opinions letting students sort out among themselves what they think is plausible. In so doing, she may feel as if she misses "teachable moments" that she might ordinarily have directed the conversation. Why doesn't she? Why not intervene? What if she had introduced a vocabulary word like photography or added some historical information? What would be wrong with that?

Here are three quick responses: first, think of this as the start of a process, not the finish. The best images for VTS play to students' interests, development, and ability to make sense of them, jumpstarting a process that builds over time. As such, an image is secondarily a historical document. Once kids are interested in it because of, say, the characters and the story, a teacher can always return to it as a way of illustrating life at a particular time. If and when it is reintroduced, given the interest nurtured by VTS, students are likely to appreciate

the way such images enliven and flesh out history that can otherwise seem abstract.

Second, while teachers are required to do a lot of direct instruction these days, this is a chance to let students explore a complex subject without direction. Instead of thinking about what's missing, it's more productive for teachers to be excited about students' enthusiasm for discovering and sharing; they do that well. Independent thinking, collaboration, listening, all sought as Common Core anchor standards: these are things very hard to "teach"; they have to be learned by authentic experience, and VTS has proved to be that.

And, third, we might assess this kind of experience in terms of what we learned at MOMA: we supplied information routinely, and it didn't stick.

In VTS, students are busy probing images for meaning, not medium or history. Why imply that they're missing something? Why dampen their willingness for and pleasure at talking about what interests them? Why limit thinking?

And what better way to teach it? The most important reason for a VTS teacher's restraint is that, for these lessons, his priority is to teach thinking. He takes advantage of the open-ended nature of art to prioritize students' thinking and sharing ideas instead of finding right answers. He doesn't relinquish an active role, prompting students, for example, to supply evidence to back up observations and ideas. He facilitates in such a way as to stress respectful, extended examination and dialogue—collaborative peer interaction.

For thinking to develop, it's essential to have both a strategy for teaching it as well as an opportunity for young people to exercise their brains. By remaining the neutral facilitator, we are actually teaching students how to learn. They internalize a strategy for constructing meaning from unfamiliar material, and they apply the thinking behaviors—supplying evidence, for example—in many lessons. Research by Housen's team, corroborated by others, has documented significant impact on observing, inferring meaning, arguing in evidence, considering multiple possible meanings, revising and elaborating on an earlier thought.

Directly related to this, discussions foster language at the same time as thinking. Oral language precedes writing; discussions are necessary for students to become fluent writers. Talking through ideas eases students into writing as they find words to articulate thoughts of increasing complexity.

In schools that implement VTS, one-hour, image-based discussions are conducted ten times a year beginning in kindergarten. Images used are sequenced so that students discuss more challenging images over time and are exposed to a diversity of media and images representing different styles and periods. Lesson plans, images, and a huge compendium of information about VTS are available to teachers on a website: http://www.vtshome.org along with Housen's research studies. The New York Times has also begun a blog as part of its online services to schools everywhere; a photograph from the news is posted once a week with an opportunity for students to post comments based on the VTS questions: http://learning.blogs.nytimes.com/category/lesson-plans/whats-going-on-in-this-picture/

**Applying VTS in Other Lessons**

We weren't long into our research testing the impact of VTS when some fifth graders turned VTS into a verb. A New York City teacher told us that her kids wanted "to VTS" the cover of a new chapter book they were about to start. She was willing and so asked them, "Well, what do you think is going on here?" Off they went. She felt that as a result of their discussion of the cover as well as a few illustrations, students read with more curiosity than usual and with a novel-but-welcome level of interest. They wanted to know if they had figured out the story from the pictures.

The teacher had a further reflection after the lesson: she thought that as a result of examining the images, students were able to visualize people, events, and locations in the story and that this had a positive impact on their comprehension of it. Consequently, she and the kids made "VTSing" all sorts of images a standard practice. We hear such anecdotes regularly to this day, and the teachers' impressions seem to resonate with what reading specialists say about comprehension: that understanding is aided by readers being able to visualize what they read.

Again during one of our early studies trying to find what thinking skills developed from VTS—this one in Byron, Minnesota—VTS project coordinator Catherine Egenberger noticed a second-grade classroom teacher asking her students to choose an image hanging on the wall and write about it as their visit to the Minneapolis Institute of Art was drawing to a close. Given their age and usual reluctance to write, the teacher thought it would be a quick exercise to fill a few minutes before meeting the bus to take them the two hours back to their small community in the farmlands of southeastern Minnesota.

To her amazement, she actually had to pull the students away from what she thought would be simply a time killer. They were late for their bus, and while that was a problem for the driver, the teacher was intrigued—as were we. We began to watch for feedback that art as a prompt was an effective way to get kids to write. The feedback came and was consistent, so writing about images, usually after discussions, is now firmly entrenched as practice in most VTS classrooms. Writing samples collected "pre-" and "post-VTS" attest to significant change in description, narrative claims, evidence, and consideration of multiple possibilities.

That wasn't the end of what we learned from teachers, and how they came to apply the strategy to many subjects, a practice we never expected. Because they see students looking deeply, describing with details, inferring with evidence, developing and debating various theses, teachers want to continue the practice to discuss literature, math problems, social studies and science.

A particularly inspiring example of this comes from Tracy McClure, a sixth grade teacher in Sonoma County CA. Tracy had incorporated poetry into her sixth-grade language arts lessons for years, convinced in part that if students were expected to become good writers, they needed many models to help them understand what that means. And they needed to experience writing in a way that helped them feel the power of words, the effects of considered expression, the breadth of available words, the rich potential in thoughtful use of language.

Once she saw VTS in operation with visual arts for a year, she thought, "Aha! Here's a way to make my approach consistent and to give the kids a more active role!" She initiated "a poem a day"

discussion applying the technique to poetry to see if kids arrived at the appreciation of language she sought, ideally one that might impact their writing. She rephrased the questions slightly to accommodate the fact that kids were examining writing instead of images. For the second question, she uses "What did you read that makes you think that?" Or even "What line?" or "What word made you think that?" to help home in on specifics. Over time, even the recalcitrant became as engaged as she hoped.

Tracy isn't sparing with her choice of poems as you will learn from reading the following comment, sent to me in a welcome e-mail, about what she feels as a teacher:

> Two days ago, we discussed one by Emily Dickinson, "As Imperceptibly as Grief," which has lots of antiquated language. One student wanted to know the meaning of perfidy, and no one in the group could answer, so immediately ten or fifteen kids whipped out dictionaries to look it up, and at least that many recorded the meaning on their copies of the poem. Then, as we continued to discuss the poem, I noticed seven or eight kids furtively thumbing through their dictionaries, apparently looking up other challenging words. When I noticed them trying to "sneak" research, I said that it would be fine for them to look up other words and bring the definitions to the group's attention.

Tracy's class scored 87% proficient in language arts in 2012; the school's overall student average was around 50%. Old Adobe principal Jeff Williamson, a constant and astutely critical observer of what happens in the classrooms of his school, has written to me that because of experiences like "poem a day," "Our students devour literature." It may not always show up on tests but it's palpable in classrooms.

Tracy's "poem a day" is the extension of a practice seen similarly in VTS teachers' classrooms in many subjects. Marion Bageant, a second grade teacher in Spokane WA, capitalizes on the familiar practice to help her students, many of them English language learners, with word problems, the emphasis of her assigned math curriculum. She's seen marked improvement in test performance, especially remarkable among those who were not learning given a more standard approach

to teaching the lessons. Brian Fizer's mostly immigrant third graders apply VTS to engage in rigorous discussions of primary documents that enliven history and align with Massachusetts' social studies standards. Craig Madison's third graders apply the method to their science explorations extended with a few other questions leading to group research projects that deeply engage the young scientists and involve literacies extending across disciplines in precisely the ways sought by Common Core standards.

Examples of this expanded practice abound, in part because the VTS questions and facilitation process enables authentic explorations of a range of unfamiliar material for students, puts into play group and individual behaviors familiar from art image discussions, engages more students in collective problem solving, and nurtures skills useful for life in general. Importantly, VTS is a tool that feels completely natural to teachers and aligns with values that led them to teaching in the first place.

To apply VTS in many lessons, teachers use the same steps and methods as in discussions of art. However, the questions are adapted slightly based on the type of subject under discussion; the following suggestions are not research-based as VTS questions are, but based on observations of teachers at work.

*Questions for text such as poems or short stories*

- What's going on in this poem/story/text? (Or more simply: What's going on here?)
- What did you read, or what words did you read, that make you say that?
- What more can you find?

*Questions for math*

- What's going on here, or with this problem? (Or: What does this problem ask us to do/find out?)
- What did you read/see that makes you think that?
- What more can you find?
- How might we solve this problem?
- What did you read/see that makes you think that?
- Are there other possibilities?

*Questions for other imagery (such as scientific or historical photos)*

- Begin with the standard VTS questions but follow-up questions are usually appropriate as well.
- What do you know about [fossils, for example, or shadows]?
- What can we learn from this [letter, chart, map, or diagram]?
- What more are you curious to know?
- How might we find the answer to that question?
- How might we find out if we're correct?
- What else might we want to find out?
- How might we do that?

Many such discussions engage students with a topic that is further explored by individual, pair, or group projects, often based on questions or subjects the students themselves identify. Such follow-up depends on the subject and the intent of the lesson; with poems open-ended discussion itself might be the point whereas science or history discussions simply establish starting places for further inquiry. Following up on what is discovered in discussions gives both teachers and students room to be inventive as well as directive in their inquiries.

**In Conclusion**

For over twenty years, Abigail Housen and I studied how looking and talking—facilitated by teachers—impacts cognition. Our intention was to produce people, of all sorts and ages, who could find meaning and pleasure in works of art on their own. But it soon became bigger than this. We found a way for teachers to nurture thinking and language skills that work even with kids who struggle. We used her data to painstakingly craft a teaching method for a particular purpose but we were surprised by the range of its impact. What I suspect Housen always knew was that the creation of meaning from works of art involved all of the aspects we describe as "knowing how to learn."

Particularly after the years of mandated curricula and teaching to a very limiting form of testing, we as teachers need to adopt additional strategies to teach our young ones how to use and widen their capacity to learn on their own. We have always wanted them to become

confident, engaged, curious, and enabled to find answers to their questions but that result has remained elusive as we prepped them for tests we'd hate to take ourselves. Common Core standards, despite the challenge presented by yet another battery of achievement tests, open the door for more expansive, better teaching that has been asked of us for a long time. Let's seize the day.

# What Does It Mean To Think Like A Teacher?

*Cindy Meyer Sabik,*
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*At any given moment, the disciplines represent the most well-honed efforts of human beings to approach questions and concerns of importance in a systematic and reliable way. (Howard Gardner, The Disciplined Mind, p. 144)*

*What they never tell you is that when you're eleven, you're also ten, and nine, and eight, and seven, and six, and five, and four and three, and two, and one. (Sandra Cisneros, "Eleven," from The House on Mango Street)*

As a small child, according to Howard Gardner, you form powerful theories about how the world works (1995, p. 2). When, as an infant, you come to terms with the fact that your mother leaves the room, and then you work your way toward a theory that allows for her continued existence and for her eventual return, you're going to rely on that theory. You will formulate it out of your lived experience, then test and re-test it. It will be activated and reinforced every time your mother leaves a room, then later returns. Not only are you going to remember this theory,

you're going to operate by it. Constructed over time, vetted through testing and re-testing, it is self-authored and put into practice. Of course it is powerful; it is authentic learning. This applies to all sorts of phenomena—why it gets dark at night, why flowers bloom in the spring, why you love to read and hate the dark. Your young mind is hard at work through those early years.

The fact that we already have deeply embedded theories about how the world works is, Gardner argues, one of several reasons that academic learning in schools tends toward the superficial. We don't just "believe" our theories. We invented them; we live by them. Formed out of experience and honed through repeated testing, they aren't on the table for critique. That's why, according to Gardner, "even students who have been well trained and who exhibit all the overt signs of success—faithful attendance at good schools, high grades and high test scores, accolades from their teachers—typically do not display an adequate understanding of the materials and concepts with which they have been working (p. 3).

Our intuitive theories can be interrupted, Gardner argues, when we think disciplinarily. We change, for example, not when we study grammar but when we think like writers; not when we read a textbook, or fill out a worksheet, or memorize a list of facts from history but when we think like historians. It begs a question though: What does it mean to think like a writer, or like a historian?

According to Gardner, "performances of disciplinary (or genuine) understanding…occur when students are able to take information and skills they have learned in school or other settings and apply them flexibly and appropriately in a new and at least somewhat unanticipated situation" (p. 9). This presents a delightfully rich challenge to classroom teachers. It reinforces the imperative toward invoking prior knowledge in any lesson and is congruent with contemporary practices around both project-based learning and deeper learning. Thus, when we ask a youngster to "think like a scientist" as she engages in an experiment on gravitational pull, we must first invoke her prior knowledge, her compelling, intuitive theory about how gravity works. We must ensure that it is present so that it can be interrupted.

Then we must provide the counterpoint to that—a lesson that invites, that compels her to "think like a scientist." This is nicely congruent

with the project-based model of curriculum development, the hallmarks of which are inquiry, student agency and connection to the world beyond school. While the power of this contemporary model is being explored, articulated and developed, it is quite counter-cultural to our ingrained model. One approach to maintaining a project-based learning (PBL) mindset is to continually ask how practitioners in the world are applying the concepts we introduce in schools.

A disciplinary mindset is invoked when the humanities teachers at my school run a writing workshop—because that's what writers do; when math students think like programmers, applying principles of mathematics as they create video games; when physics students think like engineers applying basic principles of physics as they build a car. When our school's learning specialist asked to see the car-builders' physics notes, they claimed they had not taken notes, but when she asked them to explain the physics, they were happy to explain and elaborate (and strikingly adept at it).

As we design engaging activities to enable students to go deep, to engage with course content in authentic and meaningful ways, and to think about the ways in which their understandings transfer to situations in the world beyond the classroom, we should ask how would a writer/historian/scientist approach this task? What does it mean to think like a writer? Like a scientist? Like a historian? Even more wonderfully challenging: What does it mean to ask a first grader or a third grader or a tenth grader to "think like an historian," or a scientist or a writer?

**Teaching is a Cultural Activity**

There is another, perhaps more profound, layer to the challenge facing teachers, and the teachers of teachers. In their 1999 book *The Teaching Gap,* Stigler and Hiebert reported on their work in the Third International Mathematics and Science Study, known as the TIMMS Study. Their comparative study of eighth grade mathematics classrooms in Germany, Japan and the USA revealed differences in classroom practice from the use of bell time, worksheets, and questions, to the ways in which students greeted teachers, interacted with each other, and approached the challenge of a new problem.

One of their conclusions is that teaching is a cultural activity—so much so that the most conservative teacher in the United States looks more like the most progressive teacher in the United States than like a teacher in either Germany or Japan. Anticipating that "there would be great variability in teaching methods within the United States" (p. 11), they reported instead "as we looked again and again at the tapes we collected, we were struck by the homogeneity of teaching methods within each culture, compared with the marked differences in methods across cultures" (p. x). While there are certainly marked differences in teaching styles and philosophies among and between American teachers, Stigler and Hiebert discovered that "these differences, which appear so large within our culture, are dwarfed by the gap in general methods of teaching that exist across cultures" (Stigler and Hiebert, p. x).

What does this mean, that teaching is a cultural activity? It means, according to Stigler and Hiebert, that "we learn to teach indirectly, through years of participation in classroom life, and we are largely unaware of some of the widespread attributes of teaching in our own culture" (p. 11). It means that the toddler in Gardner's model, who observes the world and forms powerful theories about where her parents go when they leave the room and why it gets dark at night, will continue to engage in that activity several years later, as she sits in a classroom, observing the behaviors of teachers and students, including herself. She will, again, form powerful models of what it means to inhabit this world—in this case, the world of "school."

Notions like homework, tests, and report cards are part of that model. Appropriate behavior; what is "academic" and what is not; what constitutes "important" or legitimate subject matter and what does not; how we define "mastery" and how that is demonstrated (even the very use of the term "mastery")—all of these are formed, as in Gardner's model, personally, through observation and analysis, through repetition and application. Notions about school and schooling are constructed in the deepest sense. They are not what we "believe." They are what we know and come to understand intuitively—"in our bones."

What does this mean for teacher education and school reform? It means that much like the superficial learning that too often occurs

in K-12 classrooms, teacher education programs and programs of professional development are relegated to the superficial. Stigler and Hiebert are quite direct about it: "the fact that teaching is a cultural activity explains why teaching has been so resistant to change" (p. 12). And in the same way that students' deeply-held, intuitive theories must be invoked so that they might be interrupted, so, too, must we extract our deeply held understandings of school and teaching, not only so that we might examine them critically, but so that we might reinvent them.

According to Stigler and Hiebert, "the cultural nature of teaching gives us new insights into what we need to do if we wish to improve it" (p. 12). Their recognition of the deep power of culture allows us recognize and frame the larger structures of what we are trying to address systemically, and provides a lens through which to reflect on many of the smaller cogs in the machinery—the tropes and mindsets that we act on from deep habit with roots in a system that took form long before any of us ever set foot in a department of education, or sat in a classroom desk. It allows us to find clarity in contemporary learning practices as we move away from the ingrained habits of disciplinary specialists doling out content, designing lesson plans in isolation and closing the door when class starts, to a collaborative model in which we work in teams to design contexts in which students discover and apply knowledge, skills, and understandings. This is where we begin to understand what it means to "think like a teacher."

**The Essential Question**

What *does* it mean to "think like a teacher?"

Is education a discipline? Or is it a "meta-discipline," the core concern of which is to worry about teaching the other disciplines? A complex array of questions unfolds: Indeed, what *does* it mean to think "disciplinarily?" What does it mean to think like a scientist? To what extent does that differ from what has been going on in science (or history, or English) classrooms for the past century?

Traditional transmission-mode classrooms are not centered on formulating and articulating questions. But professionals in the field—in any field—engage in research. And research is always in response

to questions. That is, in fact, what keeps work focused, what allows you to make sense of it. So how do you "think like a scientist?" Is it as simple as asking scientific questions and applying the scientific method of observation, hypothesis, and testing?

If Gardner is correct that the way to change a youngster's understanding of the world is to find ways to compel him to "think like a scientist," then it follows that the teacher's question is, "how do I get a nine-year-old (or a 12-year old, or a 15-year old) to think like a scientist?" If "thinking like a scientist" means posing research questions, then attempting to answer those questions though experimentation, does it not follow that "teaching" science means helping youngsters to pose, refine, and frame appropriate research questions, followed by the construction of appropriate means of exploration and experimentation? Simply put, professionals who are engaged in research begin by asking questions.

In this reflexive model, the question, "what does it mean to think like a teacher?" leads us immediately to consider what it means to ask students to think disciplinarily. "What does it mean to think like a scientist or a writer?" is accompanied by questions about cognition and brain research and how learning happens, about what is socially, emotionally, and developmentally appropriate. These are the research questions that teachers ask. The complexity of the question-within-a-question, along with concerns with methodology and child development, elements of teaching not rooted to a specific discipline, make teaching one of the most intellectually complex, challenging, and engaging of professions.

Jo Boaler (2008), in *What's Math Got to Do With It*, claims that "school math is widely hated, but the mathematics of life, work, and leisure is intriguing and much more enjoyable." There are, she says

> Two versions of math in the lives of many Americans: the strange and boring subject that they encountered in classrooms and an interesting set of ideas that is the math of the world, and is curiously different and surprisingly engaging. (p. 5)

Boaler uses the terms "mathematical thinking" to describe what she wants teachers to ask of youngsters. She says, "children need to solve complex problems, to ask many forms of questions, and to use, adapt, and apply standard methods as well as to make connections between

methods and to reason mathematically" (p. 12). She describes a process of teaching youngsters not only to ask questions, but of teaching them "the qualities of a good mathematics question" (p. 154). Students' good questions were posted around the room. Students were invited to extend problems by "posing their own questions."

Boaler and her graduate students encouraged "mathematical *reasoning*. Students learn to reason through being asked, for example, to justify their mathematical claims, explain why something makes sense, or defend their answers and methods to mathematical skeptics" (p. 154). Additionally, students articulate their understandings through "representations" that might include graphs, charts, diagrams, etc. They engage in many activities that involve the flexible use, interpretation and adaptation of mathematics and mathematical thinking.

The inquiry-based, authentic approach that Boaler is developing and advocating stands in opposition to classroom practices that she and Stigler and Hiebert bemoan: "The traditional K-12 mathematics curriculum with its focus on performing computational manipulations, [which] is unlikely to prepare students for the problem-solving demands of the high-tech workplace" (p. 8).

In humanities classrooms, the question "what does it mean to think like a writer" leads to authentic inquiry in writing workshops, as students ask questions of their peers: what works in this piece, and how can I make it stronger? In genuine, collaborative inquiry, they hone their writing skills. My colleague, Dana Huff, observes, "if we write professionally, we expect to have an editor. No one says we don't really know how to write on our own if someone edits our work. No one says we're cheating. Yet, with students, I have heard teachers argue that students need to write in isolation."

Once teachers begin thinking this way, project-based learning becomes second nature, and inquiry, student agency and application to the world beyond the classroom become deeply rooted in meaningful curriculum created by teams of teachers engaging in their own meangful work.

**Conclusion**

Culture is intractable. It runs deep, is largely subconscious. Jung referred to it as the "collective unconscious." Freud referred to

"archaic remnants." To claim that culture is resistant to change is a profound understatement.

This cultural moment, this paradigm shift we are experiencing in education, is a confluence of evolving factors, including constructivism, brain research, inquiry-based education, and the ubiquity of knowledge in the digital age. All of that is for naught if we cannot interrupt the cultural stranglehold of our habits and mindsets. The correlation of Gardner's theory with Stigler and Heibert's findings leads us to profound insight into the necessity of invoking prior knowledge and understandings as we continue to learn how to teach and learn in this new paradigm.

One of the principles of the Coalition of Essential Schools is that "The principal and teachers should perceive themselves as generalists first and specialists second" (Coalition of Essential Schools). As teachers, we are both students of how children learn, and passionate specialists in one or more disciplines. Those disciplines might be traditional or emerging, singular or cross- or trans-disciplinary, but they constitute the context from which we engage our students in the real work of the world beyond the walls of the school, to discover the pleasures to be found in looking at a problem through various lenses—the lens of the scientist, the venture capitalist, the journalist, the social scientist.

As generalists first, we are, as Sizer noted, engaged in the process of teaching kids to "use their minds well." This does not preclude being thoroughly versed in one or more subject areas, even in imagining—in partnership with our students—new and trans-disciplinary subject areas. We too, have an imperative to "use our minds well." As we fearlessly invoke our own prior knowledge and deeply held understandings in order to challenge and disrupt them, we ask ourselves fundamental questions—what is school, homework, rigor? Why do they matter? *Do* they matter?—we are reinventing schools and reinventing ourselves. We are thinking like teachers.

**References**

Boaler, J. (2008). *What's Math Got to do With it?: Helping children learn to love their most hated subject--and why it's important for America*. New York: Viking.

Cisneros, S. (1991). Eleven. *The House on Mango Street*. London: Bloomsbury Pub.

*Coalition of Essential Schools*. Retrieved April 20, 2014, from http://www.essentialschools.org/items/4

Freud, S., & Hall, G. S., trans. (1920). *A General Introduction to Psychoanalysis*. New York: Boni and Liveright. Retrieved April 21, 2014, from Bartleby.com, 2010. www.bartleby.com/283/.

Gardner, H. (1999, 2000). *The Disciplined Mind: Beyond facts and standardized tests, the k-12 education that every child deserves*. New York, NY: Penguin.

Gardner, H. (1995, 2004). *The Unschooled Mind: How children think and how schools should teach*. New York, NY: Basic Books.

Huff, D. (2014). C is for Collaboration. huffenglishcom. Retrieved April 20, 2014, from http://www.huffenglish.com/c-is-for-collaboration/

Jung, C. G. (1959). *The Archetypes and the Collective Unconscious*. New York: Pantheon Books.

Stigler, J. W., & Hiebert, J. (1999). *The Teaching Gap: Best ideas from the world's teachers for improving education in the classroom*. New York: Free Press.

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